BEYOND THE BACCALAUREATE: AN ANALYSIS OF THE LABOR MARKET OUTCOMES OF FIRST-GENERATION COLLEGE GRADUATES

by

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(Under the Direction of Robert K. Toutkoushian)

ABSTRACT

As the cost of living continues to increase over time, many Americans are placing greater scrutiny on the financial choices they make. An area for such evaluation is if the outcomes of going to college continue to be worth the cost. One underrepresented group, first-generation college students (FGCS), is less likely than non-FGCS to attend and graduate from college. However, for FGCS who successfully complete college, it is important to consider whether the outcomes of going to college were worth the investment. A useful starting place is determining if earnings after college are equal among FGCS and non-FGCS. Utilizing data from the *2008/2018 Baccalaureate & Beyond Longitudinal Study* (B&B:08/18), this dissertation compares the income of FGCS and non-FGCS one year, four years, and ten years after the completion of a baccalaureate degree using a series of linear regression and hurdle models. Findings indicate that despite the initial disparity when comparing means, much of the difference in income is explained by variables such as gender and occupation rather than first-generation status alone.

INDEX WORDS: first-generation, parental education, college completion, labor market outcomes

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CHAPTER 1

INTRODUCTION

Going to college is a rite of passage for many people. The numerous benefits of going to college, from higher earnings to increased job security and even greater life satisfaction, are well documented (Baum, Ma & Payea, 2010; Kim, Tamborini & Sakamoto, 2015; McMahon, 2009; Torche, 2011). Going to college is also a crucial step toward achieving the American Dream of upward social mobility. However, as the aftershocks of the COVID-19 pandemic continue, much of what higher education represents and is able to offer has been called into question. Some colleges are closing or being forced to merge as student enrollment declines, certain programs are being eliminated after being reviewed and found to not be beneficial to students, and there have been calls to overhaul student loan forgiveness in the wake of rising inflation. In response, today's college-age students are evaluating whether the costs associated with going to college outweigh the rewards (Saul, 2022).

Federal initiatives such as the College Scorecard (Delisle, 2022) and the Gainful Employment Rule under Title IV of the Higher Education Act (Serna, 2014) call for public transparency regarding the post-collegiate outcomes of students. The College Scorecard is an initiative introduced under the Obama administration in 2013. Operationalized by the US Department of Education, the College Scorecard is an interactive tool that shares admissions information in addition to annual cost, graduation rates, and median earnings of college graduates from particular institutions. The Gainful Employment Rule, also released during the

Obama administration, and updated in later administrations, requires colleges and universities to demonstrate that graduates can afford their debt repayments and earn more than graduates in their state who did not go to college. Because of these initiatives, colleges are not only required to make data on the post-collegiate outcomes of students publicly available, but they risk losing federal funding if graduates of their programs do not meet certain thresholds for post-collegiate earnings and debt repayment. Additionally, as many institutions seek to diversify their student populations, the recent US Supreme Court ruling to ban race-conscious college admissions decisions has college administrators grappling with how to ensure that their student populations represent the communities they serve (Carnevale, Mabel & Campbell, 2023).

Although "going to college" itself is glamorized by society, the true goal for many students is to earn a credential that will lead to gainful employment. Survey data from the Cooperative Institutional Research Program's Freshman Survey shows that although there are many reasons students go to college, two reasons that have increased in popularity over the years include receiving a better job and increasing earning potential (Egan, Stolzenberg, Bates, Aragon, Suchards & Rios-Aguilar, 2013). Similarly, Tsai, Brown, and Tian (2022) found that high school students listed the importance of getting a job and increasing skills that will be needed for a job as their top reasons for planning to attend college. In fact, one of the first questions many people ask one another upon meeting is: "What do you do for a living?" The inherent reason this question is asked is to sort people into categories of perceived value (Stiglitz, 1975). A person's answer signals his or her socioeconomic status. Thus, those in professions perceived to be more lucrative or of higher social status receive different responses than those in less lucrative or less respectable professions. Currently, two out of three jobs in the United States require a postsecondary credential (Carnavale & Rose, 2015), which compels many people to

attend college. However, although millions of people participate in the workforce every year, each person's type of employment and subsequent earnings can be vastly different. Sometimes there are reasons for differences in income, such as whether or not the person attended college, type of institution, discipline, whether someone has a graduate degree or additional certifications, and cost of living adjustments in different geographic locations. Other times factors such as gender, race or ethnicity perpetuate income disparities despite work to overcome them (Staklis & Skomsvold, 2014).

Horace Mann famously described education as society's "great equalizer" (Masyada 2023), yet the outcomes of students who have gone to college are not all the same. Higher education administrators strive to help colleges and universities be representative of the general public, but some groups of people continue to attend and graduate college at lower rates than others. Because college credentials are required for most jobs, those who do not attend or complete college often experience lower returns in the job market, which can have a negative impact on not only that person's life but also affect future generations (Torche, 2011).

One group that has faced challenges with going to and completing college is first-generation college students (FGCS). Although there are varying definitions, for the purposes of this study, FGCS is defined as students whose parents did not attend college. Several research studies have been conducted to understand why FGCS face disadvantages, and it is important to determine why FGCS face disadvantages when compared to non-FGCS. It could be because they lack information about college, sometimes referred to as "college knowledge" (Fry, 2021). Another explanation is that their families do not value college because they do not have experience attending college. A third possibility is that they lack the resources and preparedness to be successful. Ultimately, FGCS likely face disadvantages due to a combination of these

reasons. Researchers have found that FGCS often have less economic, social, and cultural capital compared to their non-FGCS peers (D'Amico & Dika, 2013; Nguyen & Nguyen, 2018; Terenzini, Springer, Yaeger, Pascarella, & Nora, 1996). As a result, policymakers have focused their attention on finding ways to get FGCS to go to college to equalize the outcomes between first-generation and non-first-generation students. Most of the early literature on FGCS focuses on college attendance and persistence rather than those who completed college. More recent research focuses on FGCS successfully attending and completing college (Manzoni & Streib, 2019; Toutkoushian, May-Trifiletti, & Clayton, 2019).

Due to the evidence that FGCS are at a disadvantage to non-FGCS in terms of going to college, it is important to determine if FGCS who complete college are still at a disadvantage relative to non-FGCS specifically in terms of labor market outcomes after college. Once FGCS enroll in college, college should ideally eliminate any disparities for these students if the only disadvantage FGCS face is that they and their families do not know how to navigate getting into college. However, studies show that FGCS who have begun college still graduate at lower rates than non-FGCS (Engle & Tinto, 2008; Ishitani, 2003), indicating that starting college does not put FGCS at less of a disadvantage for *completing* college. Comparing groups that have both successfully entered and graduated college, this study focuses on FGCS and non-FGCS who have graduated from college in order to determine if FGCS are still at a disadvantage in the labor market after completing college.

Despite decades of research on the demographic characteristics and college-going patterns of first-generation students, we still know little empirically about how first-generation status relates to career and salary outcomes for this group. There have been studies on both FGCS and studies on the labor market outcomes of students pursuing baccalaureate degrees, but

little research has combined the two topics. For this dissertation, I investigated the labor market and postbaccalaureate outcomes of FGCS who successfully graduated from college in order to determine if they were still at a disadvantage in the labor market compared to non-FGCS. FGCS in general are a large group, but focusing on FGCS graduates is important because by completing college, FGCS graduates have demonstrated that they have qualities that separate them from FGCS who did not attend or complete college.

Statement of Purpose

This study seeks to fill the gap in the literature pertaining to the labor market outcomes of FGCS graduates. Using restricted data from the *2008/2018 Baccalaureate and Beyond Longitudinal Studies (B&B 08:18)*, I compared the postbaccalaureate experiences and earnings of FGCS and non-FGCS one year, four years, and ten years after graduating from college by using three linear regression models and three hurdle models to compare income holding constant other factors.

To date, there has not been a study that examined the labor market outcomes of FGCS at the specific time periods of one year, four years, and ten years after graduating from college. Most of the work on the "outcomes" of FGCS stops one year or four years after students complete college, well before many professionals have reached their long-term career objectives.

This study examines the career outcomes of FGCS who graduated in 2008 and participated in follow-up interviews in 2009, 2012, and 2018. This study also compares the income of FGCS and non-FGCS holding constant other factors in order to investigate whether first-generation status is significant when regressing income on other explanatory variables. A final step used to compare the income of FGCS and non-FGCS is using regression models that separate cases where survey respondents did not report any income. Coined a "hurdle model"

because it differentiates respondents who were able to get over the "hurdle" of getting a job, I repeated the earlier regression models at each of the three follow-up periods with only students who reported income rather than all students. This helped me explore the relationship between FGCS and non-FGCS graduates with reported income in addition to determining the likelihood that certain groups would be employed.

Research Questions

In this dissertation, I examine the career choices and labor market outcomes of first-generation college students who graduated from college. Specifically, I examined the following research questions:

1. Controlling for the effects of other factors, are FGCS earning significantly more or less than non-FGCS one year, four years, and ten years after the completion of a baccalaureate degree?
2. Separating cases where graduates are not generating any income, are FGCS earning significantly more or less than non-FGCS one year, four years, and ten years after the completion of a baccalaureate degree?

Significance of the Study

A study about the labor market outcomes of FGCS graduates is crucial to the field of higher education. It is possible that FGCS graduates have similar outcomes to non-FGCS who have graduated from college, but this topic needs to be studied empirically. Although the struggles FGCS have had with attending and completing college are well known, less is written

about FGCS graduates, and even less is written about the labor market outcomes of FGCS who graduate from college.

With rising inflation and competition in the job market, it is crucial to focus on not only the job placement rates of students in general, but also to focus on the placement rates for underrepresented groups in particular. The average college student who takes out student loans borrows nearly $29,000 to fund their undergraduate education (Haywood, 2023). Because first-generation college students are more likely to come from low-income families, they are more likely to have to borrow money for their education and thus incur more debt. If their income after college does not measure up to the incomes of their non-FGCS peers, this double burden of earning less money and having more debt would imply that college is not equalizing the outcomes of FGCS.

How much college graduates earn matters because it determines whether or not they are able to afford to buy a home, own a car, and potentially even expand their families. Determining how much graduates earn at different points over time is important as well. It is possible that FGCS and non-FGCS have similar earnings initially, for example, but have significantly different earnings later in life. Likewise, it is possible that these groups have significantly different earnings initially, but they equalize over time or that there is not a difference in earnings in any particular time period. Because very little literature on the labor market outcomes of FGCS exists, examining the outcomes of these groups across different points in time after degree completion will add to what is known about this group and ultimately add to the body of literature on this topic.

In the following pages, I explore the stated research questions. I begin by examining key literature related to college outcomes and FGCS. This review of the literature begins with a

discussion on how to define FGCS, provides an overview of the benefits of going to college for all students, summarizes and highlights early research on FGCS, and concludes with a section on the previous studies on the labor market outcomes of FGCS.

Next, I describe three theoretical perspectives that are important for consideration of the college pathways and resulting labor market outcomes of first-generation college students. These theories include the Human Capital Theory (Becker, 1962; 1975; Mincer, 1958; Shultz, 1961), the Social Capital Theory (Bourdieu, 1977; 1986; Lin, 1999; Pasco, 2003), and the Social Cognitive Career Theory (Lent, Brown, & Hackett, 1994; Raque-Bogdan & Lucas, 2016). Together, these theories help explain the experiences and earnings of FGCS who graduated from college as well as the potential differences in earnings between FGCS and non-FGCS.

I then describe the methodological design of the study, including a series of regression analyses designed to explore FGCS labor market outcomes using *B&B 08:18*, a National Center for Education Statistics survey that examines students' education and work experiences following bachelor's degree attainment. Being able to compare FGCS to non-FGCS in the descriptive statistics, I spend time reviewing the variables overall and then separated by FGCS status.

Finally, I present the findings and summarize the study. I begin with the results of the linear regression and hurdle models. Because the findings from the linear regression and hurdle models are very different from the pattern observed from the descriptive statistics of the study, I discuss the importance of using regression to explore this research topic rather than relying on differences in means alone. Because of the unique findings from the models, I conduct additional analysis on the results of female and Asian survey responses. I also discuss interaction effects and re-run the models by FGCS status in order to understand how the interaction of FGCS and

other variables alters the earlier results. These findings are then discussed in the broader context of higher education policy surrounding FGCS and national conversations about student loan forgiveness. I conclude by identifying the limitations of this study and providing recommendations for future research.

CHAPTER 2

In the following section I share a literature review of what is known about the labor market outcomes of first-generation college graduates. This begins with a discussion on how to define FGCS, summarizes what is known about FGCS, reviews the benefits of all students who go to college, and concludes with what is known specifically about FGCS who complete college and enter the workforce. Afterward, I describe three theories used to guide this study. These include Human Capital Theory, Social Capital Theory, and Social Cognitive Career Theory.

LITERATURE REVIEW

Defining FGCS

When studying and categorizing FGCS, researchers often grapple with how to define this group. Some define FGCS as the first in their family to *attend* college (Billson & Terry, 1982; Choy, 2001; Inkelas, Daver, Vogt, & Leonard, 2007; Nuñez & Cuccaro-Alamin, 1998; Terenzini et al., 1996; Tsai, Brown & Tian, 2022). Others claim that FGCS are the first to *graduate* from college (Hoover, 2023; Inkelas, Daver, Vogt, & Leonard, 2007; Ishitani, 2003, 2006; Padgett, Johnson, & Pascarella, 2012; Prospero & Vohra-Gupta, 2007; Wells, Seifert, Padgett, Park, & Umbach, 2011). Toutkoushian, Stollberg, and Slaton (2018) explored eight alternative definitions of first-generation college students in order to determine if the way in which first-generation status was defined impacted the outcomes in a series of regression models. Similarly, Toutkoushian, May-Trifiletti, and Clayton (2019) examined whether college graduation varies by

how first-generation status is defined. There is currently not a standard definition of first-generation status used across higher education research.

The term “first-generation” can be used to denote someone being the first generation in their family to be born in the United States. In this case, researchers would have to decide if the student is still considered a first-generation college student if his or her parents attended college in another country. It is possible that the student’s experiences navigating college for the first time would be similar to other FGCS even if that student’s parents attended college in another country.

Another consideration is what is meant by “parent”. Do step-parents or guardians count? Also, many students live with their grandparents. If a grandparent attended college but the student’s parents did not, would that make them FGCS? What if the grandparent did not attend college but the student’s parents did, and the student did not live with his or her parents? Parents also might have differing levels of education. If one parent attained a college degree and the other parent did not, is the student first-generation? Understanding how parent is defined is crucial in researching first-generation students because parental education determines first-generation status.

What is meant by college is yet another consideration for how to define first-generation status. Many studies on FGCS use a four-year college degree as the marker for “college education”, but would a two-year degree count? How about attendance at a technical or vocational college? Once again, parents may have differing levels of degree attainment. A student with parents who completed baccalaureate degrees from four-year colleges may have different outcomes than a student with parents who attended vocational or technical school.

In alignment with the 1998 Higher Education Act, the Common App (Hoover, 2023) uses a definition of first-generation status that focuses on a student's parental education and specifically bachelor's degree attainment, which is consistent with a definition in which parents have *attended* but not *graduated* from college. This definition mirrors what is used on the Free Application for Federal Student Aid (FAFSA) form and subsequently used in ranking survey metrics, such as the U.S. News Best Colleges survey and other federal programs such as the federal TRIO program. The Common App brief (Hoover, 2023) also mentions that it is common for students to not know their parents' education attainment, which can complicate survey data and coding for first-generation status.

Because there is not a standard definition of first-generation in higher education research, it is important for researchers to understand very specifically how first-generation status is constructed in various studies. Surveys collect different information on parents, which then affects how one measures FGCS. Changing how one measures FGCS can ultimately change the results of a given study.

For the purposes of this dissertation, I used the strictest definition of first-generation status: parents have no postsecondary education beyond high school. Because the purpose of this dissertation was to empirically test whether or not college equalizes the outcomes of students, it was not important to replicate the various definitions shown in Toutkoushian et al. (2018), but rather test if the children of parents with no postsecondary experience have similar labor market outcomes to those with parents with postsecondary experience. Students with parents who have had exposure to college but did not graduate would theoretically have more social capital than students with parents who did not go to college. Leveraging that social capital could give non-FGCS an advantage in the labor market.

In the table below, I showed average earnings and related metrics by the varying definitions of FGCS status. When deciding which definition of FGCS status to use in this study, I began with a review of the data by examining FGCS as defined as parents with no college or postsecondary education in addition to the option to use FGCS as defined by parents who attended college but did not graduate.

The table shows that students whose parents had no college experience earned the most among the three groups in 2009 but less than non-FGCS in 2018. Students of parents with no college experience and non-FGCS were the least likely to be employed in 2012, with only 76% of students employed at that time frame. Non-FGCS were the most likely to be employed part-time in 2009, at 17%. By 2018, students of parents with no college experience were the most likely to be employed part-time, at 11%. Students of parents with some college experience incurred slightly more cumulative debt than students of parents with no college experience. Because the earnings, debt, and employment characteristics of FGCS vary across metrics, it was not clear that I should use one particular definition instead of another.

Table 1: Average Earnings by First-Generation Status

	Parents with No College		**Parents with Some College**		**Non-FGCS**	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
Income						
2009	27,506	19,881	25,958	19,148	24,229	19,638
2012	35,590	28,899	35,156	27,222	35,448	29,572
2018	63,367	46,308	62,878	44,761	71,013	53,352
Employed (yes/no)						
2009	0.83	0.37	0.83	0.37	0.79	0.40
2012	0.76	0.43	0.78	0.41	0.76	0.43
2018	0.87	0.34	0.88	0.32	0.88	0.33
Employed Part-Time						
2009	0.13	0.34	0.15	0.36	0.17	0.37
2012	0.09	0.29	0.09	0.29	0.11	0.31

	Parents with No College		Parents with Some College		Non-FGCS	
	Mean	Std Dev	Mean	Std Dev	Mean	Std Dev
2018	0.11	0.31	0.10	0.30	0.10	0.30
Cumulative Debt	45,549	56,180	45,710	55,374	39,086	60,004

For simplicity in this dissertation, I constructed two distinct groups of FGCS and non-FGCS rather than using the three options above. Survey respondents with parents with no college became FGCS, and survey respondents in the "parents with some college" and "non-FGCS" categories above were grouped into the non-FGCS category for the duration of the study.

After reviewing several important considerations for defining FGCS and explaining how FGCS is defined in this dissertation, I will now briefly review the previous literature on the characteristics of FGCS.

