Who benefits the most from a tertiary degree?: A cross-national comparison of selection and the economic returns to post-secondary education

Extended Abstract

Introduction

Given a limited amount of resources and the prospect of an extended recession, it is critical to understand what is gained from the often substantial investments in post-secondary education by both individuals and the state. In this paper, we ask two questions: 1) What are the returns to a university education? and 2) How do these returns differ across country contexts? Drawing on panel data and matching techniques, we explore the covariation between the propensity to complete a university education and its economic returns. We utilize a cross-national approach, comparing parallel analyses of three country cases: the United States, the United Kingdom, and Germany. The educational characteristics of institutions in these three countries vary widely and this variation should lead to different returns to a university degree. By taking this approach, we can begin to discover in what educational contexts those most likely to benefit from a university degree actually attain one.

Background

Estimating the income returns to education poses several challenges. A large methodological literature examines the possible endogeneity of education decisions (Manski and Wise 1983; Card 1999; 2001; Brand and Xie 2010). If workers who complete post-secondary schooling systematically differ from those who do not in unobserved ways that influence income, then the estimated returns to post-secondary schooling will be biased. Although researchers agree that bias exists, it remains unclear whether selection upwardly or downwardly biases estimates. On the one hand, according to a utility maximization model, those most likely to benefit financially from a post-secondary education should be more likely to complete post-secondary schooling, leading to positive selection and upwardly biased estimates of the returns to college (Carneiro, Hansen, and Heckman 2003; Heckman, Urzua, and Vytlacil 2006; Willis and Rosen 1979). On the other hand, sociologists argue that many non-economic factors, such as class and gender norms, informational inequities, or social network composition, influence post-secondary attendance and completion decisions. As a result, college attendance may be disconnected from ability, particularly among the most advantaged individuals, and those most likely to complete college may not be those who would gain the most in terms of economic returns (Brand and Xie 2010). Additionally, the returns to a college education are heterogeneous. Even in the absence of omitted variables, a simple regression predicting wages or earnings would not correctly estimate returns to education because some groups of people experience greater returns than others (Black et al 2008; Tuor and Backes-Gellner 2008; Heckman et al 2008).

Recent research from the US shows *negative* selection into college: individuals who are *least* likely to attend college receive the greatest earnings returns to a college education (Brand and Xie 2010). Brand and Xie (2010) utilize propensity score matching to simultaneously account for multiple sources of heterogeneity in the income returns to post-secondary education. They show, in the US case, that the propensity to complete college and income returns are negatively associated.
This paper suggests that the US should continue its efforts to expand access to higher education, particularly for the least advantaged individuals. However, the United States is a particularly unique context. The monetary costs of college are high while the non-monetary barriers to college attendance are relatively low. With an underdeveloped vocational education system, there are few non-academic post-secondary education options. Primary and secondary schools are not formally tracked and the informal tracking tends to group students based on race and socioeconomic status rather than aptitude, ability, and desire. And finally, college attendance has become a norm, particularly among the middle class. Together, these features of the American schooling system may

strongly encourage the negative selection observed by Brand and Xie. However, it is impossible, without a comparative study, to determine whether it is these unique institutional characteristics that contribute to the pattern of negative selection (Buchmann 2011).

In this paper, we replicate the Brand and Xie analysis in two additional country contexts: the United Kingdom and Germany. These countries represent very different governmental and educational contexts compared to the US. Below we describe the educational systems of each country and key characteristics of the countries that may lead to differences in the returns college graduates receive across countries.

Germany

The German educational system is characterized by early rigid tracking and a highly developed vocational education track. Between the age of 10 and 12 (depending on the state) teachers, parents, and students together decide which educational track to enter: Gymnasium, Realschule, or Hauptschule. These tracks are housed in separate schools and prepare students for different post-secondary activities. Gymnasium is the highest level, preparing students for the Abitur exam—a requirement for entrance into university. Realschule is a less academic alternative to attending gymnasium. Students typically go on to a higher vocational school for post-secondary education. Finally, Hauptschule is the lowest educational track in Germany. Hauptschule typically leads to continuing part-time vocational education and/or an apprenticeship. In 2006, approximately 40% of German secondary students were enrolled in an academic program, while the other 60% were enrolled in vocational programs. Transition to tertiary education is highly selective – in the same year, only 35% of German secondary students transitioned into tertiary education, compared to 57% in the UK and 64% in the US (OECD 2010). Most universities in Germany charge nominal fees and are state run. Additional cost of living assistance is available to all tertiary level students. The number of years it takes to attain a bachelor's degree depends on the subject studied; however, the average time to degree is higher in Germany than in the US or the United Kingdom.

