Does a College Degree Lead to Equal Income Achievement Outcomes for First-Generation College Graduates a Decade Later?

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I.   Introduction

Does a college degree lead to a meritocracy among students from unequal social backgrounds? While many researchers have examined the equalizing power of a college degree, we are not certain if students of different generational statuses (either first-generation or continuing generation according to parents' highest attained level of education) receive equal payoff from a degree. It is important to account for students' differing generational statuses because generational status can affect one's college experience even after accounting for factors such as parental income and occupation (Wilbur and Roscigno 2016). Additionally, the broader question of the equalizing power of a college degree has not reached a consensus among researchers. Certain studies suggest that a meritocracy indeed exists among students from unequal social origins after graduating from college (Pfefer and Hertel 2015; Torche 2011). Conversely, other more recent research has found that social stratification continues even after students have graduated (Gregg et al. 2017; Laurison and Friedman 2016; Witteveen and Attewell 2017).

The question becomes even more complex when college degrees are recognized as heterogenous. College experiences vary greatly and college students' experiences are informed by their individual achievement, their major, and the selectivity of their higher education institution (Roksa et al. 2007). For this reason, the generational wage gap, or the difference between continuing-generation and first-generation college graduates' wages, may not be consistent across achievement levels, majors, and institutions.

It is also difficult to isolate whether the generational wage gap is due to differences in higher education experiences or to the labor market. An earnings gap could result from first- and continuing-generation students earning degrees at different universities, with

different levels of achievement, and in different majors, but it may also be due to first- and continuing-generation students receiving unequal earnings despite possessing the same credentials and grades (Manzoni and Streib 2019).

In this paper, I hope to use data from the Baccalaureate and Beyond Longitudinal Study (B&B) – a nationally representative survey of college graduates sponsored by the National Center for Education Statistics (NCES) – following a cohort of graduates ten years after receiving their degrees to examine whether a college degree is associated with equal earnings for first- and continuing-generation students. I am also interested in determining which levels of achievement, institutions, and majors are correlated with equal earnings among first- and continuing-generation students. To contribute to and expand upon previous literature, I plan on drawing from the 2007/2008 B&B data released in 2018. In previous studies, the 1993/2003 B&B data was the most recent that followed respondents 10 years after graduating.

II.   Literature Review

First-generation students enter higher education on an unequal playing field. They are more likely to drop out of college, less likely to ask for help from professors, less likely to have parents who help them navigate the collegiate setting, face greater financial challenges, and have barer résumés than continuing-generation students (Pascarella et al. 2004b; Wilbur and Roscigno 2016; Yee 2016). Despite starting and experiencing college unequally, some research suggests that a college degree acts as an equalizer for first-generation students. Some studies have shown that a college degree equalizes earnings for graduates whose parents have unequal earnings, family incomes, and occupational statuses. For example, Torche (2011) analyzes multiple indicators of social origin to show that college graduates earn similar amounts regardless of their

upbringing. Chetty et al. (2017) study administrative data of over 30 million Americans who attended college and find that students from different economic backgrounds who attend the same university later earn the same average salary. Even so, other studies claim that wage gaps by parental income, parental occupation, and socio-economic status remain after graduation and impact students from disadvantaged social origins (Giani 2016; Laurison and Friedman 2016; Witteveen and Attewell 2017). Studies by Armstrong and Hamilton (2013), Rivera (2015), and Rivera and Tilcsik (2016) all found that, compared to students from higher social origins, students from lower social origins have worse labor market outcomes.

The handful of studies that have looked at generational status' effect on wage gaps examine an abbreviated time horizon before wages tend to stabilize, usually focusing on 1 to 4 years post-graduation. Again, conclusions were mixed with some studies finding wage equality (Choy 2001) and others finding wage gaps (Thomas and Zhang 2005; Zhang 2005). Furthermore, many existing studies that seek to answer whether college graduates receive equal earnings regardless of their social origin contain limitations that affect their generalizability. In the past, studies have only considered students at elite universities (Bowen et al. 2005) or students who graduated during a recession (Giani 2016). Therefore, their conclusions cannot be generalized to the greater population of American college graduates.