What is Known about FGCS

Pre-collegiate characteristics

Some of the most noticeable differences between FGCS and their non-first-generation peers are with regard to the pre-collegiate characteristics of each group. FGCS are more likely than non-FGCS to be female, older than the traditional 18-22 year old age range, and more likely than non-FGCS to have children (Nuñez & Cuccaro-Alamin, 1998). Terenzini et al. (1996) found that FGCS are more likely than non-FGCS to come from low-income families, to have lower SAT and ACT scores than non-FGCS, and more likely to be underrepresented ethnic/minority students. FGCS are more likely than non-FGCS to attend high schools with less rigorous curricula and to have lower reading, math, and critical thinking skills compared to non-first-

generation students (Choy, 2001). Carlton (2015) also notes that FGCS were less likely than their non-FGCS peers to expect to obtain a bachelor's degree or advanced degree. Overall, FGCS tend to be less academically prepared than their non-FGCS peers (D'Amico & Dika, 2013; Nguyen & Nguyen, 2018).

Enrollment

Regarding enrollment in postsecondary institutions, FGCS are more likely than non-FGCS to work during college, more likely to enroll part-time, and less likely to enroll in college directly after high school (Terenzini et al.,1996). FGCS also enroll in and earn fewer credit hours than their non-first-generation peers (Pascarella et al., 2004). FGCS are more likely to enroll in two-year institutions than four-year intuitions (Hahs-Vaughn, 2004; Ward, Siegel, & Davenport, 2012) and more likely to enroll in public institutions than private institutions (Ward et al., 2012). Nuñez & Cuccaro-Alamin (1998) explain that the choice to attend college is both an opportunity and a risk for FGCS. FGCS try to navigate the tension of completing a degree that could lead to higher earnings with the guilt of leaving their previous environment. FGCS often find it difficult to balance academic rigor with other tasks such as working or continuing to raise a family.

Persistence/Attrition

With regard to persistence in college, the literature clearly indicates that FGCS are more likely to stop-out or dropout than their non-first-generation peers. Billson & Terry (1982) explain that attrition is highly correlated with family income and that FGCS often come from families with lower incomes than non-first-generation students. Apart from paying for college, social and academic integration during the first year of college are barriers for FGCS. FGCS are more than twice as likely as non-first-generation students to drop out of a four-year institution before their second year and more likely than non-first-generation peers to work off campus (Choy, 2001).

Lohfink & Paulsen (2005) reemphasized that FGCS are more likely to be female, racial/ethnic minorities and low-income. They found that when one of these traits intersects with being FGCS, the student is more likely to drop out. They also found that FGCS are less likely than non-FGCS to live on campus. Tinto (1993) emphasized that students are more likely to persist when they successfully depart from their home context and become academically and socially integrated into the college setting. FGCS who participate in work-study programs are also more likely to be retained (Ishitani, 2003). This could be due to the student being able to avoid student loans by working while in school and being more socially integrated with peers and the college context by working on campus.

Graduation

FGCS generally complete college at lower rates than non-FGCS. The type of institution a FGCS attends greatly impacts completion rates, as students in two-year colleges have lower completion rates than students in four-year colleges and FGCS are more likely to attend two-year institutions than four-year institutions (Hahs-Vaughn, 2004; Ward, Siegel, & Davenport, 2012). Ishitani (2003; 2006) found that FGCS females are more likely than males to graduate in four years. Females who stop-out around the third year of college, however, are more likely to drop out than males, and FGCS students who attend private colleges have higher graduation rates, as private colleges tend to have higher completion rates than public colleges (Ishitani, 2006). This is disconcerting, however, because FGCS are often low-income students and may not be able to afford to attend private institutions or may have to incur student loans, which has been shown to make FGCS more likely to drop out of college (Ishitani, 2003). Despite these challenges, FGCS students who graduate have grades comparable to non-first-generation students (Terenzini et al., 1996).

Because much of the descriptive narrative around FGCS comes from literature published several decades ago, it is important to discuss whether the profile and general characteristics of FGCS described in these earlier publications is still accurate. Tsai et al. (2022) find similarities in the individual characteristics, family characteristics, and precollegiate experiences of FGCS as those from earlier studies. Hussar and Bailey (2014) emphasized the changing racial and ethnic demographics of the United States, explaining that White and Asian students were predicted to have small increases in enrollment in the coming decade, while Black and Hispanic students, groups who are disproportionately more likely to come from low-income backgrounds, were predicted to increase their enrollment by more than 25%. Likewise, Carnevale et al. (2023) explain that although Hispanic/Latino students make up 14% of the incoming class at selective colleges, they make up 24% of the high school graduates nationwide. Students from lower socio-economic backgrounds and racial minorities, many of whom are FGCS, are underrepresented at selective colleges and universities.

Benefits of Going to College

As stated earlier, it has been well documented that despite the rising cost of college in general, college attendance continues to be worth the investment for the vast majority of students. Regardless of the benefits that students generally receive, different subgroups may receive more benefits than others. I will begin this section with a review of the benefits of going to college and conclude with what is known about how different subgroups experience the benefits of college differently.

Lifetime earnings

When conducting a study on the labor market outcomes of students, my primary focus was on earnings, as the primary benefit of labor market participation is increased earnings. Baum, Ma, and Payea (2013) explain that individuals with higher levels of education typically earn more across their lifetime and are more likely to be employed than individuals with lower levels of education. Those earning bachelor's degrees and working full time were shown to earn more than $20,000 more than high school graduates in 2011. Those who entered college at 18 and graduated in four years were also able to earn enough by age 36 to compensate for being out of the labor force for four years and for borrowing to pay for tuition and fees.

Job Satisfaction

Individuals who go to and complete college tend to report greater job satisfaction than those with lower levels of education (Baum et al., 2013). This is likely because earning a college credential leads to more specialized career paths and potentially greater autonomy. Earnings in jobs that require a college credential are also typically higher than in jobs that do not require a degree, which may impact job satisfaction.

Social Mobility

Greater social mobility is another benefit of attending college. Although students enter colleges and universities with different economic backgrounds, many hope that college completion will lead to social class advancement. Chetty et al. (2017) found that students from different socioeconomic backgrounds experienced the same average salary after attending the same university.

Health Benefits

Individuals who go to college also tend to experience greater health benefits than those who do not go college. Those who attend college are less likely to smoke, more likely to exercise, less likely to be obese, and more likely to have health insurance and receive regular check-ups by a doctor (Baum et al., 2013).

Societal Benefits

Baum, Ma, and Payea (2013) also explain that mothers with higher levels of education tend to spend more time with their children than those with lower levels of education. Individuals with higher levels of education are also more politically active and more likely to volunteer in their communities than those with lower levels of education. Finally, those with higher levels of education are more likely to vote than those with lower levels of education.

Differences in Subgroups

Gender

In her recent book on the gender pay gap, Claudia Goldin (2021) explains that the incomes of college-educated men and women are very similar in the early years after college, and large differences are not apparent until nearly ten years after college graduation. Despite women being more likely to have a bachelor's degree (45% of 25-year-old women compared to 36% of 25-year-old men) and earning professional degrees at higher rates than ever, the wages of females are still lower than those of men. "Occupational segregation" may account for some but not all of the differences.

Race

Race is another factor often cited in income disparities. Many studies cite wage gaps between underrepresented groups when compared to non-underrepresented White counterparts (Boland, Gasman, Samayoa & Bennett, 2021; Staklis & Skomsvold, 2014; Thomas & Zhang, 2005). Due to the exclusionary origins of higher education, women and underrepresented groups were not able to attend college for significantly longer periods of time than White individuals. Because of this, there are lasting impacts on the college-going patterns, labor market participation, and earnings of different racial groups.

College Major

Manzoni and Streib (2019) point out that colleges are internally stratified by major. Students completing an arts degree, for example, likely have differing career trajectories than those completing science or engineering degrees. Carnevale et al. (2015) note that science, technology, engineering, health, and business majors typically out-earn fine arts, humanities, and education majors. Thus, the major a student chooses can impact earnings later in life.

Occupation

Similarly to college major, stratification among occupations can lead to vastly different earnings. Apart from the occupations themselves, workers can choose to work part-time as opposed to full-time, work non-traditional shifts that offer shift differentials, and work in different geographic locations that may provide differences in pay. Manzoni and Streib (2019) found that distribution into industries, jobs, and work locations impacted wage gaps more than academic or educational factors.

What is Known about the Labor Market Outcomes of FGCS who Graduate

There are currently only a few publications on the postbaccalaureate outcomes of FGCS. The work of Nuñez and Cuccaro-Alamin (1998) is a helpful starting place for examining first-generation status and salary after college. Their study uses the 1989-90 Beginning Postsecondary Student Longitudinal Study (BPS) to analyze characteristics of first-generation students. The authors compared the means of FGCS and non-FGCS rather than using regression analysis and found that five years after beginning their postsecondary education, first-generation students were employed in similar positions and earned salaries comparable to their non-first-generation peers. Limitations to the study include being published over two decades ago using data from students who entered college over three decades ago. The findings may still be valid, but it would be beneficial to conduct a study with more recent data to determine if the findings are the same. Also, Nuñez and Cuccaro-Alamin (1998) used information obtained from students five years after beginning college, when only 36% of the students had graduated. They supplement their work with data from the 1994 Baccalaureate & Beyond Longitudinal Study (B&B), but this is only one year after the students in that study graduated, meaning that the salaries the students were earning at that time were reflective of starting salaries in the jobs that they were able to find within a year of graduation and not necessarily an indication of what the average college graduate earns once he or she finds stable employment.

An NCES Stats in Brief (Cataldi, Bennett & Chen, 2018) also claims that FGCS and non-FGCS have similar employment rates and earnings. The researchers found that FGCS attend graduate school at lower rates than non-FGCS. However, this study also compared means rather than using regression techniques to analyze labor market outcomes of FGCS. It is important to

control for other effects rather than just comparing means. Even if FGCS as a whole have similar outcomes, there may be differences in some fields, college majors, etc.

Ford (2018) conducted a study on the labor market outcomes of FGCS and concluded that FGCS have similar labor market outcomes to non-FGCS but lower numeracy skills. Numeracy skills, such as being able to interpret and communicate mathematical information can be important in advanced degree programs, but they also have applications in daily tasks such as managing personal finances. This study leads readers to question whether there are other skill gaps between FGCS and non-FGCS who have graduated from college.

Torche (2011) used several national datasets to analyze intergenerational mobility across levels of schooling and found a U-shaped pattern of parental influence. Her study does not specifically state interest in "first-generation" students, but it includes parental education in the models. The author notes that educational and labor market factors influence college selectivity, fields of study, and earnings.

Thomas and Zhang (2005) report that college quality, college major, sex and race/ethnicity are important contributing factors to wage growth in the early career. State of residence will have an impact on earnings due to cost of living. Thomas and Zhang (2005) also found that earnings after college were substantially, but not uniformly, larger when examined four years after graduation as compared to one year.

In the study most closely related to this dissertation, Manzoni & Streib (2019) find a generational wage gap between first-generation and continuing-generation students' wages 10 years after college completion. Using a Blinder-Oaxaca Decomposition model, the authors break down the factors that influence the wage gap and find that income and find that geographic location, work industries, and jobs impact the wage gaps more than educational institutions,

majors, and achievement levels. For females, however, the wage gap fades when controlling for race and motherhood. For males, the wage gap fades when controlling for labor market characteristics rather than individual characteristics such as race.

Similarly, Adamecz-Völgyi, Henderson, and Shure (2023) used a decomposition model to examine how first-in-family (FiF) graduates fare in the labor market in England. They found that FiF women earned an average of 7.4% less than non-FiF females but that FiF males did not experience a wage penalty compared to non-FiF males. The authors found that two-thirds of the wage difference for females was explained by lower educational attainment, attending less elite institutions, degree field, working in smaller firms, working in jobs that do not require degrees, and motherhood.

In conclusion, the first step to any study on first-generation college students is to clearly define first-generation status. Although there has been a shift from defining FGCS as the first to attend college and instead the first to graduate from college, there is not a standard definition used in higher education research. Previous studies have indicated that going to college is often a worthwhile investment in one's future. However, as the cost of college rises, it is important to ensure that college continues to be beneficial to various underrepresented groups, such as FGCS. Although there are not many studies on the labor market outcomes of FGCS, those that have been conducted tend to indicate that even if there are differences in the labor market outcomes of FGCS compared to non-FGCS, FGCS status alone is not the reason for the differences.

THEORETICAL FRAMEWORK

The key dependent variable in this study is earnings. Thus, I selected theories that relate to how the career paths and labor market outcomes of FGCS influence earnings. These theories

in particular explain how investment in oneself, expanding one's social network, and mimicking the behaviors of others to accomplish a goal can ultimately lead to higher earnings. Billson & Terry (1982) explain that family income is highly correlated with occupation, which is determined in large part by education. Bourdieu (1977), Becker (1975), Mincer (1958), Shultz (1961), and other theorists would argue that success in college and a person's ultimate economic success are impacted by social and even cultural factors. Acquiring a lucrative job often requires the completion of a college degree, which can be impacted by a range of academic and social integration milestones while in college.

Below, I describe each of the three theories and then explain how they relate to the earnings of FGCS.

Human Capital Theory

Human Capital (Becker, 1962; 1975; Mincer, 1958; Shultz, 1961) is investment in oneself through the development of skills, training, or education. Early work towards the development of the Human Capital Theory came from Adam Smith, an economist and philosopher whose work *The Wealth of the Nations* (1776) connected labor and skills with earnings. The concept of investment in human capital leading to greater worker productivity was compared to the increase of productivity that comes from adding machines to a factory. Later work by Mincer (1958) argued that formal and informal training such as years of schooling and work experience can be used to explain differences in income. Schultz (1961) describes forgone earnings as a necessary consideration when assessing the costs and benefits of increasing human capital. Choosing to attend college often means that students and their families will forgo earnings for at least four years while a student attends college. However, because FGCS often

come from low-income families, choosing to forgo earnings may be more taxing on FGCS families than non-FGCS families. Students who choose to attend college may decide to work while in school, but that could be overly burdensome on the students and compromise performance both at work and in school. Finally, Becker (1962, 1975) explained that deciding to invest in human capital involves risk and uncertainty because the outcome of investment in human capital is not known at the time of investment.

The application of Human Capital Theory to education was popularized by Gary Becker in 1975. Earlier work by Shultz (1961) and Becker (1962) helped communities understand that investment in education could lead to economic growth in the region. Students sometimes choose to attend college because it is a long-term investment in their lives. Earning a college degree has the potential to lead to a higher paying job, which could lead to greater wealth over the course of a lifetime. As Paulsen and Toutkoushian (2008) explain, many economics frameworks, including Human Capital Theory, analyze how *incentives* affect the *behavior* of decision makers. For first-generation students who pursue higher education to earn greater economic capital over the course of their lives, Human Capital Theory is a helpful frame for understanding both the motivation for attending college as well as thinking about how going to college can enhance the labor market outcomes of FGCS.

Social Capital Theory

Social Capital Theory (Bourdieu, 1977; 1986; Lin, 1999; Pasco, 2003) introduces the idea that having social networks outside of the family leads to greater nonfinancial social advantages. Social capital can also be described as membership in a group (Bourdieu, 1977), as participation in a group often affords greater social advantages than nonparticipation. Bourdieu argued that the point of all human activity is to gain greater social advantages (Pasco, 2003).

First-generation students may choose to attend college in order to socialize with people in higher social classes than their own and to form social networks that will be useful to them and their families later in life. Likewise, those with the best labor market outcomes likely have strong social networks (Groot, Van Den Brink & Van Praag, 2007).

Social Capital Theory is an important framework for studies on FGCS because students who have parents who did not go to college experience many college processes differently than their non-first-generation peers. Having parents who have experiences such as filling out a college application, completing a FAFSA, and attending office hours can be very useful to students who do not have experience doing those things. Non-FGCS who have parents with large and diverse social networks may gain more social advantages in college than students whose parents did not go to college. For example, a non-FGCS may have family friends who can give advice on a particular major in college or provide summer jobs or internships. FGCS often come from families that do not have social networks that are as robust and have to navigate socialization in college on their own and later navigate the workforce on their own.

When discussing social capital as it relates to FGCS, researchers can sometimes view the social capital of FGCS from a deficit perspective or focus on the kinds of social capital that FGCS do not have. However, researchers such as Nelson (2020) and Morales (2014) highlight the resilience of FGCS. It takes additional skills for FGCS to be able to attend and successfully complete college without the context and support given to some of their peers. Similarly, Crozier, Reay and Clayton (2019) explain that working-class students adapt and create hybrid identities in order to navigate their way through higher education.

Social Cognitive Career Theory

The Social Cognitive Career Theory (Lent, Brown, & Hackett, 1994; Raque-Bogdan & Lucas, 2016) describes three parts of choosing a career: 1) How interest in academic topics and careers develop 2) How academic interests and careers are chosen and 3) How careers are acquired. Social Cognitive Career Theory is derived from the Social Cognitive Theory (Bandura, 1986). Bandura describes Social Cognitive Theory as achieving an accomplishment by mimicking the behaviors of others. Similar to the Social Capital Theory, those employing the Social Cognitive Theory rely on the social networks surrounding them to be successful. Raque-Bogdan & Lucas (2016) apply Social Cognitive Career Theory to first-generation students through the exploration of college self-efficacy and college outcome expectations among FGCS. Their work finds that FGCS often mimic the actions of their peers in order to navigate college. When choosing a college major or a career goal, however, FGCS rely on their own self-efficacy.

Because of their varying levels of exposure to college, FGCS and non-FGCS likely have differing approaches to developing interest in academic topics and careers, choosing academic interests and careers, and acquiring careers. Non-FGCS can rely on the academic experiences of their parents in a way that FGCS cannot. However, as described above, FGCS are more likely to mimic the actions of their peers when navigating academia and eventually the job market.

Application of Frameworks to the Labor Market Outcomes of FGCS

Pasco (2003) explains that students possess varying amounts of economic, social, and cultural capital. A student with high levels of economic capital does not necessarily contain much social or cultural capital. Likewise, a student with high levels of social capital does not necessarily possess much economic or cultural capital. Because FGCS often have lower levels of cultural and social capital than their non-first-generation peers, they must rely on their own self-efficacy to navigate college.

FGCS are often predicted to perform differently in college than their non-FGCS peers, depending on the outcome of interest. When predicting enrollment in college, for example, education literature suggests that FGCS are less likely than non-first-generation students to enroll directly after high school (Terenzini et al., 1996), FGCS enroll in and complete fewer courses than non-first-generation students (Pascarella et al., 2004), and FGCS are more likely to enroll in public institutions than private intuitions (Ward, Siegel, & Davenport, 2012) and more likely to enroll in two-year institutions than four-year institutions (Hahs-Vaughn, 2004; Ward, Siegel, & Davenport, 2012). The Social Capital Theory aligns with these findings because students with lower amounts of social capital are often not as informed about college and do not prepare for college as early as students with greater amounts of social capital. When predicting whether a student will graduate from college, education literature suggests that FGCS who are female are more likely to graduate in four years than FGCS who are male (Ishitani, 2003) and FGCS who attend private institutions have higher graduation rates than FGCS who attend public institutions (Ishitani, 2006). Again, this aligns with what is known about the Social Capital Theory because those with less social and cultural capital are often less academically and socially integrated into the college environment and are less likely to persist.