United Kingdom (excluding Scotland)

Education is compulsory for all children between ages 5 to 16 (except N. Ireland 4-16). Compulsory education is free with the important exception of independent or public schools, which account for 6% of students and have much higher than average college completion rates and eventual earnings. At 16, the age that compulsory education is complete, students may choose to continue with their academic education and complete A-Level exams, enter a further education institution to pursue vocational training, or leave school completely. At the secondary level, vocational and academic programs are often housed in the same institutions. Almost 60% of upper secondary students continue with the academic program. Vocational training is less developed than in Germany, with only 31% of UK youth enrolled in vocational upper secondary education, in comparison to 58% of Germans. Tuition fees for University were not introduced in the UK until 1998. Acceptance rates for University has hovered around 75% since the mid-1990s, however, only about half of pupils in 2009 obtained the certifications necessary to pursue A-level examinations. A bachelor's degree typically takes 3 years to complete. A tertiary vocational program typically takes 1-2 years. Just under 40% of 25-29 year-olds in the UK completed tertiary school in 2008.

Hypotheses

We expect that institutional differences in the three countries considered here will influence the direction and strength of selection into college attendance and completion.

In countries with developed vocational schooling programs and where vocational education leads clearly into a job, we expect that selection into college completion will be positive rather than negative. With more extensive post-secondary training options, the relative costs of pursuing academic, rather than vocational, post-secondary education will be higher and more transparent than in a country where vocational education is undeveloped and less connected with work

opportunities. Additionally, a larger vocational education program should diminish stigma associated with pursuing vocational rather than academic post-secondary education, even among the more advantaged populations. Together, these factors should lead to more positive selection among the college educated.

By contrast, rigid tracking from an early age has been documented to lead to greater performance inequality (Hanushek and W ößmann 2006) , which should lead to negative selection. Because track placement is often highly correlated with socioeconomic background, and track placement in rigidly tracked countries determines an individual's eligibility for university attendance, the privileged will benefit from such systems, regardless of skill, ability, and aptitude, leading to negative selection.

Finally, government subsidization of post-secondary education may influence selection in either direction – it may increase positive selection in attendance and completion by allowing those who stand to benefit most to attend, regardless of financial constraints; on the other hand, it is also possible that if the costs of post-secondary education are unilaterally reduced, those who have less to gain may still pursue post-secondary training, negatively influencing selection.

Data and Methods

The data needs for this analysis are quite stringent; to properly measure the returns associated with post-secondary education, we require earnings information from a panel throughout the life course. To maximize comparability across countries, we restrict our analysis to men only, and rely on several data sources with substantial overlap in design and time period. For the USA, we use data from the National Longitudinal Survey of Youth 1979 (NLSY), a cohort study of young people aged 14-22 years when they were first surveyed in 1979. In the United Kingdom, we use the National Child Development Study (NCDS), a longitudinal study that surveys all children born in one week in March of 1958 in England, Scotland and Wales. Respondents from the NCDS are 21 in 1979, providing some overlap with the NLSY cohort. Their wages are observed in 1991 when respondents are 33 years old. For Germany, we rely on the German Socio-Economic Panel study (GSOEP) 1984, a household panel study beginning in 1984, with sufficient observations of young adults (N=928) for comparison with the two cohort studies

We recreate the set of variables used in Brand and Xie (2010) with small modifications as necessitated by differences in survey instruments. Test scores and academic achievement are available in each country, allowing us to control for differences in cognitive ability, a common explanation for differences in both earnings and college attendance and completion. Each dataset also contains rich data on family background, health, and attitudes. Table 1 provides a summary of measures across the three surveys.

We begin with an analysis of the returns to a college education in each country separately. We consider two outcomes: employment status and earnings given employment. Using a standard regression analysis we predict each outcome using the predictors in table 1. We ignore the bias introduced by unmeasured characteristics and by heterogeneous effects across populations.

Next, to allow for heterogeneous effects across populations, we use the propensity score matching method employed by Brand and Xie (2010). We believe that the returns experienced by college graduates should vary depending on their propensities to attend college, how these returns vary will depend on the educational and occupational contexts in the countries respondents live and are educated in. We therefore match respondents who completed college with respondents who did not complete college but have the same propensities to complete college within each country. Our focus is twofold; first, how do the earnings of respondents who completed college (the treatment) compare to the earnings returns of those who did not complete college (the control), and second, do the differences between treated and untreated differ as the propensity to attend college increases. We use a two-step analysis. The level 1 analysis estimates treatment effect using OLS. The second level examines heterogeneous effects by propensity score strata using a hierarchical linear model.