There is also the question of how the increasing stratification of American colleges and universities affects earnings for first- and continuing-generation students post-graduation. Research has shown that disadvantaged students, compared to advantaged students, benefit more from attending college in general and particularly benefit from attending high-selectivity colleges (Brand and Xie 2010), but they fail to

examine how student earnings' compare when those students have graduated from the same type of four-year university. Others have looked at the relationship between institutional selectivity and the equalizing power of a college degree, but they do not consider generational status (Giani 2016; Witteveen and Attewell 2017) or include only relatively elite universities in their analysis (Dale and Krueger 2014).

Additionally, college majors are more consequential for future earnings than institutional selectivity (Kim et al. 2015). Generally, business, engineering, health, science, and technology majors out-earn education, fine arts, and humanities majors (Carnevale et al. 2015). Few studies have examined if first- and continuing-generation students are proportionately represented in high-earning majors even though student distribution across majors will shape the wage gap. Bowen et al. (2005) find that first-generation students are overrepresented in the social sciences, business, and humanities and underrepresented in the natural sciences, but their sample is limited to highly selective universities. It is also not clear if majors lead to the same returns for first- and continuing-generation students. Wolniak et al. (2008) find that that math, engineering, and computer science majors benefit most from having advantaged parents and that parents' education and income relate to their children's post-college income across a wide range of majors. However, they do not address intra-major wage gaps by generational status and their results aren't generalizable as their sample includes solely alumni of Appalachian universities.

College graduate academic achievements levels are also heterogenous. GPA is positively correlated with earnings (Gerber and Cheung 2008) and previous research has shown that first-generation students have lower GPAs on average than continuing-generation students (Bowen et al. 2005; Walpole 2003). Still, it is unclear if first- and

continuing-generation students with the same college GPA receive the same returns
after graduation.

Labor market experiences also differ amongst college graduates. A graduate's
occupation, economic sector, work hours, and work location each relate to their
earnings (Mouw and Kalleberg 2010; Yankow 2006). Inequality is likely to result if first-
and continuing-generation graduates unevenly sort into these labor market experiences
or receive unequal returns from them (Manzoni and Streib 2019). Thus, labor market
factors are integral to the question of whether college graduates from different
generational statuses receive equal pay.

III.   Data

This analysis uses data from the National Center for Education Statistics (NCES)
2008/18 Baccalaureate and Beyond Longitudinal Study (B&B:08/18) to explore the
earnings outcomes of bachelor's degree recipients 10 years after they have completed
their degrees. The B&B:08/18 is the third follow-up in a nationally representative
longitudinal study of students who completed the requirements for a bachelor's degree
during the 2007–08 academic year. For the purposes of this paper, earnings data
measured in respondents' 2018 annualized total salaries will be used.

My analysis is based on college students who were either first-generation status or
continuing-generation status upon their graduation in 2008. Within the group of
student respondents, I define first-generation as those whose highest education attained
by either parent falls under "did not complete high school;" "high school diploma or
equivalent;" "Vocational/technical training;" "some college but no degree;" "associate's
degree;" or "do not know parents educational level." Continuing-generation students are

those whose highest education attained by either parent is "bachelor's degree"; "master's degree or equivalent"; "professional degree"; or "doctoral degree".

The tables referenced throughout the rest of this data discussion can be found at the end of the paper. Table 2 shows both the mean and median 2018 annualized salary by full-time and part-time status and college generational status. The median is included to account for bias in mean earnings levels. Table 3 displays respondents' mean and median 2018 annualized salary by college generational status and occupational industry. Table 4 shows the mean and median 2018 annualized salary by GPA and college generational status. Finally, Table 5 exhibits respondents' mean and median 2018 annualized salary by college generational status and institutional type. On average, the tables exhibit a trend of first-generation college graduates earning less than continuing-generation college graduates, no matter how the data are organized.