Arrow (1973), Spence (1973), and Stiglitz (1975) describe college as a screening mechanism for future employers. Those with high academic credentials, such as good grades at prestigious institutions, are likely to earn more money than students with lower grades at less prestigious institutions or students who did not go to college. Non-first-generation students tend to have larger social networks or greater amounts of social capital than FGCS. Therefore, the connections non-first-generation students make through networking may help them secure jobs more quickly than first-generation students.

Tinto (1993) describes the trouble FGCS have with separating from their home context, and Nuñez & Cuccaro-Alamin (1998) explain the tension FGCS feel as they navigate new academic responsibilities while continuing to fulfill family and work commitments. Using Social Cognitive Career Theory to predict the post-graduate outcomes of FGCS students explains that FGCS will choose careers based on their academic interests and self-efficacy. Raque-Bogdan & Lucas (2016) explain that although the choice to go to college and where to attend college are often collectivistic decisions among FGCS and their families, choice of college major and occupation are often individualistic decisions made by the first-generation student. When considering concepts from Social Capital Theory, deciding on a college major and career goal by oneself makes sense. FGCS often do not have families or members of social networks who have gone to college and can give helpful feedback when choosing a major or a career path. Therefore, non-first-generation students would be more likely to choose college majors and careers with family members, and FGCS would be more likely to make those decisions on their own.

What Theories Would Predict about Variables Used in the Study

Using guidance from prior studies described in the literature review of this dissertation on the earnings of FGCS, I selected several dependent and explanatory variables to use in this study. Below, I describe what the theories would predict regarding earnings as they relate to each of the selected variables.

Table 2: Theories and Variable Selection

Theory	Variable	Predicted Results
Human Capital Theory (HCT)	FGCS Status	In general, HCT would predict that FGCS would earn less than non-FGCS because they are less likely to attend and complete college. HCT

Theory	Variable	Predicted Results
		would not predict differences in earnings for FGCS and non-FGCS who graduated from college because both groups invested in their future by earning new skills and credentials.
	Employment Status	HCT would predict that those with more skills and higher levels of education are more likely to be employed than those with less skills and lower levels of education.
	Cumulative Debt	Those with higher cumulative debt likely earn less than those with less debt because students who take on debt are more likely to come from low-income backgrounds than those who do not accumulate debt in college.
	Gender	Females will likely earn less than males because they are more likely than males to be working part-time as opposed to full-time and more likely to be unemployed.
	Race/Ethnicity	Underrepresented minorities are predicted to earn less than non-minorities because they are less represented in selective institutions and certain occupations.
	Low-Income	HCT would assert that people from low-income backgrounds would earn less than those from wealthier backgrounds because those from wealthier backgrounds likely have access to better resources that will lead to more lucrative jobs.
	College GPA	Those with higher GPAs will earn more than those with lower GPAs.

Theory	Variable	Predicted Results
	College Major	Those with more rigorous college majors are predicted to earn more than those who chose majors that were less rigorous or less selective.
	Institution Type	Students who attend private institutions likely earn more than those who attend public institutions.
	Institution Selectivity	Those who attend more selective institutions should earn more than those who attend less selective institutions.
	Geographic Location	Those who live in higher income regions such as the Northeast or Far West are predicted to earn more than those from lower income regions such as the Midwest or Southeast.
	Occupation	HCT would assert that more specialized occupations like legal professionals and medical professionals would earn more than those who did not need specialized training for their occupation.
	Graduate School Enrollment	Those who went to graduate school should earn more than those who did not further their education and training in graduate school.
Social Capital Theory (SCT)	FGCS Status	SCT would predict that FGCS would earn less than non-FGCS if they have less social capital than their non-FGCS peers.
	Employment Status	SCT would predict that FGCS would be less likely to be employed than non-FGCS because perhaps they have lower amounts of social capital.

Theory	Variable	Predicted Results
	Cumulative Debt	Those who accumulate more debt do not necessarily earn more or less than those who accumulate less debt or do not take on debt.
	Gender	Females would likely earn less than males because although females tend to be more social than males, they do not necessarily have the same kinds of social connections to help them acquire lucrative jobs.
	Race/Ethnicity	Underrepresented minorities would likely earn less than non-minorities because underrepresented groups tend to not have as expansive social networks.
	Low-Income	Those from low-income backgrounds would likely earn less than those from wealthier backgrounds.
	College GPA	Those with higher GPAs would probably earn more because they likely use their social capital to have greater academic achievements.
	College Major	Students who graduate from more selective majors likely earn more than students who graduate from less selective majors.
	Institution Type	Students who attend private institutions likely earn more than those who attend public institutions.
	Institution Selectivity	Students who attend the most selective institutions likely earn more than those who attend less selective institutions.
	Geographic Location	Those in geographic regions that are more populated likely earn more than those in

Theory	Variable	Predicted Results
		geographic regions with smaller populations.
	Occupation	Students who pursue more selective occupations likely have different kinds of social capital and earn more than students who do not pursue selective occupations.
	Graduate School Enrollment	Those who attend graduate school likely earn more than those who do not and likely have social networks that influenced their decision to attend graduate school.
Social Cognitive Career Theory (SCCT)	FGCS Status	SCCT would predict that FGCS who graduated from college would earn the same as their non-FGCS peers who graduated from college because FGCS mimic the patterns and decisions of their peers, including post-collegiate career choices.
	Employment Status	SCCT would predict that FGCS would be just as likely as non-FGCS to be employed.
	Cumulative Debt	Those with greater amounts of debt would not necessarily earn less than those with lower debt loads because each group was able to successfully navigate and graduate from college.
	Gender	SCCT would predict that females would have earnings comparable to males because both groups successfully navigate college and select careers.
	Race/Ethnicity	Underrepresented minorities would have earnings comparable to non-minority peers.
	Low-Income	Students from low-income backgrounds would not

Theory	Variable	Predicted Results
		necessarily earn less than those from wealthier backgrounds because these students were able to successfully attend and graduate from college.
	College GPA	Those with lower GPAs would likely earn less than those with higher GPAs.
	College Major	Those in more selective majors would likely earn more than those in less selective majors.
	Institution Type	Students who attend private institutions likely earn more than those who attend public institutions.
	Institution Selectivity	Those who attend more selective institutions should earn more than those who attend less selective institutions.
	Geographic Location	Those who live in higher income regions such as the Northeast or Far West are predicted to earn more than those from lower income regions such as the Midwest or Southeast.
	Occupation	SCCT would assert that more specialized occupations like legal professionals and medical professionals would earn more than those who did not need specialized training for their occupation.
	Graduate School Enrollment	Those who went to graduate school would likely earn more than those who did not attend graduate school.

CHAPTER 3

DATA AND METHODOLOGY

In the following chapter I describe the data source, construction of variables, method and analytic plan used in this study. I conclude the chapter with a brief discussion on the limitations of the study.

Data source

The data source for this dissertation is the *2008/2018 Baccalaureate & Beyond Longitudinal Study* (B&B:08/18), a National Center for Education Statistics (NCES) postsecondary survey. B&B:08/18 is the third cohort in the *Baccalaureate & Beyond Longitudinal Study* and is comprised of 19,000 sample members. Students in this survey are identified through the *National Student Postsecondary Aid Study* (NPSAS) once they are in the last year of their undergraduate education. Survey members are asked questions about their educational experiences and future employment. The initial survey interviews for B&B:08/18 are with graduating seniors in 2008, and follow-up interviews occur in 2009, 2012, and 2018.

Although many studies on FGCS exist, very few examine the postbaccalaureate experiences of FGCS. B&B has information on the experiences of students who have completed a baccalaureate degree, making it an ideal choice for my study, which focuses on FGCS who have completed college. Additionally, B&B:08/18 is one of the only datasets that provides labor market information for FGCS, which is crucial for answering my research question related to the labor market outcomes of FGCS. Because B&B:08/18 is a nationally representative study,

findings are generalizable to the larger US population. Therefore, findings about FGCS from this dissertation may be applicable to all FGCS who successfully graduate from college.

The initial sample restrictions for the data include reporting only students who participated in the base-year, first follow-up and second follow-up interviews as well as students who reported educational attainment levels for both parents. Because I dropped cases where students did not provide income information across the three follow-up periods (regardless of it the student was employed), removed income outliers, dropped cases where parental education data was missing (as opposed to unknown), and capped age at 45, my final sample consisted of nearly 11,850 respondents.

First-generation status is the independent variable of interest in this study, so the construction of the first-generation variable was crucially important. Unfortunately, the family composition and parental education variables in B&B: 08/18 are not as nuanced as other studies such as the Education Longitudinal Study of 2002. B&B: 08/18 simply provides a variable for mother's highest education and father's highest education, with data on parental education being captured through the NPSAS survey. As a result, I was not able to distinguish which students came from a single parent household or other nontraditional family unit. Parental marital status was available, but only for dependent students, which meant that nearly 40% of the sample had missing parental marital status data. Because of this, I coded students as first-generation if both parents had at most a high school education or if students did not know the highest education of one parent and the other parent had at most a high school education.

Construction of Variables

I included the following variables in this study:

Dependent Variables. I selected three dependent variables for the models in this study. These continuous variables represent annualized salary one year, four years, and ten years after graduation. By examining the annualized income of graduating seniors in 2009, 2012, and 2018, I could detect employment patterns among FGCS and non-FGCS over time rather than examining these groups during one isolated time period. Outliers were removed from the sample after constructing histograms for each of the income variables. Those with incomes above $100,000 in 2009, $200,000 in 2012, and $300,000 in 2018 were removed from the sample. I included variables for both *income in dollars* and *log of income* to express unit changes in both dollars and as a percent change.

Because the dataset was constructed using responses from the B:B student survey in each of the follow-up periods, the income variables were not the same across all time periods. Income in 2009 consisted of income from the respondent's current job, as opposed to multiple jobs or a recent job. However, the 2012 and 2018 income variables include the sum of the respondents' income from all jobs in which the respondent was employed. In 2018, survey respondents skipped the income question if they were not currently employed, so legitimate skips were recoded as zeros to indicate that they were unemployed in order to be used in the analysis.

First-Generation Status. The control variable of interest in this study is first-generation status, as measured by educational attainment of the student's father and mother. As mentioned above, I used the strictest definition of first-generation status in this dissertation: parents received at most a high school education, which means that neither parent attended college. I removed cases where parental education of either parent was missing. For the variable construction, firstgen=1

if mother's education was high school or less and father's education was high school or less, else firstgen=0. I also coded instances where one parent's highest education was high school or less and the other parent was unknown (as opposed to missing) as first-generation.

Other Explanatory Variables.

A continuous variable for *cumulative debt* was created to describe the total amount of debt a student obtained while earning his or her baccalaureate degree.

I constructed *employment* variables for 2009, 2012, and 2018. This was coded as 1 if income was greater than 0, else 0.

Part-time employment variables were constructed for 2009, 2012, and 2018 to differentiate those who were working part-time from those who were working full-time or not working.

A dummy variable was created for *female*, where female=1 if female, else 0. In the models, male was the reference category.

A variable was constructed for *age*. Respondents aged 45 and above in the initial interview were dropped because individuals above this age range are typically not competing with traditionally aged college graduates who are just entering the labor market. This removed nearly 350 respondents from the sample.

I also constructed a series of dummy variables for *race and ethnicity*. This includes the five distinct groups of Asian, Black, Hispanic, White, and Other. "Other" includes American Indian or Alaska Native, Native Hawaiian/other Pacific Islander, and More than one race. Variables are coded as a 1 if the participant selected the specified race/ethnicity category, else 0. In the regression models, white is the reference category.

Dependency status was used to differentiate students who were dependent on their parents or guardians during the 2008 interview from those who were independent. The variable is coded a 1 if the student was dependent and 0 if they were independent. Approximately 61% of the sample were dependent.

A variable called *low-income* was created to describe which students came from lower socioeconomic backgrounds. Participants were coded as a 1 if their annual family income was less than $25,000, else 0. Derived from a NPSAS variable, this represents total income in 2006 for independent students or parents of dependent students. $25,000 was selected as the threshold for low-income status because that was the metric used for low-income status for TRIO eligibility at the time of the survey. TRIO is a United States Department of Education outreach program designed to provide services for students from disadvantaged backgrounds.

College GPA was used in the study to give an indication of the academic abilities of the students. The variable was constructed by dividing GPAs by 100 to standardize the GPAs on a scale from 0.0 to 4.0.

Seven variables were created for *major* at the time of graduation, which include STEM, Social Sciences, Humanities, Health, Business, Education, Other Major. In each case, the variable is coded as one for the respective major, else 0. Other major is the reference category. Major is an important variable in the model because this represents the major discipline the student graduated with, as opposed to declaring and later changing the major. College major is not always related to occupation, but there are some professions closely related to a college major or groups of meta-majors.

Institution type variables were created for public 4-year and private 4-year institutions, with a third variable representing all other institution types, which served as the reference

category. Because public institutions are often less expensive than private institutions and for-profit institutions, institution type has implications for cumulative debt and may relate to student earnings.

Selectivity variables were constructed to describe institutions that were minimally selective, moderately selective, and very selective. Moderately selective was used as the reference category. Guided by NCES-Barron's classification of institutional selectivity, I summarized the variables into the three distinct categories.

Variables were constructed for *geographic region* in 2009, 2012, and 2018. These regions were based on the respondent's legal residence at the time of each interview. Variables that indicate rurality would be preferable rather than geographic region alone because each region will contain both rural and urban areas, and the outcomes of students from rural areas are likely different from the outcomes and earnings of students from urban areas. However, because indicators of rurality were not available, I used geographic region to test for differences in earnings. The geographic regions were divided into six groups: Mideast, Great Lakes, Plains, Southeast, Southwest, Rocky Mountains, Far West, Northeast. Region variables were available for 2009 and 2018; however, I had to construct similar regions for 2012 using state of residence. It is possible that a student lived in a different geographic region at one of the follow-up periods than in a prior survey check-in, which could impact the student's earnings.

Occupation describes the current field of work of the survey respondent. Separate occupation variables were constructed for each of the three follow-up periods. B&B:08/18 contains a variable with 33 separate occupational categories. Using the guidance of Manzoni and Streib (2019), I condensed these groupings into 13 categories, including distinctions between professional roles and support roles in some fields. Because some respondents were unemployed

and thus did not have an occupation, unemployed is used as the reference category in the linear regression models. For the hurdle models, only employed respondents are used in the analysis, so "other" occupation is used as the reference category.

Finally, I created variables for if the respondents were enrolled in *graduate school* in 2009, 2012, or 2018. Students were coded as 1 if they were enrolled in graduate school at the time of the follow-up interview, else 0.

After generating each of the variables, I grouped the explanatory variables into sets of variables for use in the models. The first grouping, personal characteristics (P), includes sex, race/ethnicity, age, and dependency status. Ability characteristics (A), includes college GPA and college major. Monetary/Financial Characteristics (M), includes whether or not the student is considered low income, graduate school enrollment, and cumulative debt. Employment Characteristics (E), includes whether or not the respondent is employed, if the respondent is employed part-time, geographic location of employment, and occupation. Finally, institutional characteristics (I), includes whether an institution is public/private and selectivity of the institution. A full list of the variables with descriptions is available in Appendix A.

The descriptive statistics, shown below in Table 3, reveal that just over one fifth (21%) of the sample is considered first-generation. The average income of all sample members in 2009 was roughly $26,000 per year. In 2012, this increased to nearly $36,000 per year. In 2018, the average annual income was nearly $66,000 per year. The majority of respondents were employed across all time periods, with the highest rate of unemployment occurring in 2012 at 22%. 60% of the sample was female, and the sample was predominately White. Over two-thirds of the sample were dependents in 2008, and roughly one-third of the sample came from low-income

backgrounds. By 2018, nearly 30% of the sample had attained a Master's degree, and 12% had attained a doctoral degree.

Table 3: Descriptive Statistics

	Mean	Std Dev	Minimum	Maximum
First-Generation Status				
FGCS Status-Parents with No College	0.21	0.41	0	1
Income Variables				
Income in 2009	26,043	19,657	0	99,000
Income in 2012	35,821	28,269	0	195,000
Income in 2018	65,862	47,855	0	295,000
Log income in 2009	8.36	3.95	0	12
Log income in 2012	8.24	4.43	0	12
Log income in 2018	9.71	3.66	0	13
Employed 2009	0.82	0.38	0	1
Employed 2012	0.78	0.41	0	1
Employed 2018	0.88	0.33	0	1
Part-Time in 2009	0.15	0.35	0	1
Part-Time in 2012	0.10	0.30	0	1
Part-Time in 2018	0.10	0.30	0	1
Cumulative Debt	42,977	57,047	0	844,067
Demographic Characteristics				
Female	0.60	0.49	0	1
Male	0.40	0.49	0	1
Age	23.88	4.65	18	45
Black	0.09	0.28	0	1
Hispanic	0.09	0.29	0	1
Asian	0.06	0.24	0	1
Other	0.03	0.18	0	1
White	0.73	0.44	0	1
Dependency Status	0.64	0.48	0	1
Low-Income	0.31	0.46	0	1
GPA				
College GPA	3.35	0.45	1	4
College Majors				
STEM	0.34	0.47	0	1
Social Sciences	0.13	0.33	0	1
Humanities	0.09	0.29	0	1
Health	0.07	0.25	0	1
Business	0.12	0.33	0	1
Education	0.09	0.28	0	1
Other	0.16	0.37	0	1
Institution Type				

	Mean	Std Dev	Minimum	Maximum
Public 4-Year	0.53	0.50	0	1
Private 4-Year	0.32	0.47	0	1
Other Institutional Type	0.15	0.36	0	1
Institution Selectivity				
Very Selective	0.27	0.45	0	1
Moderately Selective	0.53	0.50	0	1
Minimally Selective	0.14	0.34	0	1
Geographic Location				
Mideast 2009	0.17	0.38	0	1
Great Lakes 2009	0.16	0.36	0	1
Plains 2009	0.12	0.32	0	1
Southeast 2009	0.23	0.42	0	1
Southwest 2009	0.09	0.28	0	1
Rocky Mountains 2009	0.05	0.21	0	1
Far West 2009	0.14	0.35	0	1
Northeast 2009	0.05	0.21	0	1
Mideast 2012	0.17	0.37	0	1
Great Lakes 2012	0.15	0.35	0	1
Plains 2012	0.11	0.31	0	1
Southeast 2012	0.23	0.42	0	1
Southwest 2012	0.09	0.29	0	1
Rocky Mountains 2012	0.05	0.21	0	1
Far West 2012	0.14	0.35	0	1
Northeast 2012	0.05	0.21	0	1
Mideast 2018	0.16	0.36	0	1
Great Lakes 2018	0.14	0.35	0	1
Plains 2018	0.11	0.31	0	1
Southeast 2018	0.22	0.41	0	1
Southwest 2018	0.09	0.29	0	1
Rocky Mountains 2018	0.05	0.22	0	1
Far West 2018	0.15	0.36	0	1
Northeast 2018	0.04	0.20	0	1
Occupation				
Clerical 2009	0.02	0.14	0	1
Blue Collar 2009	0.02	0.15	0	1
Business Support 2009	0.05	0.22	0	1
Sales/Customer Service 2009	0.06	0.23	0	1
Legal Professionals 2009	0.00	0.04	0	1
Legal Support 2009	0.09	0.28	0	1
STEM Professionals 2009	0.08	0.28	0	1
STEM Support 2009	0.06	0.23	0	1
Educators 2009	0.15	0.35	0	1
Human Services 2009	0.14	0.35	0	1
Arts & Humanities 2009	0.02	0.12	0	1
Managers 2009	0.05	0.22	0	1

	Mean	Std Dev	Minimum	Maximum
Other 2009	0.09	0.28	0	1
Clerical 2012	0.02	0.14	0	1
Blue Collar 2012	0.02	0.15	0	1
Business Support 2012	0.07	0.26	0	1
Sales/Customer Service 2012	0.04	0.20	0	1
Legal Professionals 2012	0.01	0.09	0	1
Legal Support 2012	0.09	0.28	0	1
STEM Professionals 2012	0.08	0.27	0	1
STEM Professionals 2012	0.10	0.30	0	1
Educators 2012	0.16	0.37	0	1
Human Services 2012	0.17	0.37	0	1
Arts & Humanities 2012	0.02	0.14	0	1
Managers 2012	0.08	0.26	0	1
Other 2012	0.08	0.27	0	1
Clerical 2018	0.01	0.09	0	1
Blue Collar 2018	0.02	0.14	0	1
Business Support 2018	0.07	0.26	0	1
Sales/Customer Service 2018	0.04	0.19	0	1
Legal Professionals 2018	0.02	0.12	0	1
Legal Support 2018	0.05	0.22	0	1
STEM Professionals 2018	0.08	0.26	0	1
STEM Support 2018	0.14	0.35	0	1
Educators 2018	0.14	0.35	0	1
Human Services 2018	0.14	0.35	0	1
Arts & Humanities 2018	0.03	0.16	0	1
Managers 2018	0.10	0.29	0	1
Other 2018	0.06	0.23	0	1
Graduate School Enrollment				
Enrolled in 2009	0.23	0.42	0	1
Enrolled in 2012	0.18	0.38	0	1
Enrolled in 2018	0.06	0.24	0	1
Highest Degree				
Masters	0.29	0.45	0	1
Doctorate	0.12	0.32	0	1
N	11,850			

Rounded to nearest 10 per NCES restricted use guidelines.