Although we cannot employ any direct statistical measure of the causes of variation in the returns to post-secondary education across countries, we theoretically discuss how differences may be related to institutional environments.

First Results from the UK

The first column of table 2 shows the results of a standard regression analysis showing the relationship between college completion and wages for men age 33, assuming that the effects are homogenous across the population. This analysis suggests that a college degree has positive effects on wages. Completing a college degree increases a man's wages 17%. However, this simple analysis ignores the possibility that the effect of a college degree may differ across populations. The second column of table 2 allows for heterogeneous effects of a college degree. Consistent with the results of Brand and Xie (shown in Table 2 under NLSY heading), we observe a pattern of negative selection in the UK. At age 33, those with the lowest propensity to attend university receive the greatest benefit from a university education. Individuals with propensities between 0 and .1 would increase their earnings 28% if they attended college. By contrast, individuals who are almost certain to attend college, with propensities between .8 and 1, would increase their earnings by only 4% if they attended college. Although a college degree is always beneficial, this analysis shows that it is significantly more beneficial for those least likely to attend. Figure 1 provides an illustration of this result.

This initial finding, while preliminary, provides first evidence of the generalizability of Brand and Xie's negative selection hypothesis. Although secondary schools are generally comprehensive in the UK as in the United States, *within school* mechanisms such as honors classes and O-level achievement (the precursor to A-levels for the NCDS cohort) sort youth into tracks that determine their chances of University eligibility. Despite the fact that University attendance was completely free, and University acceptance rates very high for the 1958 birth cohort we observe in the NCDS, inequalities at earlier transitions in the academic pipeline still resulted in higher rates of college completion among those who would stand to gain the least. Further analysis with this data (including women and income observed at older ages) will reveal the robustness of this finding for the UK. Moreover, comparisons with the German SOEP will enable us to examine our second hypothesis by measuring the returns to a college degree in a country with various post-secondary vocational options.

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Table 1 Variable Description, Means, and Standard Deviations, NCDS and GSOEP

Variable	Description	NCDS		GSOEP	
		Mean	S.D.	Mean	S.D.
Income	Logged gross hourly wages	2.31	0.54	2.52	0.48
College Degree Attained		0.22	0.42	0.14	0.35
Race/Ethnicity	1: white 0: not white; 1: not born in Germany 0: born in Germany	0.01	0.11	0.13	0.33
Parents' income	Total monthly family income when 16; Mother's and father's hourly wages	189.75	60.92	21.98	13.86
Mother's education	Years of education; CASMIN level	10.04	1.49	3.56	2.10
Father's education	Years of education; CASMIN level	10.17	2.01	3.97	2.23
Intact family	Intact family at 11; [not included]	0.91	0.29		
Number of siblings	Number of siblings; at least 1 sibling	2.00	1.48	0.87	0.34
Rural residence		0.49	0.50	0.39	0.49
Resides in East Germany	GSOEP only			0.18	0.39
Academic achievement	math and reading achievement on standardized tests at age 16; retrospective reports of grades from German, math, and foreign language	0.34	0.19	2.66	0.76
Cognitive Ability	General Ability verbal test; verbal cognitive test	28.24	5.39	14.19	5.32
	General Ability non-verbal test; numerical cognitive test	15.85	6.89	10.71	3.86
College Track	respondent took A-levels; respondent attended Gymnasium	0.19	0.39	0.25	0.43
Teachers' encouragement	teacher thinks child has outstanding ability at age 11; [not included]	0.27	0.45		
Parents' encouragement	mother reads to child at 7; retrospective report parents encouraged academic achievement	0.55	0.50	2.05	0.77
Friends' college plans	Respondent cites peers as reason to leave school; [not included]	0.08	0.26		

Table 2 Effects of College Completion on Log Hourly Wages under the Assumption of Homogeneity

	NCDS		NLSY	
	Log Wages 1991, Age 33		Log Wages 1994, Age 29-32	
	OLS	HTE	OLS	HTE
NCDS				
Completed College	0.173***		.180***	
	(0.047)		(.047)	
Propensity to Complete College				
0-.1		.275*		.351**
		(.121)		(.123)
.1-.2		.257*		.164
		(.104)		(.121)
.2-.4		.212		.099
		(.124)		(.107)
.4-.6		.149		.212*
		(.114)		(.104)
.6-.8		.125		.082
		(.090)		(.082)
.8-1		.041		
		(.203)		
Slope		-.043		-.046
		(.030)		(.038)

Note: Standard errors are reported in parentheses. Unemployed workers are omitted. Both analyses control for background characteristics, academic achievement, cognitive ability, and expectations.

Figure 1 Hierarchical Linear Model of the Economic Returns to College, NCDS Men 1991