IV.   Methods

I use the NCES DATALAB PowerStats program to execute a multivariate linear regression model on Baccalaureate and Beyond Longitudinal Study (B&B:08/18) data to analyze the effect of students' generational status (either first-generation or continuing-generation) on their earnings, measured approximately 10 years after graduation in terms of graduates' current or most recent annual salary.

The multivariate linear regression model contains the following components:

Outcome variable: Earnings, in terms of graduates' 2018 annualized total salary for all current jobs

Explanatory variable: Students' generational status, either first-generation or continuing generation according to parents' highest attained level of education (first-generation = 1, 0 otherwise)

Controls:
- undergraduate GPA, measured from 0.0-4.0
- employment status, categorized as either full-time or part-time (part-time = 1, 0 if otherwise)

The results of the multivariate linear regression model analysis on Baccalaureate and Beyond Longitudinal Study (B&B:08/18) data are displayed below:

Table 1:	**Linear Regression analysis for annualized total salary for all current jobs, as of B&B:08/18 interview based on Highest education attained by either parent, Grade point average and Current job, as of B&B:08/18 interview: Full-time/part-time status.**				
	b	**Standard error**	**p-value**	**Lower 95% CI**	**Upper 95% CI**
Intercept	$51,232	4777.13	0.000	$41,868	$60,594
Highest Education Attained by Either Parent (reference group: continuing-generation students)					
First-generation students	-$10,777	1495.908	0.000	-$13,709	-$7,845
Undergraduate Grade Point Average					
GPA	$110	14.098	0.000	$82	$138
Current job status, as of B&B 08/18 interview (reference group: worked full time)					
Worked part time	-$35142	1584.984	0.000	-$38,249	-$32,035
df: 14,696	**R²: 0.074**				

V. Results

I seek to answer whether a college degree is associated with equal earnings for first- and continuing-generation students. Observing the results presented in Figure 1, it is estimated that first-generation college graduates earn $10,776.54 less than their

continuing-generation colleagues ten years after obtaining their bachelor's degree. Additionally, a one-unit increase in undergraduate GPA is correlated with an annual income increase of $109.94. All three of the regression coefficients are significant at the 95% level, as exhibited by their small p-values. The R^2 value of the model is 0.074, which indicates that 7.4% of the variation in 2018 annualized total salaries is explained by the regression model.

VI. Conclusion/Discussion

Given that the regression model found that first-generation graduates make less than their continuing-generation peers 10 years after obtaining their bachelor's degree, this analysis helps confirm the myth of the equalizing power of a college degree for first-generation college students. On the other hand, we do not know how large the gap would have been had they not gone to college. While my analysis ultimately corroborates the findings of Thomas and Zhang 2005; Gregg et al. 2017; Laurison and Friedman 2016; and Witteveen and Attewell 2017, this examination was not nearly as robust as I had hoped it would be due to the limitations of the NCES PowerStats program. B&B:08/18 raw data were un-available for download and analysis. The restricted access nature of NCES B&B data limited this paper's analysis to the functions available on the NCES PowerStats DATALAB, which did not include the ability to add interaction terms or fixed effects.