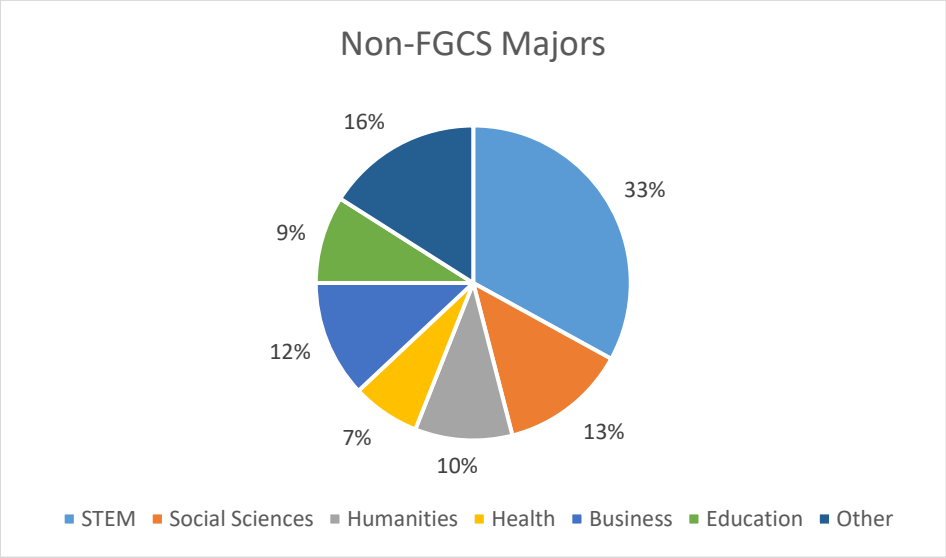
Table 4 further divides the summary statistics by first-generation status. Comparing the average income between FGCS and non-FGCS, we can already see an interesting pattern emerge. FGCS earn significantly more than their non-FGCS peers one year after graduation

($27,506*** vs $25,647), nearly the same four years after graduation ($35,590 vs $35,884), and FGCS earn significantly less ten years after graduation ($63,367 vs $66,538**).

Nearly one-third of respondents (28%) did not accumulate any debt as of the 2012 interview, but of the 72% of respondents who did borrow money for education, there was an average debt of around $43,000. The summary statistics reveal that FGCS have a higher average debt than non-FGCS ($45,549 compared to $42,280), and the two-tailed t-test confirms that this difference is significant at the $p<0.01$ level.

The distribution of student majors is very similar for FGCS and non-FGCS, as shown in Figure 1. Surprisingly, both FGCS and non-FGCS graduated more students in STEM than any of the other major disciplines. However, when STEM is further broken down, FGCS were more likely than non-FGCS to graduate in computer and information sciences, and non-FGCS were more likely than FGCS to graduate from biological science majors. Figure 1 also reveals that FGCS were more likely than non-FGCS to graduate with business and health degrees, and non-FGCS were more likely than FGCS to graduate with social science and humanities degrees.

Figure 1: Student Majors by First-Generation Status



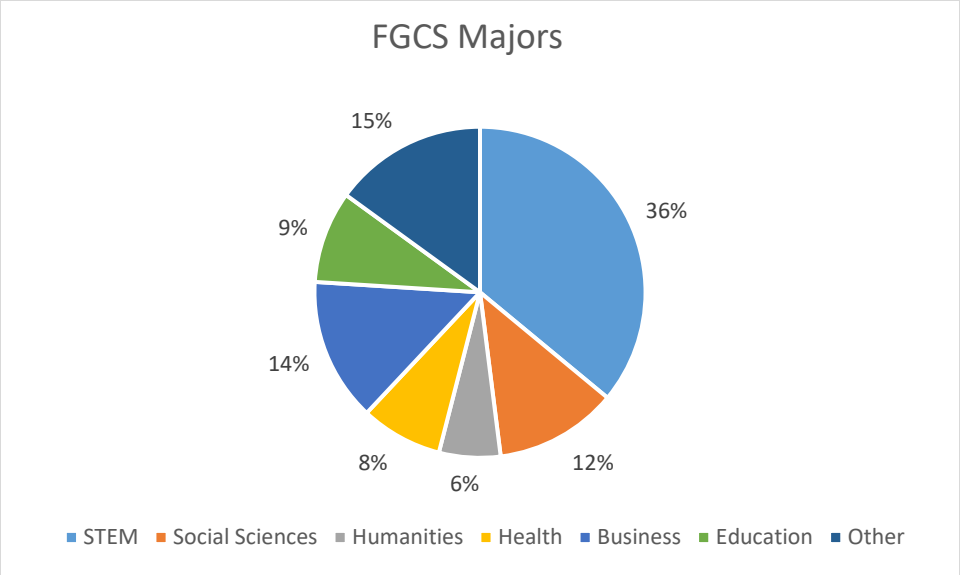


Table 4 also shows that FGCS were more likely to be employed than non-FGCS in 2009, which was significant at the p<.05 level. Non-FGCS were slightly more likely than FGCS to be employed in 2012, which was significant at the p<.05 level. Similarly in 2018, non-FGCS were more likely than FGCS to be employed, which was also significant at the p<.05 level.

Table 4: Descriptive Statistics by First-Generation Status

	Non-FGCS		**FGCS**	
	Mean	Std Dev	Mean	Std Dev
First-Generation Status				
FGCS Status-Parents with No College	0	0	1	0
Income Variables				
Income in 2009	25,647	19,578	27,506***	19,881
Income in 2012	35,884	28,097	35,590	28,899
Income in 2018	66,538**	48,246	63,367	46,308
Log income in 2009	8.31	3.98	8.53**	3.87
Log income in 2012	8.28*	4.39	8.08	4.54
Log income in 2018	9.74*	3.63	09.58	3.76
Employed 2009	0.82	0.39	0.83*	0.37
Employed 2012	0.78*	0.41	0.76	0.43
Employed 2018	0.88*	0.32	0.87	0.34
Part-Time in 2009	0.15*	0.36	0.13	0.34
Part-Time in 2012	0.10*	0.31	0.09	0.29

	Non-FGCS		FGCS	
	Mean	Std Dev	Mean	Std Dev
Part-Time in 2018	0.10	0.30	0.11	0.31
Cumulative Debt	42,280	57,263	45,549**	56,180
Demographic Characteristics				
Female	0.59	0.49	0.61*	0.49
Male	0.41*	0.49	0.39	0.49
Age	23.40	4.00	25.64***	6.22
Black	0.07	0.26	0.13***	0.33
Hispanic	0.07	0.25	0.17***	0.38
Asian	0.05	0.22	0.11***	0.31
Other	0.03	0.18	0.03	0.17
White	0.77***	0.42	0.56	0.50
Dependency Status	0.68***	0.47	0.51	0.50
Low-Income	0.29	0.45	0.42***	0.49
GPA				
College GPA	3.35*	0.45	3.33	0.46
College Majors				
STEM	0.33	0.47	0.36**	0.48
Social Sciences	0.13*	0.33	0.12	0.32
Humanities	0.10***	0.30	0.06	0.25
Health	0.07	0.25	0.08**	0.27
Business	0.12	0.32	0.14**	0.34
Education	0.09	0.28	0.09	0.28
Other	0.16	0.37	0.15	0.36
Institution Type				
Public 4-Year	0.53	0.50	0.52	0.50
Private 4-Year	0.33***	0.47	0.28	0.45
Other Institutional Type	0.14	0.35	0.19***	0.39
Institution Selectivity				
Very Selective	0.29***	0.45	0.22	0.41
Moderately Selective	0.54*	0.50	0.52	0.50
Minimally Selective	0.13	0.33	0.17***	0.38
Geographic Location				
Mideast 2009	0.17	0.37	0.18	0.39
Great Lakes 2009	0.16	0.37	0.15	0.36
Plains 2009	0.12***	0.33	0.10	0.30
Southeast 2009	0.22	0.42	0.24	0.43
Southwest 2009	0.09	0.28	0.09	0.29
Rocky Mountains 2009	0.05***	0.22	0.03	0.16
Far West 2009	0.13	0.34	0.15**	0.36
Northeast 2009	0.05**	0.21	0.04	0.19
Mideast 2012	0.16	0.37	0.18*	0.39
Great Lakes 2012	0.15	0.35	0.15	0.35
Plains 2012	0.11*	0.32	0.10	0.30

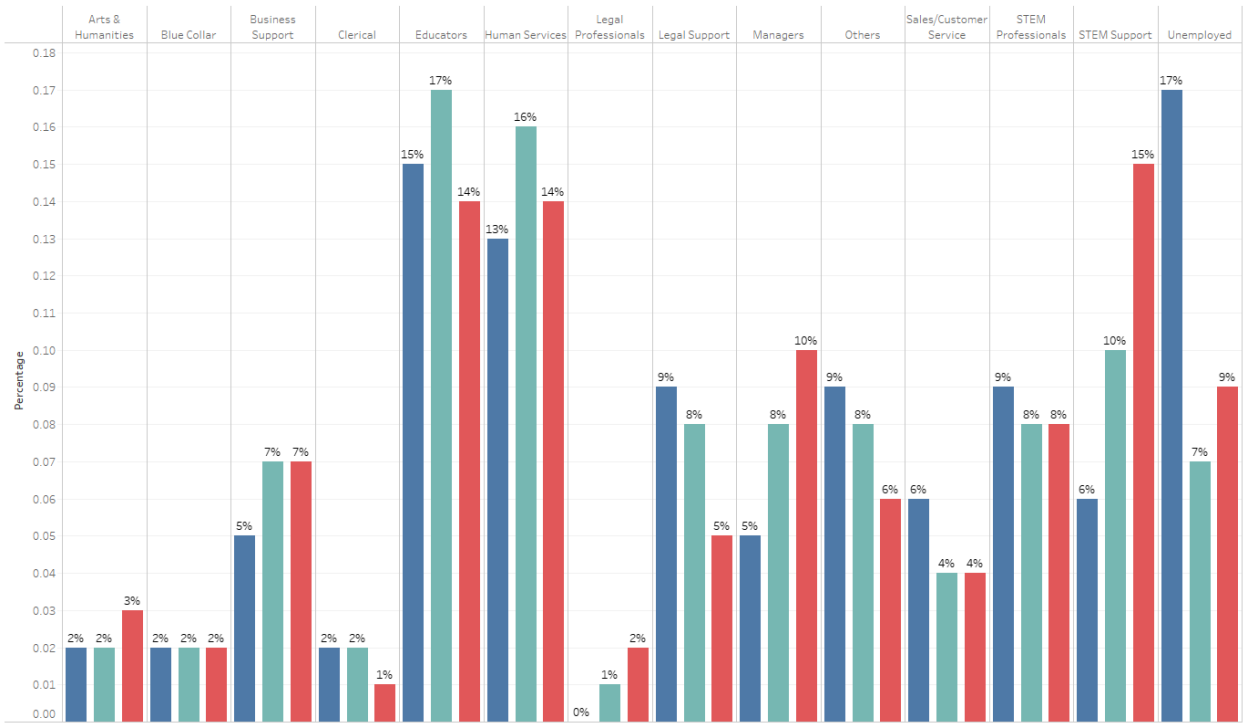
	Non-FGCS		FGCS	
	Mean	Std Dev	Mean	Std Dev
Southeast 2012	0.23	0.42	0.23	0.42
Southwest 2012	0.09	0.29	0.10	0.29
Rocky Mountains 2012	0.05***	0.22	0.03	0.17
Far West 2012	0.14	0.34	0.15*	0.36
Northeast 2012	0.05*	0.21	0.04	0.19
Mideast 2018	0.15	0.36	0.17*	0.38
Great Lakes 2018	0.14	0.35	0.14	0.35
Plains 2018	0.11*	0.31	0.10	0.30
Southeast 2018	0.22	0.41	0.23	0.42
Southwest 2018	0.09	0.29	0.09	0.29
Rocky Mountains 2018	0.06***	0.23	0.03	0.17
Far West 2018	0.15	0.35	0.15	0.36
Northeast 2018	0.04*	0.21	0.03	0.18
Occupation				
Clerical 2009	0.02	0.14	0.02	0.15
Blue Collar 2009	0.02	0.14	0.02	0.15
Business Support 2009	0.05	0.22	0.05	0.22
Sales/Customer Service 2009	0.06	0.23	0.05	0.23
Legal Professionals 2009	0.00	0.05	0.00	0.04
Legal Support 2009	0.09	0.29	0.09	0.29
STEM Professionals 2009	0.08*	0.28	0.07	0.26
STEM Support 2009	0.05	0.22	0.07**	0.25
Educators 2009	0.15**	0.36	0.13	0.34
Human Services 2009	0.13	0.34	0.18***	0.38
Arts & Humanities 2009	0.02	0.13	0.01	0.11
Managers 2009	0.05	0.22	0.06**	0.24
Other 2009	0.09**	0.29	0.07	0.26
Clerical 2012	0.02	0.14	0.02	0.15
Blue Collar 2012	0.02	0.15	0.02	0.15
Business Support 2012	0.07*	0.26	0.06	0.24
Sales/Customer Service 2012	0.04	0.20	0.04	0.19
Legal Professionals 2012	0.01**	0.10	0.00	0.06
Legal Support 2012	0.08	0.28	0.09	0.29
STEM Professionals 2012	0.08	0.27	0.07	0.26
STEM Support 2012	0.09	0.29	0.10	0.30
Educators 2012	0.17**	0.38	0.15	0.36
Human Services 2012	0.16	0.37	0.19***	0.39
Arts & Humanities 2012	0.02*	0.15	0.02	0.13
Managers 2012	0.08	0.26	0.07	0.25
Other 2012	0.08*	0.28	0.07	0.26
Clerical 2018	0.01	0.09	0.01	0.11
Blue Collar 2018	0.02	0.14	0.02	0.14
Business Support 2018	0.07	0.26	0.07	0.25

	Non-FGCS		FGCS	
	Mean	Std Dev	Mean	Std Dev
Sales/Customer Service 2018	0.04	0.19	0.04	0.19
Legal Professionals 2018	0.02***	0.13	0.01	0.09
Legal Support 2018	0.05	0.22	0.05	0.22
STEM Professionals 2018	0.08	0.26	0.07	0.26
STEM Support 2018	0.14	0.34	0.13	0.33
Educators 2018	0.14	0.35	0.14	0.35
Human Services 2018	0.14	0.35	0.16**	0.37
Arts & Humanities 2018	0.03	0.16	0.03	0.16
Managers 2018	0.09	0.29	0.09	0.29
Other 2018	0.06	0.23	0.05	0.22
Graduate School Enrollment				
Enrolled in 2009	0.23**	0.42	0.21	0.41
Enrolled in 2012	0.18	0.38	0.17	0.37
Enrolled in 2018	0.06	0.24	0.06	0.23
Highest Degree (Attained by 2018)				
Masters	0.29	0.45	0.28	0.45
Doctorate	0.13***	0.33	0.09	0.28
N	9,320		2,530	

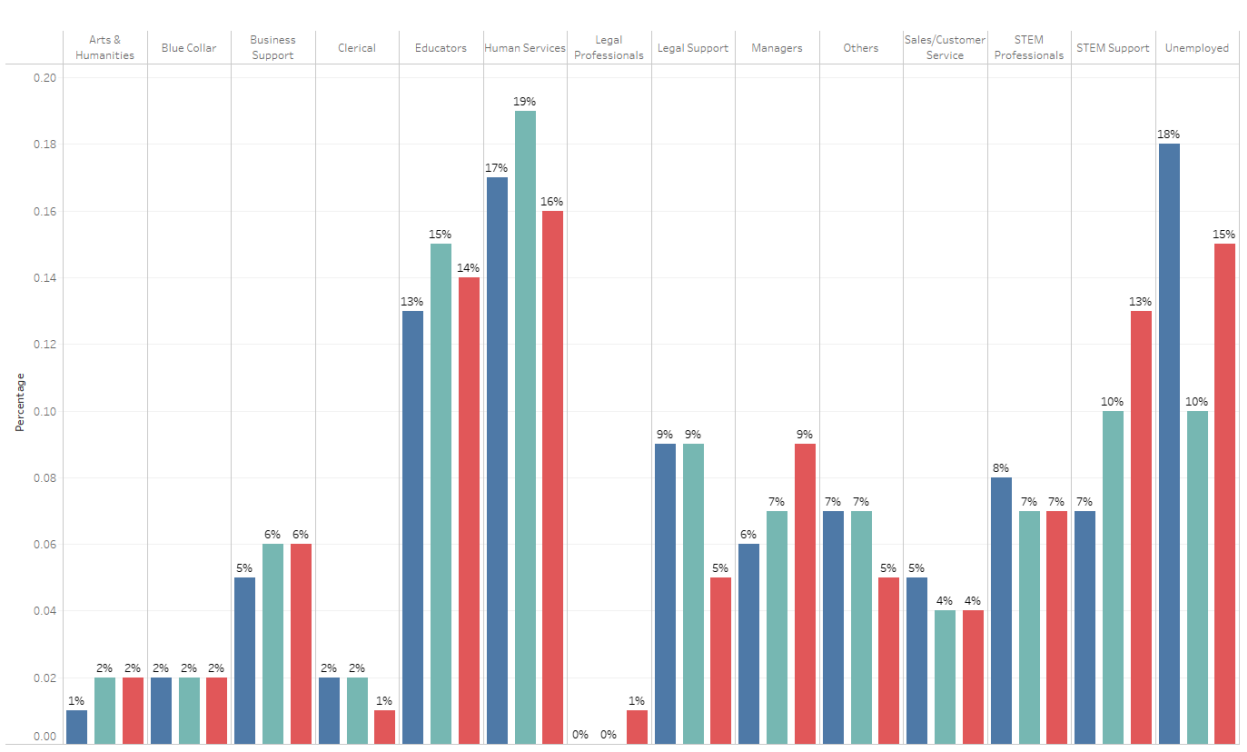
Rounded to nearest 10 per NCES restricted use guidelines.
*** p<0.001, **p<0.01, *p<0.05

Figure 2 shows the change in occupations by FGCS status over time. Non-FGCS, for example, were more likely to work in clerical professions in 2009 and 2012 than in 2018. Similarly, 9% of non-FGCS worked in legal support in 2009, 8% of non-FGCS worked in legal support in 2012, and this dropped to 5% in 2018. Conversely, non-FGCS had very few survey respondents who worked as legal professionals in 2009, but this number grew in both 2012 and 2018. It is likely that the growth resulted from students attending law school during the 2009 timeframe and entering the legal job market closer to 2012 and 2018. The percentage of non-FGCS in STEM professionals remained steady over time at around 8%, and the number of STEM support professionals grew from 6% in 2009 to 10% in 2012 and 15% in 2018.