For the same reason, I was also unable to include undergraduate institution type, undergraduate major, or job category as controls in my regression model and resorted to summary statistics to examine the correlation between those variables and earnings measured approximately 10 years after graduation in terms of graduates' current or most recent annual salary. Additionally, I suspect that the inability to include certain

control variables within my model contributed to the low R^2 value of 0.074. I would strongly encourage further analysis by individuals with the financial and academic clearance to access B&B:08/18 raw data and for the readers of this document to refrain from inferring causality from the estimates provided in this report.

a. Tables

Table 2:	CURRENT JOB HOURS AND SALARY: Among 2007–08 bachelor's degree recipients who were working for pay in 2018, annualized salary in current job, by college generational status				
	Annualized salary in current job				
Generational Status	**Working full time**		**Working part time**		
	Average	**Median**	**Average**	**Median**	
First-Generation	75,894	65,500	42,389	31,500	
Continuing-Generation	87,406	72,000	51,183	36,400	
Total	**82,372**	**69,950**	**47,242**	**35,000**	

Table 3:	CURRENT JOB HOURS AND SALARY: Among 2007–08 bachelor's degree recipients who were working for pay in 2018, annualized salary in current job, by college generational status and occupation in 2018				
	Annualized salary in current job				
Occupation of Current Job	**First-Generation**		**Continuing-Generation**		
	Average	**Median**	**Average**	**Median**	
Artists and designers	60,939	52,000	59,010	51,000	
Business managers	86,091	76,000	104,606	90,000	
Business occupations (non-management)	79,537	72,240	88,889	76,000	
Business/legal support (non-secretarial)	47,624	43,680	51,079	44,000	
Communications professionals	65,081	55,000	64,405	55,000	

Computer/Information systems occupations	88,463	85,000	100,955	91,000
Construction/mining occupations	45,302	52,000	68,743	60,000
Engineering technicians	77,093	67,000	85,209	84,500
Engineers	96,699	93,600	95,535	94,000
Fitters, tradesmen, and mechanics	73,068	69,000	62,112	46,800
Food service occupations	43,181	36,400	42,207	36,400
Healthcare professionals (non-nurses)	97,905	75,000	113,495	85,800
Information professionals	55,022	58,000	46,083	45,282
Legal professionals	132,478	111,000	132,046	100,000
Life scientists	57,233	49,130	66,468	62,000
Nurses	76,834	70,928	80,099	74,000
Other educators	52,164	44,500	56,233	52,780
Other healthcare occupations	56,723	50,336	69,629	60,000
Personal care occupations	47,244	31,200	51,147	32,240
Physical scientists	88,961	72,580	88,762	78,000
PK-12 educators	52,234	48,500	51,895	51,000
Postsecondary educators	69,766	59,079	73,549	63,000
Protective service occupations	81,962	72,000	68,048	65,000
Sales occupations	73,078	60,000	94,002	75,000
Secretaries and administrative assistants	48,566	45,760	40,870	44,000
Social scientists	63,504	63,500	81,160	79,000
Social service professionals	55,141	51,000	56,814	52,935
Transport support occupations	51,522	43,200	58,682	52,000
Total	**70,792**	**61,381**	**82,094**	**68,000**

Table 4:	CURRENT JOB HOURS AND SALARY: Among 2007–08 bachelor's degree recipients who were working for pay in 2018, annualized salary in current job, by college generational status and GPA				
	Annualized salary in current job				
Undergraduate Grade Point Average	First-Generation		Continuing-Generation		
	Average	Median	Average	Median	
2.00-2.49	61,683	57,500	67,113	55,000	
2.50-2.99	64,479	59,999	78,499	65,000	
3.00-3.49	71,376	60,450	80,699	68,500	
3.50 or higher	76,027	65,000	87,840	72,000	
Total	**70,792**	**61,381**	**82,094**	**68,000**	

Table 5:	CURRENT JOB HOURS AND SALARY: Among 2007–08 bachelor's degree recipients who were working for pay in 2018, annualized salary in current job, by college generational status and undergraduate institution type				
	Annualized salary in current job				
Undergraduate Institution Type	First-Generation		Continuing-Generation		
	Average	Median	Average	Median	
Public	71,578	60,000	81,874	69,000	
Private	71,672	64,000	88,654	73,341	
Total[+]	**70,792**	**61,381**	**82,094**	**68,000**	

[+] Includes others who attended more than one institution

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