Figure 2: Occupations by FGCS Status



FGCS Occupations in 2009, 2012, & 2018



FGCS were more likely to work in human services than any other field across the three follow-up periods, with 17% of FGCS working in human service in 2009, 19% of FGCS working in human service in 2012, and only 16% working in human services in 2018. There was also a decline in FGCS working in legal support and clerical services from 2009 to 2018. Both FGCS and non-FGCS experienced growth in management professions between 2009 and 2018, which makes sense because employees commonly have opportunities to manage others later in their careers rather than in the beginning.

Next, I describe the methodological design of the study, including the construction of the variables used in the study and the regression models.

Method

To analyze the labor market outcomes of FGCS and non-FGCS I created six regression models: three log of income models and three hurdle models. I began with a linear regression equation on income in 2009, 2012, and 2018 in what is considered a naïve regression. The naïve regression is called naïve because it assumes the attributes in the regression are conditionally independent. Using naïve regression in the final output of a study is typically not suggested because the modeling rarely mimics what takes place in reality. However, it was useful to begin with the naïve regression in order to describe the data simply and begin to detect patterns across the three time periods.

Next, I ran the models using log of income and shared the results of those models in this dissertation. Because the results of these models did not account for the difference between respondents with reported income and those who did not have income, I created three additional models called hurdle models. The construction of these models is described in greater detail below.

Income Models

To begin the exploration of how first-generation status relates to income, I start with the log of income of each of the annualized salary variables regressed on first-generation status, followed by additional explanatory variables. I use log of income rather than income in dollars to express percent change rather than unit change and curtail the effect of outliers.

I performed a logarithmic transformation on each of the income variables because there are instances in the data where income is zero dollars. Log(0) is undefined, so I added one dollar to income so that the smallest value for income was one dollar and log(1) = 0.

In order to interpret the coefficients in a semi-log regression model, the exact percentage is found by finding the exponential of the coefficient and subtracting the result by one. However, for simplicity, I describe the results as being a close approximation of the coefficient.

The models will take the form:

$$\log(Income) = \alpha + FGCS\beta + \varepsilon$$

$$\log(Income) = \alpha + FGCS\beta + P\delta + \varepsilon$$

$$\log(Income) = \alpha + FGCS\beta + P\delta + A\omega + M\lambda + E\sigma + I\rho + \varepsilon$$

where FGCS=1 if both parents have at most a high school education or one parent has at most a high school education and the other parent's highest education level is unknown. P', A', M', E', and I' are sets of variables defined earlier. The first model regresses first-generation status on the log of income in 2009. The second model regresses first-generation status in addition to the set of personal variables on log of income. Finally, the third model regresses first-generation status, a set of personal variables, a set of ability variables, a set of monetary variables, a set of employment variables, and a set of institutional variables on log of income. The models are repeated for the log of income in 2012 and once again for the log of income in 2018.

I also weighted the data to take into account the stratified sampling design in B&B: 08/18. It is common to weight the data when using national datasets in order to approximate findings that are generalizable to the US population. I used WTE000, a weight recommended for students who received a bachelor's degree in the 2007-08 academic year and responded to all interviews.

In addition to applying weights, I also used robust standard errors in the models. This was done to account for possible heteroscedasticity and ensure that the results were more conservative than they would have been otherwise.

The log of income models help us determine whether FGCS earn more or less than non-FGCS, but they do not show whether FGCS are more or less likely to be employed or whether they earn the same as their non-FGCS peers who are employed because the current linear regression models do not separate unemployed respondents from employed. Thus, I also incorporated hurdle models in this study.

Hurdle Models

An important first step in distinguishing potential differences between the labor market outcomes of FGCS and non-FGCS is to decide how to handle instances where survey respondents are unemployed. There is a difference between students who were able to find a paying job after graduation and those who were not. Cragg (1971) described these limited dependent variable models as "hurdles" that must be overcome before the positive values of the dependent variable can be observed. Thus, in this case, separating graduates with no income from graduates with income describes what it takes to "get over the hurdle" of getting a job. The standard hurdle model takes the form:

$H_i = X\alpha + u$ where H=1 if Y>0 and H=0 if Y=0

$Y_i = X\beta + \varepsilon$ when Y>0

Applying this method to annualized salary, the models still take the form:

$$\log(Income) = \alpha + FGCS\beta + \varepsilon$$

$$\log(Income) = \alpha + FGCS\beta + P\delta + \varepsilon$$

$$\log(Income) = \alpha + FGCS\beta + P\delta + A\omega + M\lambda + E\sigma + I\rho + \varepsilon$$

However, the log(Income) is interpreted only when income>0. When income is 0, the results of the lower limit show the likelihood of employment. Like the earlier regressions, these models will be repeated across the three follow-up periods.

Similarly to the earlier income models, I applied weights and used robust standard errors in the hurdle models.

CHAPTER 4

FINDINGS

In the following chapter I discuss the findings of the six regression models built for this study.

Table 5 shows the abbreviated results of the 2009 regression model, with the full findings of each of the models listed in the appendices. The first model shows that first-generation students earn about 12% more than non-FGCS one year after graduation, but this finding was not significant at the $p<0.05$, $p<0.01$, or $p<0.001$ confidence levels. The coefficient is somewhat larger than the percent difference in the means in Table 2 due to the weighting of the sample. The second model shows that FGCS earn about 14.1% more than non-FGCS and that compared to males, females earn about 10.2% less, but neither finding is significant at the stated confidence levels. It also shows that compared to White students, Black students, Asian students, and Hispanic students earn significantly less money one year after graduation. The coefficient for Asian students (-1.492) is extreme because the log transformation on income. Many studies on income use only positive income. However, in this study, the log transformation is so extreme for people with zero incomes that it distorts the mean log of income. Because it was important to show the outcomes of both employed and unemployed survey respondents in my study, I kept the distorted coefficients in the log of income models. These results normalize in the hurdle models, where the results of employed respondents are separated from the results of unemployed respondents. Finally, the third model shows that first-generation students earn about 3.1% less than non-FGCS one year after graduation, but this result did not reach statistical significance.

Compared to males, females earned about 4.7% less, with significance at the p<0.01 level, and compared to those who were not from low-income families, those who were from low-income families earned about 6% less one year after graduation, which was significant at the p<.001 level. Respondents who were employed part-time earned about 68.5% less than respondents who were employed full-time, and this finding was significant at the p<.001 level.

Each of the occupation variables showed significance at the p<0.001 level because the occupations were compared to those who were unemployed. However, the scale of the earning varied across occupations, with STEM professionals and Business support professionals earning the most in 2009 compared to those in other occupations. I chose to keep the occupation variables in the model rather than removing them even though we already know that those who are employed earn more than those who are not employed because occupation is strongly correlated with income. The r-squared with occupation in the model is 98%. The r-squared with occupation removed is only 7%.

Finally, survey respondents enrolled in graduate school were shown to earn about 15.6% less than those who were not enrolled in graduate school in 2009. This finding was significant at the p<0.001 level. These findings are likely because those who were enrolled in graduate school were less likely to be working.

Table 5: Abbreviated 2009 Linear Regression Results

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
First-Generation	0.120	0.141	-0.031
	(0.85)	(0.97)	(-1.50)
Female		-0.102	-0.047**
		(-0.90)	(-2.80)
Low Income		-0.411**	-0.060***
		(-3.07)	(-3.69)
Black		-0.520*	-0.029

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
		(-2.41)	(-0.97)
Hispanic		-0.454*	-0.040
		(-2.29)	(-1.56)
Asian		-1.492***	0.044
		(-4.64)	(1.36)
Other		0.497*	-0.016
		(2.53)	(-0.38)
Age		0.054***	0.019***
		(5.08)	(12.98)
Employed Part-Time			-0.685***
			(-23.97)
Clerical			10.19***
			(282.50)
Blue Collar			10.30***
			(177.34)
Business Support			10.58***
			(480.09)
Sales/Customer Service			10.16***
			(308.20)
Legal Professionals			9.774***
			(45.00)
Legal Support			10.15***
			(441.39)
STEM Professionals			10.59***
			(331.91)
STEM Support			10.58***
			(361.12)
Educators			10.15***
			(242.30)
Human Services			10.21***
			(455.75)
Arts & Humanities			10.20***
			(152.98)
Managers			10.40***
			(341.54)
Other Occupation			10.07***
			(335.58)
Enrolled in Grad School			-0.156***
			(-6.59)
Constant	8.590***	7.590***	-0.490***
	(141.77)	(27.88)	(-6.72)
Observations	11,850	11,850	11,850
R-squared	0.0002	0.0178	0.9775

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, "unemployed" occupation.

+ p<.10, * p<.05, ** p<.01, *** p<.001

In the 2012 models in Table 6, FGCS earned about 33.4% less than non-FGCS, and this finding was significant at the p<.05 level. In the second model, FGCS earned about 11% less than non-FGCS four years after graduation, but this finding was not significant at the traditional significance levels. Females earned about 35.4% less than males, and this finding was significant at the p<.01 level. The significant negative findings for Asian students compared to White students continued in the 2012 models. Low-income students earned about 11.1% less than students who were not low income, but this finding was not significant at the standard levels.

By the third model, FGCS earned nearly 9.2% more than non-FGCS, a result which was not significant at the p<.05, p<.01, or p<.001 levels. Females continued to earn less than males in 2012, with females earning about 24% less than males, and this finding was significant at the p<.05 level. Students who majored in social sciences and humanities earned significantly less than those in the "other major" category, and those who majored in health earned significantly more.

Table 6: Abbreviated 2012 Linear Regression Results

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
First-Generation	-0.334*	-0.110	0.092
	(-2.08)	(-0.68)	(0.66)
Female		-0.354**	-0.240*
		(-2.88)	(-1.98)
Low Income		-0.111	-0.067
		(-0.79)	(-0.55)
Black		-1.042***	-0.502*
		(-4.21)	(-2.37)
Hispanic		-0.585**	-0.055
		(-2.70)	(-0.28)
Asian		-1.935***	-1.111***
		(-5.64)	(-3.93)
Other		-0.764*	-0.335

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
		(-2.10)	(-1.05)
STEM			-0.274
			(-1.46)
Social Sciences			-0.523**
			(-2.81)
Humanities			-0.713***
			(-3.51)
Health			0.946***
			(4.33)
Business			0.182
			(0.99)
Education			0.343
			(1.58)
Enrolled in Grad School			-1.577***
			(-9.05)
Constant	8.622***	9.067***	2.853***
	(132.08)	(26.77)	(4.55)
Observations	11,430	11,430	11,430
R-squared	0.0010	0.0182	0.2285

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, "unemployed" occupation.
+ p<.10, * p<.05, ** p<.01, *** p<.001

In Table 7, FGCS earned about 17.9% less than non-FGCS, but this finding did not reach traditional significance. In the second model, FGCS earned about 8.5% more than non-FGCS, and this finding was not significant at the standard confidence levels. Females, however, earned about 98.6% less than males, and this finding was significant at the p<.001 level. Likewise, low-income students earned about 53.6% less than students who were not low income, and this finding was significant at the p<.001 level. Compared to White students, Black students and Hispanic students earned over 40% less, and these findings were significant at the p<.05 level. Asian students only earned less than one percentage less than White students, and for the first time among the three time periods, the finding for Asian students was not significant, indicating that perhaps Asian students were in graduate school or otherwise out of the workforce prior to

2018. In the third model, in addition to the significant negative findings of females and low-income students, those who pursued humanities majors now had negative findings compared to students in other majors, with humanities majors earning about 5.7% less than students in the other majors category. Compared to the other categories, legal professionals also earned more than those in the other occupations in 2018.

Table 7: Abbreviated 2018 Linear Regression Results

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
First-Generation	-0.179	0.0846	-0.006
	(-1.32)	(0.62)	(-0.33)
Female		-0.986***	-0.097***
		(-9.62)	(-6.11)
Low Income		-0.536***	-0.072***
		(-4.21)	(-4.28)
Black		-0.460*	-0.047+
		(-2.22)	(-1.81)
Hispanic		-0.472*	-0.064*
		(-2.34)	(-2.37)
Asian		-0.007	-0.037
		(-0.03)	(-1.06)
Other		-0.214	-0.013
		(-0.64)	(-0.32)
STEM			0.141***
			(5.65)
Social Sciences			0.031
			(1.27)
Humanities			-0.057*
			(-2.13)
Health			0.239***
			(8.33)
Business			0.159***
			(6.26)
Education			-0.003
			(-0.10)
Clerical			10.73***
			(192.25)
Blue Collar			10.94***
			(179.33)
Business Support			11.16***

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
			(419.32)
Sales/Customer Service			11.08***
			(218.17)
Legal Professionals			11.43***
			(217.50)
Legal Support			10.80***
			(340.65)
STEM Professionals			11.21***
			(408.30)
STEM Support			11.28***
			(477.59)
Educators			10.93***
			(521.55)
Human Services			11.07***
			(548.55)
Arts & Humanities			10.96***
			(221.57)
Managers			11.25***
			(489.77)
Other Occupation			11.02***
			(348.32)
Enrolled in Grad School			-0.054+
			(-1.77)
Constant	9.741***	10.92***	-0.173*
	(168.01)	(39.16)	(-2.43)
Observations	11,430	11,430	11,430
R-squared	0.0004	0.0262	0.9832

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, "unemployed" occupation, "unemployed" work sector.
+ p<.10, * p<.05, ** p<.01, *** p<.001

Results of Hurdle Models

The first 2009 model in Table 8 shows that FGCS who are employed earn about 6.5% more than non-FGCS who are employed, and this is significant at the p<.01 level. The lower limit shows that FGCS are 2.7% more likely than non-FGCS to be employed one year after graduation, but that finding is not significant at the p<.05, p<.01 or p<.001 levels. By the second

model, FGCS earned about 0.3% more than non-FGCS, but the result was not significant. Females who were employed earned about 15.3% less than males who were employed and were about 1.1% more likely than males to be employed, but this did not reach traditional significance. Low-income students earned about 9.7 percent less than students who were not low income, and this finding was significant at the p<.001 level. They were also about 11.9% less likely than non-low-income students to be employed in 2009, which was significant at the p<.05 level. In the third model, FGCS earned 2.3% less than non-FGCS and were about 5% more likely than non-FGCS to be employed. However, neither finding was significant. Compared to respondents in the "other occupation" reference group, those in clerical work earned about 11.6% more in 2009, and this was significant at the p<.05 level. As predicted in the 2009 log of income models in Table 3, respondents who were enrolled in graduate school earned about 20.3% less than those who were not enrolled in graduate school, and this was because they were about 63.2% less likely than those not pursuing the degrees to be employed in 2009.

Table 8: Abbreviated 2009 Hurdle Model Results

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
First-Generation	0.065**	0.003	-0.023
	(2.59)	(0.11)	(-1.09)
Female		-0.153***	-0.055**
		(-7.46)	(-3.04)
Low Income		-0.097***	-0.068***
		(-4.26)	(-3.82)
Black		-0.044	-0.032
		(-1.12)	(-1.00)
Hispanic		-0.089**	-0.047+
		(-2.62)	(-1.74)
Asian		0.148**	0.047
		(2.91)	(1.07)
Other		-0.048	-0.032
		(-0.85)	(-0.71)
Clerical			0.116*

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
			(2.56)
Blue Collar			0.208***
			(3.33)
Business Support			0.487***
			(13.73)
Sales/Customer Service			0.078+
			(1.90)
Legal Professionals			-0.260
			(-1.17)
Legal Support			0.070*
			(1.99)
STEM Professionals			0.499***
			(11.82)
STEM Support			0.483***
			(11.98)
Educators			0.153***
			(3.83)
Human Services			0.119***
			(3.41)
Arts & Humanities			0.134+
			(1.89)
Managers			0.311***
			(7.86)
Enrolled in Grad School			-0.203***
			(-7.40)
Constant	10.21***	9.588***	9.550***
	(899.93)	(183.59)	(127.03)
selection_ll			
First-Generation	0.027	0.095	0.050
	(0.46)	(1.60)	(0.82)
Female		0.011	0.020
		(0.25)	(0.43)
Low Income		-0.119*	-0.168**
		(-2.34)	(-3.19)
Black		-0.171*	-0.134
		(-2.16)	(-1.61)
Hispanic		-0.150*	-0.120
		(-1.98)	(-1.51)
Asian		-0.555***	-0.479***
		(-6.12)	(-5.28)
Other		0.287**	0.365**
		(2.58)	(3.13)
Enrolled in Grad School			-0.632***
			(-12.50)

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Constant	1.001***	1.073***	0.904***
	(41.51)	(26.90)	(4.09)
Constant	-0.414***	-0.449***	-0.666***
	(-27.98)	(-29.04)	(-36.35)
Observations	11,850	11,850	11,850
Pseudo R-squared	0.0005	0.0280	0.1841

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, other occupation, other work sector.
+ p<.10, * p<.05, ** p<.01, *** p<.001

The results in Table 9 show that FGCS earn about 1.3 % more than non-FGCS in 2012 and are about 11.6% less likely than non-FGCS to be employed. The earnings result is not significant at the p<.05, p<.01, or p<.001 levels, but the likelihood of employment is significant at the p<.05 level. In the second model, females earn about 19.2% less compared to males, which is significant at the p<.001 level, and they are 7% less likely than males to be employed. Compared to White graduates, Asian graduates earn about 13.8% more even though they are 60.6% less likely than White graduates to be employed. The earnings for Asian graduates is significant at the p<.05 level, and the likelihood of employment is significant at the p<.001 level. In the third model, STEM professionals earn 25% more than those in the other occupation category, and STEM support professionals earn 23.1% more than those in the other occupation category. Both findings are significant at the p<.001 level.

Table 9: Abbreviated 2012 Hurdle Model Results

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
First-Generation	0.013	0.011	0.002
	(0.52)	(0.42)	(0.08)
Female		-0.192***	-0.099***
		(-9.36)	(-5.84)
Low Income		-0.134***	-0.084***

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
		(-5.39)	(-4.08)
Black		0.009	-0.000
		(0.27)	(-0.01)
Hispanic		-0.071+	-0.041
		(-1.96)	(-1.34)
Asian		0.138*	0.013
		(2.53)	(0.35)
STEM			0.163***
			(5.10)
Social Sciences			0.011
			(0.44)
Humanities			-0.055
			(-1.63)
Health			0.361***
			(10.10)
Business			0.139***
			(5.26)
Education			0.008
			(0.25)
Clerical			-0.090*
			(-2.00)
Blue Collar			-0.147
			(-1.29)
Business Support			0.214***
			(6.49)
Sales/Customer Service			0.005
			(0.11)
Legal Professionals			0.224*
			(2.24)
Legal Support			-0.097**
			(-2.82)
STEM Professionals			0.250***
			(5.66)
STEM Support			0.231***
			(6.06)
Educators			-0.0203
			(-0.58)
Human Services			0.0209
			(0.62)
Arts & Humanities			0.022
			(0.30)
Managers			0.133***
			(3.37)
Enrolled in Grad School			-0.0186

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
			(-0.78)
Constant	10.59***	10.44***	10.11***
	(915.99)	(214.62)	(132.61)
selection_ll			
First-Generation	-0.116*	-0.038	-0.048
	(-2.23)	(-0.70)	(-0.87)
Female		-0.070	-0.074+
		(-1.64)	(-1.70)
Black		-0.340***	-0.322***
		(-4.70)	(-4.20)
Hispanic		-0.184**	-0.115
		(-2.62)	(-1.57)
Asian		-0.606***	-0.555***
		(-6.92)	(-6.24)
Enrolled in Grad School			-0.544***
			(-10.25)
Constant	0.894***	1.084***	1.188***
	(39.32)	(9.67)	(6.07)
Constant	-0.459***	-0.479***	-0.705***
	(-17.24)	(-17.51)	(-19.90)
Observations	11,850	11,850	11,850
Pseudo R-squared	0.0004	0.0191	0.1746

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, other occupation.
+ p<.10, * p<.05, ** p<.01, *** p<.001

In Table 10, FGCS in the first model earn about 8.3% less than non-FGCS, and this is significant at the p<.01 level. The lower limit shows that FGCS are also about 4.8% less likely than non-FGCS to be employed ten years after graduation, but this result does not reach traditional significance. In the second model, FGCS earn about 2.8% less than non-FGCS, and the finding is no longer significant. Females earn about 27.1% less than males, which is significant at the p<.001 level. However, females are 36.1% less likely than males to be employed in 2018, which is also significant at the p<.001 level. In the third model, managers earn 21.4% more than those in the other occupation category, which is significant at the p<.001 level.

Table 10: Abbreviated 2018 Hurdle Model Results

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
First-Generation	-0.083**	-0.028	-0.0078
	(-3.27)	(-1.06)	(-0.36)
Female		-0.271***	-0.109***
		(-13.88)	(-6.10)
Low Income		-0.165***	-0.082***
		(-7.08)	(-4.26)
Black		-0.065*	-0.061*
		(-2.00)	(-2.03)
Hispanic		-0.110**	-0.064*
		(-2.97)	(-2.05)
Asian		0.113*	-0.049
		(2.32)	(-1.24)
Other		-0.001	-0.028
		(-0.01)	(-0.60)
Clerical			-0.293***
			(-4.62)
Blue Collar			-0.088
			(-1.30)
Business Support			0.126**
			(3.00)
Sales/Customer Service			0.050
			(0.83)
Legal Professionals			0.390***
			(6.53)
Legal Support			-0.227***
			(-5.19)
STEM Professionals			0.167***
			(4.08)
STEM Support			0.242***
			(6.30)
Educators			-0.090*
			(-2.37)
Human Services			0.036
			(0.98)
Arts & Humanities			-0.067
			(-1.16)
Managers			0.214***
			(5.65)
Enrolled in Grad School			-0.060+
			(-1.67)
Constant	11.05***	11.27***	10.85***

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
	(1007.50)	(218.79)	(134.81)
selection_ll			
First-Generation	-0.048	0.050	0.048
	(-0.81)	(0.81)	(0.78)
Female		-0.361***	-0.373***
		(-7.04)	(-7.24)
Low Income		-0.173**	-0.168**
		(-3.23)	(-3.11)
Black		-0.171*	-0.167*
		(-2.14)	(-2.02)
Hispanic		-0.166*	-0.121
		(-2.05)	(-1.47)
Asian		-0.050	-0.025
		(-0.49)	(-0.25)
Other		-0.096	-0.069
		(-0.69)	(-0.50)
Age		-0.008	-0.008
		(-1.58)	(-1.56)
Enrolled in Grad School			-0.203*
			(-2.29)
Constant	1.185***	1.664***	1.455***
	(45.41)	(13.80)	(6.78)
Constant	-0.454***	-0.486***	-0.695***
	(-26.20)	(-26.87)	(-43.85)
Observations	11,850	11,850	11,850
Pseudo R-squared	0.0010	0.0308	0.1831

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, other occupation.
+ p<.10, * p<.05, ** p<.01, *** p<.001

Overall, it is noteworthy that although FGCS earn more than non-FGCS and are more likely to be employed in 2009, by 2012 and 2018, FGCS are less likely than non-FGCS to be employed. The first three log of income models showed that unlike the pattern seen in the descriptive statistics of FGCS earning significantly more than non-FGCS in 2009, about the same in 2012, and significantly less in 2018, when FGCS is held constant, the significance goes away. However, because I was not able to separate employed from unemployed respondents in

the first three models, the hurdle models helped compare the income of employed FGCS to employed non-FGCS, while also highlighting the fact that FGCS are less likely than non-FGCS to be employed over time.

Because the results for female respondents were significant in many of the models, I did some additional analysis to try to understand the differences in earnings between males and females across the three time periods. Table 11 shows that females earned significantly less than males across all three follow-up periods, with results showing significance at the $p<.001$ level. In 2009, females were just as likely as males to be employed, with employment rates at 82% for both genders. In 2012 and 2018, however, females were significantly less likely than males to be employed. Females were also shown to be significantly more likely than males to be working part-time rather than full-time in 2009, 2012, and 2018. In addition to earning less than males, females were shown to accumulate significantly more debt than males.

As I mentioned earlier, females were likely choosing to work part-time or forgo employment in order to have children or stay home to raise families. There are variables in B&B: 08/18 that further clarify if survey participants were actively seeking employment or not, if the respondents had children, and the number of months between degree attainment and the birth of a child, which had an average of three years after degree completion. However, the hurdle models show that there was still a difference in wages between males and females who were employed.

Table 11: Earnings and Employment Trends by Gender

		Male		**Female**	
		Mean	Std Dev	Mean	Std Dev
Income					
	2009	29,127***	21,562	23,946	17,948

	Male		Female	
	Mean	Std Dev	Mean	Std Dev
2012	41,243***	30,853	32,134	25,724
2018	79,880***	51,273	56,327	42,841
Employed (yes/no)				
2009	0.82	0.38	0.82	0.38
2012	0.80***	0.40	0.77	0.42
2018	0.91***	0.27	0.85	0.36
Employed Part-Time				
2009	0.13	0.33	0.16***	0.37
2012	0.07	0.26	0.12***	0.33
2018	0.05	0.22	0.14***	0.34
Cumulative Debt	41,128	58,246	44,234***	56,187

Similarly, because of the significant coefficients of Asian respondents in many of the 2009 and 2012 models, I was curious if Asian students were more likely than other groups to be in graduate school during the follow-up periods. Table 12 shows that compared to survey respondents who did not identify as Asian, Asian respondents earned significantly less in 2009 and 2012. However, by 2018 Asian respondents earned nearly $20,000 more than non-Asian respondents. Each of these results were significant at the p<.001 level. Consistent with these findings, Asian respondents were significantly more likely than non-Asian respondents to be enrolled in graduate school in 2009 and 2012.

Table 12: Graduate School Enrollment of Asian Respondents

	Asian		Non-Asian	
	Mean	Std Dev	Mean	Std Dev
Income				
2009	22,440	22,332	26,283***	19,443
2012	32,637	30,853	36,033***	27,816
2018	82,540***	60,270	64,754	46,706

	Asian		Non-Asian	
	Mean	Std Dev	Mean	Std Dev
Enrolled in Graduate School				
2009	0.28***	0.45	0.22	0.42
2012	0.25***	0.43	0.17	0.38
2018	0.06	0.24	0.06	0.24

Interaction Effects

It is important to consider whether any of the results of the variables would change in the models if some of the variables were interacted with one another. For example, would FGCS males earn more than FGCS females? The descriptive statistics by FGCS status in table 4 showed the distribution of males who were FGCS and non-FGCS, but that table did not show how these interacted variables change when regressed on income. Because I did not have a theoretical framework that guided which variables to interact and include in the models, I chose to instead run the models with only non-FGCS and again with only FGCS to determine which variables had the strongest results by FGCS status. In the following tables, I share the results of these models.

Table 13: 2009 Linear Regression Results by First-Generation Status

	(1) Non-FGCS	(2) FGCS
Female	-0.061***	0.000
	(-3.39)	(0.01)
Employed Part-Time	-0.675***	-0.697***
	(-21.50)	(-10.38)
Low Income	-0.040*	-0.139***
	(-2.24)	(-3.84)
Black	-0.014	-0.042
	(-0.39)	(-0.82)

	(1) Non-FGCS	(2) FGCS
Hispanic	-0.034	-0.025
	(-1.17)	(-0.49)
Asian	0.028	0.117*
	(0.67)	(2.24)
Other	0.014	-0.096
	(0.41)	(-0.55)
Age	0.021***	0.015***
	(11.52)	(6.58)
Public 4-yr	-0.028	-0.005
	(-1.18)	(-0.13)
Private 4-yr	-0.024	-0.068
	(-0.94)	(-1.35)
Very Selective	0.049*	-0.070
	(2.52)	(-1.28)
Minimally Selective	-0.010	0.006
	(-0.39)	(0.19)
STEM	0.060*	-0.100
	(2.00)	(-1.44)
Social Sciences	-0.038	-0.109
	(-1.28)	(-1.61)
Humanities	-0.145***	-0.056
	(-4.55)	(-0.80)
Health	0.324***	0.168**
	(9.11)	(2.97)
Business	0.080**	0.013
	(3.03)	(0.25)
Education	0.081	-0.057
	(1.57)	(-0.60)
College GPA	0.029	0.066*
	(1.62)	(2.20)
Mideast	0.076*	0.010
	(2.06)	(0.11)
Great Lakes	-0.007	0.072
	(-0.18)	(1.11)
Plains	0.000	0.025
	(0.00)	(0.32)
Southeast	0.023	0.096
	(0.64)	(1.45)
Southwest	0.070	0.129*
	(1.56)	(2.01)
Rocky Mountains	0.041	0.091
	(0.92)	(0.98)
Far West	0.090*	0.080
	(2.43)	(1.08)

	(1) Non-FGCS	(2) FGCS
Clerical	10.20***	10.18***
	(245.87)	(137.58)
Blue Collar	10.25***	10.44***
	(145.36)	(149.72)
Business Support	10.58***	10.54***
	(421.99)	(233.13)
Sales/Customer Service	10.17***	10.08***
	(275.26)	(154.13)
Legal Professionals	9.682***	10.46***
	(42.18)	(22.53)
Legal Support	10.12***	10.23***
	(390.60)	(207.84)
STEM Professionals	10.56***	10.71***
	(304.73)	(133.73)
STEM Support	10.55***	10.68***
	(312.59)	(184.89)
Educators	10.16***	10.05***
	(235.55)	(85.93)
Human Services	10.18***	10.33***
	(392.43)	(246.33)
Arts & Humanities	10.22***	10.06***
	(158.65)	(39.76)
Managers	10.38***	10.46***
	(326.51)	(139.18)
Other Occupation	10.06***	10.13***
	(308.47)	(133.86)
Enrolled in Grad School	-0.180***	-0.048
	(-7.06)	(-0.80)
Constant	-0.517***	-0.525***
	(-6.14)	(-3.53)
Observations	9,320	2,530

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, unemployed.
+ p<.10, * p<.05, ** p<.01, *** p<.001

In 2009, FGCS females did not earn more or less than FGCS males. However, non-FGCS females earned about 6.1% less than non-FGCS males, and this was significant at the p<.001 level. FGCS who were employed part-time earned about 69.7% less than those who were employed full-time, and this was significant at the p<.001 level. FGCS who came from low-income backgrounds

earned about 13.9% less than those who did not come from low-income backgrounds, and this finding was also significant at the p<.001 level.

Table 14: 2012 Linear Regression Results by First-Generation Status

	(1) Non-FGCS	(2) FGCS
Female	-0.252+	-0.182
	(-1.87)	(-0.68)
Employed Part-Time	1.631***	1.242***
	(13.21)	(4.81)
Low Income	-0.087	-0.087
	(-0.62)	(-0.34)
Black	-0.614*	-0.174
	(-2.32)	(-0.50)
Hispanic	-0.172	0.170
	(-0.68)	(0.53)
Asian	-0.950**	-1.390*
	(-3.06)	(-2.34)
Other	-0.330	-0.221
	(-0.94)	(-0.29)
Age	0.017	-0.019
	(1.02)	(-1.18)
Public 4-yr	0.160	0.312
	(0.82)	(0.94)
Private 4-yr	-0.215	0.165
	(-1.02)	(0.44)
Very Selective	0.017	-0.356
	(0.12)	(-1.13)
Minimally Selective	-0.162	-0.166
	(-0.87)	(-0.52)
STEM	-0.319	0.182
	(-1.51)	(0.48)
Social Sciences	-0.575**	-0.362
	(-2.77)	(-0.87)
Humanities	-0.730**	-0.561
	(-3.28)	(-1.12)
Health	0.882***	1.114**
	(3.46)	(2.61)
Business	0.270	0.084
	(1.31)	(0.22)
Education	0.384	0.274

	(1) Non-FGCS	(2) FGCS
	(1.61)	(0.52)
College GPA	-0.186	0.077
	(-1.43)	(0.26)
Mideast	0.460	0.096
	(1.63)	(0.17)
Great Lakes	0.647*	0.313
	(2.34)	(0.54)
Plains	0.689*	0.202
	(2.42)	(0.33)
Southeast	0.209	0.640
	(0.77)	(1.13)
Southwest	-0.328	0.421
	(-0.97)	(0.68)
Rocky Mountains	0.041	-1.058
	(0.12)	(-0.88)
Far West	-0.086	-0.023
	(-0.29)	(-0.04)
Clerical	5.877***	6.015***
	(11.95)	(5.85)
Blue Collar	6.072***	8.079***
	(13.06)	(11.19)
Business Support	6.765***	8.209***
	(17.77)	(14.59)
Sales/Customer Service	5.724***	7.273***
	(13.45)	(11.26)
Legal Professionals	7.279***	8.988***
	(15.95)	(15.13)
Legal Support	5.408***	7.157***
	(14.27)	(13.84)
STEM Professionals	6.886***	8.653***
	(17.03)	(16.11)
STEM Support	6.924***	8.501***
	(18.55)	(16.95)
Educators	5.737***	7.226***
	(16.00)	(13.64)
Human Services	5.534***	7.537***
	(15.11)	(17.02)
Arts & Humanities	5.582***	7.453***
	(10.63)	(9.36)
Managers	7.030***	7.787***
	(20.19)	(14.30)
Other Occupation	5.569***	6.991***
	(14.29)	(12.28)
Enrolled in Grad School	-1.875***	-0.339

	(1) Non-FGCS	(2) FGCS
	(-9.45)	(-1.04)
Constant	3.252***	1.499
	(4.40)	(1.09)
Observations	9319	2526

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, unemployed.
+ p<.10, * p<.05, ** p<.01, *** p<.001

In 2012, FGCS females earned about 18.2% less than FGCS males. In comparison, non-FGCS females earned about 25.2% less than non-FGCS males, and this was significant at the p<.1 level. The interaction of Asian and FGCS showed lower earnings than Asian and non-FGCS, with both results being significant at the p<p.05 level. Again, the log transformation made the results more extreme because unemployed survey respondents were included in the model. FGCS who were enrolled in graduate school in 2012 earned about 33.9% less than those who were not enrolled in graduate school, but this result did not reach traditional significance. As noted from the descriptive statistics discussion, FGCS were more likely than non-FGCS to graduate from Health majors. The results in Table 14 show that FGCS who were Health majors earned significantly more than FGCS who graduated in the "other major" category.

Table 15: 2018 Linear Regression Results by First-Generation Status

	(1) Non-FGCS	(2) FGCS
Female	-0.107***	-0.051
	(-6.11)	(-1.41)
Employed Part-Time	-0.838***	-0.858***
	(-18.80)	(-10.27)
Low Income	-0.080***	-0.051
	(-4.04)	(-1.59)
Black	-0.043	-0.051
	(-1.34)	(-1.17)
Hispanic	-0.054+	-0.086+
	(-1.68)	(-1.89)

	(1) Non-FGCS	(2) FGCS
Asian	-0.061	0.040
	(-1.48)	(0.67)
Other	0.002	-0.092
	(0.05)	(-0.72)
Age	-0.002	0.001
	(-1.05)	(0.29)
Public 4-yr	-0.015	0.088+
	(-0.58)	(1.79)
Private 4-yr	-0.027	0.066
	(-0.98)	(1.19)
Very Selective	0.081***	0.040
	(4.44)	(0.98)
Minimally Selective	-0.072**	0.019
	(-3.17)	(0.49)
STEM	0.158***	0.078
	(5.85)	(1.27)
Social Sciences	0.042	-0.013
	(1.56)	(-0.21)
Humanities	-0.058*	-0.024
	(-1.99)	(-0.36)
Health	0.250***	0.201**
	(7.74)	(3.04)
Business	0.168***	0.128*
	(5.83)	(2.37)
Education	0.010	-0.016
	(0.32)	(-0.21)
College GPA	0.077***	0.038
	(4.43)	(1.09)
Mideast	0.065*	0.038
	(2.08)	(0.60)
Great Lakes	-0.027	0.027
	(-0.80)	(0.44)
Plains	-0.104**	-0.164*
	(-2.64)	(-2.55)
Southeast	-0.063*	-0.036
	(-2.04)	(-0.63)
Southwest	-0.007	0.010
	(-0.22)	(0.15)
Rocky Mountains	-0.054	-0.114
	(-1.26)	(-1.24)
Far West	0.089**	0.182*
	(2.70)	(2.52)
Clerical	10.69***	10.83***
	(167.98)	(103.88)

	(1) Non-FGCS	(2) FGCS
Blue Collar	10.90***	11.11***
	(149.81)	(113.81)
Business Support	11.17***	11.15***
	(361.45)	(256.23)
Sales/Customer Service	11.11***	10.98***
	(199.35)	(95.08)
Legal Professionals	11.42***	11.49***
	(201.50)	(117.71)
Legal Support	10.81***	10.76***
	(295.12)	(173.00)
STEM Professionals	11.20***	11.28***
	(363.40)	(203.96)
STEM Support	11.29***	11.28***
	(433.45)	(201.03)
Educators	10.94***	10.89***
	(496.89)	(191.87)
Human Services	11.07***	11.08***
	(494.99)	(240.16)
Arts & Humanities	10.92***	11.07***
	(201.14)	(101.68)
Managers	11.26***	11.23***
	(442.82)	(217.74)
Other Occupation	11.04***	10.99***
	(342.90)	(115.18)
Enrolled in Grad School	-0.071*	0.041
	(-2.07)	(0.79)
Constant	-0.152+	-0.221
	(-1.82)	(-1.54)
Observations	9,320	2,530

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, unemployed.
+ p<.10, * p<.05, ** p<.01, *** p<.001

In 2018, FGCS females earned about 5.1% less than FGCS males. In comparison, non-FGCS females earned about 10.7% less than non-FGCS males, and this was significant at the p<.001 level. FGCS who graduated with Health majors continued to earn more than FGCS who graduated in the other major category, with Health majors earning 20.1% more than those in the other category. This result was significant at the p<.01 level. FGCS who were located in the

Plains geographical region earned 16.4% less than FGCS from the Northeast, and this result was significant at the p<.05 level.

Table 16: 2009 Hurdle Model Results by First-Generation Status

	(1) Non-FGCS	(2) FGCS
Female	-0.067***	-0.010
	(-3.48)	(-0.24)
Employed Part-Time	-0.668***	-0.717***
	(-21.94)	(-10.94)
Low Income	-0.051*	-0.140***
	(-2.50)	(-3.89)
Black	-0.003	-0.084
	(-0.07)	(-1.45)
Hispanic	-0.042	-0.030
	(-1.20)	(-0.72)
Asian	0.031	0.088
	(0.55)	(1.64)
Other	0.002	-0.143
	(0.07)	(-0.76)
Age	0.023***	0.016***
	(11.75)	(6.44)
Very Selective	0.052*	-0.019
	(2.49)	(-0.38)
Minimally Selective	-0.007	-0.007
	(-0.28)	(-0.20)
STEM	0.057+	-0.033
	(1.70)	(-0.50)
Social Sciences	-0.049	-0.069
	(-1.61)	(-1.14)
Humanities	-0.193***	-0.078
	(-5.41)	(-0.89)
Health	0.378***	0.212***
	(9.66)	(3.59)
Business	0.086**	0.048
	(2.96)	(0.88)
Education	0.084*	-0.114
	(2.12)	(-1.41)
College GPA	0.010	0.063+
	(0.54)	(1.77)
Mideast	0.091*	0.182*
	(2.12)	(2.25)
Great Lakes	-0.003	0.151+

	(1) Non-FGCS	(2) FGCS
	(-0.07)	(1.95)
Plains	-0.003	0.107
	(-0.07)	(1.19)
Southeast	0.024	0.177*
	(0.58)	(2.27)
Southwest	0.100*	0.246**
	(2.17)	(3.12)
Rocky Mountains	0.035	0.163
	(0.68)	(1.35)
Far West	0.106*	0.164+
	(2.41)	(1.90)
Clerical	0.143**	0.035
	(2.77)	(0.36)
Blue Collar	0.178*	0.296***
	(2.42)	(3.35)
Business Support	0.505***	0.397***
	(12.86)	(5.03)
Sales/Customer Service	0.102*	-0.058
	(2.25)	(-0.65)
Legal Professionals	-0.329	0.330
	(-1.39)	(0.72)
Legal Support	0.061	0.095
	(1.60)	(1.09)
STEM Professionals	0.492***	0.526***
	(10.70)	(5.00)
STEM Support	0.478***	0.495***
	(10.63)	(5.59)
Educators	0.176***	0.066
	(4.06)	(0.70)
Human Services	0.102**	0.181*
	(2.62)	(2.37)
Arts & Humanities	0.176*	-0.080
	(2.50)	(-0.31)
Managers	0.311***	0.298**
	(7.31)	(3.01)
Enrolled in Grad School	-0.238***	-0.047
	(-8.05)	(-0.70)
Constant	9.530***	9.470***
	(108.71)	(66.68)
selection_ll		
Female	0.020	0.015
	(0.39)	(0.14)
Low Income	-0.183**	-0.149
	(-3.01)	(-1.39)

	(1) Non-FGCS	(2) FGCS
Black	-0.142	-0.070
	(-1.45)	(-0.45)
Hispanic	-0.204*	0.063
	(-2.11)	(0.44)
Asian	-0.349***	-0.789***
	(-3.37)	(-4.35)
Other	0.366**	0.434
	(3.02)	(1.38)
Age	0.015*	-0.002
	(2.28)	(-0.22)
College GPA	-0.042	0.274*
	(-0.76)	(2.31)
Mideast	0.012	-0.081
	(0.10)	(-0.37)
Great Lakes	0.132	0.323
	(1.11)	(1.39)
Plains	0.148	0.844**
	(1.13)	(3.03)
Southeast	0.018	0.196
	(0.16)	(0.91)
Southwest	0.008	0.016
	(0.06)	(0.06)
Rocky Mountains	0.105	-0.249
	(0.72)	(-0.62)
Far West	-0.064	0.044
	(-0.52)	(0.20)
Enrolled in Grad School	-0.630***	-0.607***
	(-11.40)	(-4.78)
Constant	0.974***	0.326
	(3.75)	(0.72)
Constant	-0.668***	-0.695***
	(-34.20)	(-14.30)
Observations	9,320	2,530

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, other occupation.
+ p<.10, * p<.05, ** p<.01, *** p<.001

The results of the 2009 hurdle model with interacted variables shows that for FGCS females who were employed, earnings were about 1% lower than FGCS males who were employed. FGCS females were about 1.5% more likely than FGCS males to be employed, but

neither of these results were significant at the p<.05, p<.01, or p<.001 levels. FGCS females from low-income backgrounds earned about 14% less than those who were not from low-income backgrounds, and this finding was significant at the p<.001 level. FGCS from low-income backgrounds were also 14.9% less likely than survey respondents who were not from low-income backgrounds to be employed in 2009, but this did not reach traditional significance. FGCS from the Plains region who were employed earned 10.7% more than employed FGCS from the Northeast. This finding did not reach traditional significance. However, FGCS from the Plains were 84.4% more likely than FGCS from the Northeast to be employed in 2009.

Table 17: 2012 Hurdle Model Results by First-Generation Status

	(1) Non-FGCS	(2) FGCS
Female	-0.103***	-0.073+
	(-5.44)	(-1.93)
Employed Part-Time	-0.918***	-0.960***
	(-22.81)	(-11.26)
Low Income	-0.081**	-0.106**
	(-3.28)	(-2.94)
Black	-0.002	-0.007
	(-0.05)	(-0.14)
Hispanic	-0.043	-0.043
	(-1.12)	(-0.92)
Asian	-0.019	0.114+
	(-0.42)	(1.74)
Other	0.045	0.021
	(1.03)	(0.24)
Age	0.013***	0.006*
	(6.05)	(2.17)
Very Selective	0.060**	0.043
	(2.71)	(0.96)
Minimally Selective	-0.015	-0.031
	(-0.56)	(-0.81)
STEM	0.175***	0.106
	(4.90)	(1.60)
Social Sciences	0.026	-0.056
	(0.92)	(-0.93)

	(1) Non-FGCS	(2) FGCS
Humanities	-0.052	-0.071
	(-1.42)	(-0.83)
Health	0.351***	0.366***
	(8.03)	(6.64)
Business	0.155***	0.080
	(5.16)	(1.47)
Education	0.000	0.022
	(0.01)	(0.30)
College GPA	0.077***	0.083*
	(3.69)	(2.31)
Mideast	0.113**	0.080
	(3.03)	(1.19)
Great Lakes	-0.014	-0.038
	(-0.36)	(-0.51)
Plains	0.012	-0.124
	(0.30)	(-1.35)
Southeast	-0.031	-0.056
	(-0.87)	(-0.84)
Southwest	0.074+	0.048
	(1.77)	(0.65)
Rocky Mountains	-0.058	-0.136
	(-0.81)	(-1.41)
Far West	0.130**	0.143+
	(3.17)	(1.78)
Clerical	-0.093+	-0.086
	(-1.88)	(-0.79)
Blue Collar	-0.179	0.021
	(-1.41)	(0.12)
Business Support	0.209***	0.224**
	(5.86)	(2.59)
Sales/Customer Service	0.036	-0.127
	(0.71)	(-1.08)
Legal Professionals	0.228*	0.109
	(2.15)	(0.48)
Legal Support	-0.108**	-0.058
	(-2.99)	(-0.61)
STEM Professionals	0.239***	0.267**
	(4.94)	(2.59)
STEM Support	0.223***	0.272**
	(5.37)	(3.01)
Educators	-0.014	-0.048
	(-0.38)	(-0.50)
Human Services	0.006	0.068
	(0.15)	(0.78)

	(1) Non-FGCS	(2) FGCS
Arts & Humanities	0.003	0.161
	(0.04)	(0.98)
Managers	0.112**	0.225*
	(2.64)	(2.19)
Enrolled in Grad School	-0.009	-0.061
	(-0.35)	(-0.93)
Constant	10.04***	10.24***
	(113.77)	(66.02)
selection_ll		
Female	-0.075	-0.085
	(-1.55)	(-0.85)
Low Income	-0.015	-0.112
	(-0.26)	(-1.13)
Black	-0.337***	-0.267+
	(-3.70)	(-1.85)
Hispanic	-0.133	-0.098
	(-1.47)	(-0.75)
Asian	-0.447***	-0.825***
	(-4.44)	(-4.54)
Other	-0.222+	-0.181
	(-1.82)	(-0.71)
Age	0.001	-0.019**
	(0.23)	(-2.73)
College GPA	-0.089+	0.093
	(-1.75)	(0.84)
Mideast	0.189+	0.151
	(1.89)	(0.83)
Great Lakes	0.404***	0.511**
	(3.93)	(2.61)
Plains	0.411***	0.365+
	(3.59)	(1.72)
Southeast	0.223*	0.572**
	(2.31)	(3.11)
Southwest	0.005	0.527*
	(0.04)	(2.43)
Rocky Mountains	0.148	0.118
	(1.17)	(0.33)
Far West	0.102	0.344+
	(0.99)	(1.80)
Enrolled in Grad School	-0.612***	-0.285*
	(-10.37)	(-2.30)
Constant	1.183***	0.914*
	(5.15)	(2.18)

	(1) Non-FGCS	(2) FGCS
Constant	-0.700*** (-17.08)	-0.745*** (-12.63)
Observations	9,320	2,530

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, other occupation.
+ p<.10, * p<.05, ** p<.01, *** p<.001

In 2012, FGCS females who were employed earned 7.3% less than employed FGCS males, and this finding was significant at the p<.1 level. FGCS females were also 8.5% less likely than FGCS males to be employed in 2012, but this finding did not reach traditional significance. Employed FGCS who graduated from STEM majors earned 10.6% more than FGCS who graduated from "other majors", but this finding was not significant at the p<.1, p<.05, p<.01, or p<.001 levels. Employed FGCS who identified as Asian earned 11.4% more than FGCS who identified as White, and this result was significant at the p<.1 level. Asian FGCS were also 82.5% less likely than White FGCS to be employed in 2012, which was significant at the p<.001 level. Employed FGCS who were enrolled in graduate school earned 6.1% less than employed FGCS who were not in graduate school. This finding was not significant at the traditional confidence levels. However, FGCS who were enrolled in graduate school were 28.5% less likely to be employed than FGCS who were not in graduate school. This finding was significant at the p<.05 level.

Table 18: 2018 Hurdle Model Results by First-Generation Status

	(1) Non-FGCS	(2) FGCS
Female	-0.119*** (-6.08)	-0.062 (-1.48)
Employed Part-Time	-0.836*** (-18.78)	-0.860*** (-10.33)

	(1) Non-FGCS	(2) FGCS
Low Income	-0.091***	-0.053
	(-4.05)	(-1.44)
Black	-0.053	-0.072
	(-1.42)	(-1.41)
Hispanic	-0.047	-0.104*
	(-1.25)	(-1.97)
Asian	-0.070	0.025
	(-1.53)	(0.33)
Other	-0.014	-0.116
	(-0.29)	(-0.69)
Age	-0.002	-0.001
	(-1.11)	(-0.19)
Very Selective	0.090***	0.063
	(4.42)	(1.31)
Minimally Selective	-0.083**	0.023
	(-3.28)	(0.52)
STEM	0.178***	0.109
	(5.90)	(1.55)
Social Sciences	0.048	-0.006
	(1.57)	(-0.09)
Humanities	-0.066*	-0.023
	(-1.98)	(-0.29)
Health	0.290***	0.245**
	(7.62)	(3.19)
Business	0.195***	0.158*
	(5.94)	(2.48)
Education	0.003	-0.006
	(0.09)	(-0.07)
College GPA	0.087***	0.034
	(4.42)	(0.86)
Mideast	0.071*	0.053
	(2.01)	(0.73)
Great Lakes	-0.029	0.045
	(-0.77)	(0.63)
Plains	-0.116**	-0.177*
	(-2.67)	(-2.36)
Southeast	-0.071*	-0.025
	(-2.02)	(-0.38)
Southwest	-0.003	0.026
	(-0.08)	(0.34)
Rocky Mountains	-0.059	-0.098
	(-1.21)	(-0.94)
Far West	0.104**	0.229**
	(2.77)	(2.72)

	(1) Non-FGCS	(2) FGCS
Clerical	-0.332***	-0.181
	(-4.69)	(-1.31)
Blue Collar	-0.143+	0.110
	(-1.82)	(0.81)
Business Support	0.124**	0.147
	(2.74)	(1.40)
Sales/Customer Service	0.071	-0.022
	(1.12)	(-0.15)
Legal Professionals	0.375***	0.473***
	(5.94)	(3.42)
Legal Support	-0.220***	-0.238*
	(-4.63)	(-2.13)
STEM Professionals	0.147***	0.270*
	(3.44)	(2.39)
STEM Support	0.238***	0.260*
	(6.03)	(2.30)
Educators	-0.092*	-0.101
	(-2.40)	(-0.86)
Human Services	0.025	0.087
	(0.65)	(0.83)
Arts & Humanities	-0.109+	0.080
	(-1.76)	(0.55)
Managers	0.213***	0.227*
	(5.41)	(2.07)
Grad School	-0.078+	0.044
	(-1.92)	(0.69)
Constant	10.85***	10.87***
	(116.90)	(62.17)
selection_ll		
Female	-0.405***	-0.249*
	(-7.11)	(-2.10)
Low Income	-0.158*	-0.229*
	(-2.50)	(-2.09)
Black	-0.127	-0.258+
	(-1.28)	(-1.71)
Hispanic	-0.143	-0.102
	(-1.44)	(-0.68)
Asian	0.059	-0.248
	(0.49)	(-1.24)
Other	0.039	-0.412
	(0.23)	(-1.61)
Age	-0.002	-0.020**
	(-0.32)	(-2.61)
College GPA	-0.018	0.263*

	(1) Non-FGCS	(2) FGCS
	(-0.30)	(2.23)
Mideast	0.173	0.212
	(1.62)	(0.98)
Great Lakes	0.173	0.272
	(1.61)	(1.35)
Plains	0.213+	-0.008
	(1.77)	(-0.03)
Southeast	0.138	0.242
	(1.41)	(1.34)
Southwest	0.006	-0.188
	(0.05)	(-0.84)
Rocky Mountains	0.115	-0.063
	(0.87)	(-0.16)
Far West	0.102	-0.031
	(0.94)	(-0.15)
Enrolled in Grad School	-0.179+	-0.336+
	(-1.83)	(-1.71)
Constant	1.494***	1.108*
	(5.89)	(2.49)
Constant	-0.698***	-0.703***
	(-39.13)	(-20.57)
Observations	9,320	2,530

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, other occupation.
+ p<.10, * p<.05, ** p<.01, *** p<.001

In 2018, employed FGCS females earned 6.2% less than employed FGCS males, but this result did not reach traditional significance. FGCS females were 24.9% less likely than FGCS males to be employed in 2018, and this result was significant at the p<.05 level. In comparison, non-FGCS females were 40.5% less likely than non-FGCS males to be employed in 2018, which was significant at the p<.001 level. FGCS who identified as Hispanic earned 10.4% less than FGCS who identified as White, and this result was significant at the p<.05 level. Hispanic FGCS were 10.2% less likely than White FGCS to be employed, but this result did not reach traditional significance. FGCS who graduated from Health majors earned 24.5% more than FGCS who

graduated from “other majors”, and this was significant at the p<.01 level. FGCS living in the Far West geographic region earned 22.9% more than FGCS living in the Northeast, and this was significant at the p<.01 level. FGCS living in the Far West were 3.1% less likely than FGCS living in the Northeast to be employed in 2018. However, this result did not reach traditional significance.

How Results Relate to Theories

After building each of the models and interpreting the results, it was important to consider if the results of the models aligned with the predicted results of the theories mentioned in Chapter 2.

Human Capital theorists would likely argue that although FGCS would earn less than non-FGCS in general because they are less likely to attend and complete college, FGCS graduates should not have earnings significantly different from their non-FGCS peers who graduated from college because both groups acquired additional credentials that will be rewarded in the job market. Consistent with this assertion, the results of each of the models with regard to the earnings of FGCS concluded that FGCS did not have earnings statistically different from non-FGCS.

Social Capital theorists would argue that although FGCS graduates completed the same academic milestone as non-FGCS, FGCS may have lower levels of social capital that would make them earn less than non-FGCS. Newer research on the academic resilience of FGCS (Morales, 2014; Nelson, 2020), indicates that perhaps FGCS possess a great deal of social capital, as it is more challenging for them to navigate and successfully complete college than non-FGCS. By persisting, they prove that they have social capital. Because the results of the models show that FGCS do not have statistically different incomes than non-FGCS across the

three follow-up periods when holding FGCS status constant, my original predictions of Social Capital theorists assuming that FGCS would have lower incomes than non-FGCS was incorrect.

Finally, Social Cognitive Career theorists are more interested in how FGCS choose their careers than predicting the differences in income between FGCS and non-FGCS. However, because Social Cognitive Career theorists believe that FGCS mimic the behaviors of non-FGCS in order to navigate and complete college, these theorists would likely assume that there would not be differences in the incomes of these groups. Consistent with that assumption, no statistically significant differences were found.

CHAPTER 5

DISCUSSION

In the final chapter of this dissertation, I reflect on the beginning of the study, starting with why this topic is important. I then review the research questions and the analytic plan used for the study. Afterwards, I summarize the findings and limitations. I discuss the implications of the study and propose areas for future research as well as policy implications. I will conclude with an overall summary of the dissertation.

Various stakeholders across the United States are calling for increased transparency regarding post-collegiate outcomes for students. Going to college may be a rite of passage, but it is not enough to simply attend college. Graduating and earning a livable wage while not incurring substantial debt are the true goals for students who hope to use higher education as a means toward upward social mobility. Federal initiatives such as the College Scorecard and the Gainful Employment rule of the Higher Education Act require college administrators to be mindful of student outcomes rather than focusing on matriculation alone. The recent Supreme Court ruling to ban race-conscious admissions decisions will also impact the way college administrators recruit and diversify their student bodies.

Millennials and Gen-Xers are pushing for national loan forgiveness, claiming that the increased cost of college and ultimately the debt they took on to attend college is impairing their ability to own homes, purchase cars, and even grow their families. While politicians argue whether loan forgiveness is necessary or even fair for those who chose to attend college, it is

important to understand if any subgroups are at more of a disadvantage than college students as a whole in terms of earning a livable wage and repaying debt after college.

Trying to better understand the postbaccalaureate and labor market outcomes of FGCS, I designed this study with a few research questions in mind: 1) Controlling for the effects of other factors, are FGCS earning significantly more or less than non-FGCS one year, four years, and ten years after the completion of a baccalaureate degree? 2) Separating cases where graduates are not generating any income, are FGCS earning significantly more or less than non-FGCS one year, four years, and ten years after the completion of a baccalaureate degree?

Summary of Findings

At the onset of this study, I chose to examine earnings through use of linear regression models. Because the initial models contained both employed and unemployed individuals, the results revealed whether certain groups earned more than others, but they did not show how likely certain groups were to be employed. Therefore, I added hurdle models that conducted the analysis in two parts: the first part of the analysis separated cases where individuals did not report any income. The second part of the analysis included only cases with reported income. Using the hurdle model showed both how much employed individuals in particular groups earned compared to earners in the reference categories as well as how likely particular groups were to be employed compared to individuals in the reference categories.

Although FGCS appeared to earn significantly less than non-FGCS ten years after graduating from college when comparing means alone, the regression analyses showed that the significance went away when holding first-generation status constant and adding other variables to the equation. This suggests that other influences, such as gender and occupation, may be contributing to the differences in earnings between the groups.

In the log of income results, FGCS earned less than non-FGCS in 2009, slightly more than non-FGCS in 2012, and slightly less than non-FGCS in 2018. However, none of these findings were significant at the traditional confidence levels. In the hurdle model results, FGCS who were employed earned slightly less than non-FGCS who were employed in 2009 and 2018 and slightly more than non-FGCS who were employed in 2012. These results were not significant at the traditional confidence levels either. Conversely, FGCS were more likely than non-FGCS to be employed in 2009 and 2018 but less likely than non-FGCS to be employed in 2012. However, these results did not reach traditional significance.

Overall, females were shown to earn significantly less than males in the majority of the models. Additional analysis revealed that females were more likely than males to work part-time and to be unemployed across most time periods. Additional interaction effects, such as females being underrepresented in particular occupations or college majors could have contributed to the lower wages. Females were also less likely to be working four years and ten years after college completion, which are time periods when many women may be out of the workforce in order to start families or choose to stay home while raising young children.

Asian respondents also had surprising results in many of the models. Because Asian respondents were significantly more likely than non-Asian respondents to be in graduate school in 2009 and 2012, their lower wages in these timeframes are not entirely unexpected. In 2018, when Asian respondents were not more likely than non-Asian respondents to be in graduate school, the average salary of Asians was $20,000 higher than non-Asians. The reason Asian respondents earned high incomes at that time is presumably because by 2018 they were out of graduate school and had entered the workforce.

As a final measure of analysis, I reran each of the models with only non-FGCS and again with only FGCS to determine the interaction effects of the variables on FGCS status. Although Table 4 showed the distribution of the variables by FGCS status, it was important to see how the variables changed when regressed on income.

How Findings Relate to Similar Studies

The findings from this study are consistent with the findings from Manzoni and Streib (2019) and Adamecz-Völgyi et al. (2023), concluding that when held constant, FGCS do not earn less than non-FGCS after the completion of a baccalaureate degree. However, my study follows up with participants in the early stages of their career and ten years into their career rather than the ten-year mark alone. My study also uses a unique approach to analyzing earnings by comparing the metrics of both employed and unemployed FGCS rather than only employed FGCS.

In terms of what the theoretical frameworks would have predicted for the findings of this study, there are mixed results. Overall, Human Capital Theory has the most explanatory power. Human Capital theorists would have predicted the income of FGCS and non-FGCS to be similar, given that both groups earned a college degree and increased skills that would be desirable in the workforce. If this study were on all FGCS rather than FGCS graduates, Human Capital theorists would likely have predicted that FGCS would earn less than non-FGCS because FGCS are less likely to attend and complete college. Social Capital theorists would not be surprised by the lower earnings of females compared to males and underrepresented minorities compared to non-minorities given the differences in social capital between these groups but may be surprised that FGCS do not earn less than non-FGCS. Social Cognitive Career theorists would point to

occupation as a critical factor for earnings and assume that FGCS would mimic their peers when persisting through college and choosing careers.

Limitations

Although it was important to empirically study the labor market outcomes of FGCS by comparing the income of FGCS to the income of non-FGCS, it is also important to address the limitations of this study. One major limitation is that the students in the study graduated during a major recession, which could impact which jobs they chose and whether or not they chose to attend graduate school. As Rothstein (2021) explains, the effects of the 2008 Great Recession have had dire impacts on the labor market outcomes of groups such as Millennials even to this day. He mentions that the generation after Millennials, Gen-Z, is experiencing similar losses in the percentage of workers expected to be in the job market (2% missing from the current labor market vs. 3% missing respectively), but Gen-Z is not experiencing stagnant wages compared to Millennials. Because the Great Recession disrupted the career paths and potentially the income of students who graduated around 2008, conducting this study at a different time period might yield different results. However, because the literature on first-generation students suggests that FGCS may earn less than their non-FGCS peers and are less likely to attend graduate school regardless of the labor market, examining this group during a recession helps to highlight the differences between the two groups, not distract from them. Theoretically, it would be more difficult for students with less social capital to find jobs during a recession, so exhibiting that FGCS graduates were just as likely to find employment in 2009, 2012, and 2018 but had significantly less income ten years into their career demonstrates that perhaps it was helpful to conduct this analysis using a time period in which a recession occurred.

Another limitation is that income in B&B 08:18 is self-reported, which means that students may not have reported their true income. In order to mitigate the effects of students not reporting their true income, I removed income outliers from the population and used log of income in the models. Showing percent change rather than unit change reduces the effects of outliers.

This study also uses survey data that is collected across four time periods (2008, 2009, 2012 and 2018). As such, some of the survey questions changed or had slight variations between these time periods. For example, the income variables for 2009, 2012, and 2018 had to be carefully selected in order show a standard reporting of income across time. Some of the income variables showed only income for current job, showed income in units that had to be converted to an annual rate, or only surveyed students who were working, which forced me to convert legitimate skips to zeros in order to show both unemployed and employed outcomes in the models. For the geographic location variables, because measures of rurality were not available, I used region of residence variables for 2009 and 2018. I had to construct regions of residence for 2012 from the state of residence variable. Similarly, B&B: 08/18 did not contain parental education information apart from "mother's highest education" and "father's highest education". Surveys such as the Education Longitudinal Study account for non-traditional family units, such as step-parents and students being raised by grandparents, which allows for a more nuanced analysis of parental education. B&B only provided this additional family information for dependent students, which excluded much of the sample, many of whom were first-generation. Therefore, I was only able to construct first-generation status using the more restrictive "mother's highest education" and "father's highest education" variable. Although variable

selection proved challenging in this study, I was able to work with the dataset to modify some of the variables and standardize the analysis to the best of my ability when needed.

Implications for Future Research

This dissertation helps add to the minimal literature that exists on the labor market outcomes of first-generation college students. However, there are related topics that should be explored further in the future. My dissertation focuses on the employment patterns and salary outcomes of going to college, but there are other postbaccalaureate outcomes that could be studied further. For example, it would be helpful to know whether the Covid-19 pandemic has led more FGCS to work part-time rather than full-time or whether FGCS are more likely than non-FGCS to work more than one job. Researchers could also apply the same methods I used with different datasets or with different administrations of Baccalaureate & Beyond to determine if the results of the models are the same over time.

Another idea for future work would be to use a different definition of FGCS in a follow-up study. I used the strictest definition of FGCS, parents who did not *attend* college. In a future study, it would be interesting to see how the students of parents who did not *complete* college or how continuing generation college students fare in the labor market compared to non-FGCS.

I also studied the outcomes of first-generation college *graduates*, a group that defied the odds and completed college. More work could be done to continue the work of studying the labor market outcomes of first-generation students who do not successfully complete college and may end up with college debt and no college credential.

Policy Implications

Just as policymakers are holding colleges and universities accountable for the post-collegiate outcomes of all students, policymakers looking to help first-generation college

students should focus specifically on the labor market outcomes of this group. Although literature does exist on this topic, it is very sparse. Supporting research on the outcomes of FGCS from various viewpoints would be beneficial to higher education researchers and college administrators.

Even though the results of this study suggest there is not a significant difference in the earnings of FGCS and non-FGCS holding other variables constant, more work could be done to compare the outcomes of these two groups. Many FGCS choose not to attend college, and many who start college do not complete college. In addition to supporting more research on the post-collegiate outcomes of FGCS in general, policymakers should continue to support pipeline initiatives that encourage FGCS to attend, persist in, and successfully complete college.

It is possible that as college administrators move away from making race-conscious admissions decisions due to the recent Supreme Court ruling, colleges and universities will try to increase their FGCS populations in order to diversify their student bodies. Policymakers should be equipped with empirical evidence on how to help these students succeed in college and eventually in the workforce.

Summary and Conclusion

In this study, I examined the labor market outcomes of FGCS, with emphasis on earnings after baccalaureate completion. Despite observing an initial pattern of FGCS earning significantly more than non-FGCS one year after college, about the same as non-FGCS four years after college, and significantly less than non-FGCS ten years after college, further examination through linear regression analysis and hurdle modeling revealed that FGCS status was no longer significant when held constant. Gender and occupation accounted for much of the difference in means. However, because there have been very few studies to date on the labor

market outcomes of FGCS graduates, it was important to empirically study the labor market outcomes of FGCS compared to non-FGCS using recently available, nationally representative data. This study was also unique in examining earnings of FGCS and non-FGCS over time rather than in the early career alone. Because the results of this study indicate that FGCS who have graduated from college tend to have labor force participation and earnings similar to their non-FGCS peers, more work should be done to help FGCS attend and complete college rather than focusing on FGCS graduates alone.

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APPENDIX A: Variable Descriptions

Variable	NCES Name	NCES Variable Description
Annualized salary for current job in 2009	B1ERNINC	Indicates the respondent's income from their current job as of the B&B:09 interview, multiplied to compute an annual salary if reported as a monthly, biweekly, weekly, daily, or hourly rate. For respondents with multiple jobs, salary is only for the primary job, the job at which the respondent worked the most hours. Source: B&B:09 Interview.
Annualized salary for all jobs in 2012	B2INC12	Sum of the respondent's income, from all jobs in which the respondent was employed as of the B&B:12 interview, calculated on an annual basis. Source: B&B:12 Interview
Annualized salary for all current jobs, as of B&B:08/18 interview	B3INC18	Sum of the respondent's income, from all jobs in which the respondent was employed as of the B&B:18 interview. Respondents could report salary in annual, monthly, weekly, or hourly amounts. Annual amounts were included as reported; monthly amounts were multiplied by 12; weekly amounts were multiplied by 52; and hourly amounts were multiplied by the number of hours the respondent reported working at that job per week, then multiplied by 52. Source: B&B:08/18 Interview
Mother's highest education level	PMOMED	Mother's highest level of education. First based on the student interview; if not available, the federal financial aid application was used. Source: NPSAS:08 Interview, FAFSA:08
Father's highest education level	PDADED	Father's highest level of education. First based on the student interview; if not available, the federal financial aid application was used. Source: NPSAS:08 Interview, FAFSA:08
Gender	GENDER	Indicates student's gender. First based on the student interview; if not

		available, then institutional records. If both were not available, the federal financial aid application was used. Source: NPSAS:08 Interview, NPSAS:08 Institutional Records, FAFSA:08
Age in 2009	B1AGE	Indicates the respondent's age (in years) as of the B&B:09 interview. Source: B&B:09 Interview
Race: Asian	RAASIAN	Student is Asian. First based on student interview; if not available, then institutional records were used. Source: NPSAS:08 Interview, NPSAS:08 Institutional Records
Race: Black or African American	RABLACK	Student is Black or African-American. First based on student interview; if not available, then institutional records were used. Source: NPSAS:08 Interview, NPSAS:08 Institutional Records
Race: American Indian or Alaska Native	RAINDIAN	Student is Native American or Alaska Native. First based on student interview; if not available, then institutional records were used. Source: NPSAS:08 Interview, NPSAS:08 Institutional Records
Race: Native Hawaiian or other Pacific Islander	RAISLAND	Student is Native Hawaiian or other Pacific Islander. First based on student interview; if not available, then institutional records were used. NPSAS:08 Interview, NPSAS:08 Institutional Records
Race: Other	RAOTHER	Student is of a race other than the following: -White -Black or African American -Asian -American Indian or Alaska Native -Native Hawaiian or other Pacific Islander Based primarily on the student interview. This category was not included in the institutional records. If institutional records are the only source for the race variables, this was set to zero. Source: NPSAS:08 Interview, NPSAS:08 Institutional Records
Race: White	RAWHITE	Student is White. First based on student interview; if not available, then institutional records were used. Source:

		NPSAS:08 Interview, NPSAS:08 Institutional Records
Race: Hispanic or Latino origin	HISPANIC	Student is of Hispanic or Latino origin. First based on the student interview; if not available, then institutional records were used. See HISPTYPE for type of Hispanic or Latino origin. Source: NPSAS:08 Interview, NPSAS:08 Institutional Records
Dependency status	DEPEND	Student's dependency status during the 2007-08 academic year. Source: FAFSA:08, NPSAS:08 Interview, NPSAS:08 Institutional Records
Low-Income status	CINCOME	Total income in 2006 for independent students (DEPEND=2) or parents of dependent students (DEPEND=1). The 2006 calendar year income was used in the federal need analysis to determine financial aid eligibility for the 2007-08 academic year. This is a continuous variable. Low income is defined as $25,000 or below.
Part-Time Employment in 2009	B1LFP09	Indicates the respondent's level of labor force participation and enrollment as of the B&B:09 interview.
Part-Time Employment in 2012	B2EMPRT	Indicates the respondent's employment intensity across all jobs held as of the B&B:12 interview. This variable is based on respondent-reported full time/part time status for each job, not hours worked per week.
Part-Time Employment in 2018	B3EMPSTAT18	Indicates the respondent's employment status considering all current jobs and whether the respondent was searching for employment as of the B&B:08/18 interview.
Grade point average in high school	HSGPA	High school grade point average on the standardized test date, according to self-report on test questionnaire. For a number of students, both College Board and ACT score reports were available. In these cases, high school grade and curriculum information from the more recent test date was used. Source: ACT, College Board

Enrolled in Grad/Prof School in 2009	B1ENRST	Indicates the respondent's enrollment in a degree or certificate program at the time of the B&B:09 interview. Source: B&B:09 Interview.
Enrolled in Grad/Prof School in 2012	B2CURDEG	Indicates the type of degree or certificate program in which the respondent was enrolled as of the B&B:12 interview. Source: B&B:12 Interview.
Enrolled in Grad/Prof School in 2018	B3CURENR	Indicates whether the respondent was currently enrolled in a degree or certificate program as of the B&B:08/18 interview.
College Major	MAJORS4Y	Field of study: undergraduate (10 categories). Source: Derived from ACG/SMART grant files, NPSAS:08 Interview.
Highest Degree	B3HIDEG	Highest degree completed between BA completion and B&B:08/18 interview.
Cumulative Debt	B2BORAT	Cumulative amount borrowed for education as of 2012.
2009 Region	B1REGION	Region of residence in 2009.
2012 Region	B2STCDR	Derived from state of residence in 2012.
2018 Region	B3REGION	Region of residence in 2018.
2009 Occupation	B1OCC33	Occupation, 33 categories, in 2009.
2012 Occupation	B2CJOCC33	Occupation, 33 categories, in 2012.
2018 Occupation	B3CJOCC33	Occupation, 33 categories, in 2018.
Institution Type	AIDSECT	Institution sector (with multiple).
Institution Selectivity	SELECTV2	Selectivity (4-year institutions).

APPENDIX B: 2009 Linear Regression Results

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
First-Generation	0.120	0.141	-0.031
	(0.85)	(0.97)	(-1.50)
Female		-0.102	-0.047**
		(-0.90)	(-2.80)
Low Income		-0.411**	-0.060***
		(-3.07)	(-3.69)
Black		-0.520*	-0.029
		(-2.41)	(-0.97)
Hispanic		-0.454*	-0.040
		(-2.29)	(-1.56)
Asian		-1.492***	0.044
		(-4.64)	(1.36)
Other		0.497*	-0.016
		(2.53)	(-0.38)
Age		0.054***	0.019***
		(5.08)	(12.98)
Employed Part-Time			-0.685***
			(-23.97)
Public 4-yr			-0.030
			(-1.43)
Private 4-yr			-0.033
			(-1.43)
Very Selective			0.028
			(1.54)
Minimally Selective			-0.005
			(-0.25)
STEM			0.035

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
			(1.28)
Social Sciences			-0.050+ (-1.85)
Humanities			-0.134*** (-4.62)
Health			0.300*** (10.08)
Business			0.070** (2.99)
Education			0.052 (1.13)
College GPA			0.032* (2.08)
Mideast			0.069* (2.00)
Great Lakes			0.008 (0.25)
Plains			0.009 (0.25)
Southeast			0.038 (1.22)
Southwest			0.093* (2.38)
Rocky Mountains			0.047 (1.15)
Far West			0.095** (2.82)
Clerical			10.19*** (282.50)

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Blue Collar			10.30***
			(177.34)
Business Support			10.58***
			(480.09)
Sales/Customer Service			10.16***
			(308.20)
Legal Professionals			9.774***
			(45.00)
Legal Support			10.15***
			(441.39)
STEM Professionals			10.59***
			(331.91)
STEM Support			10.58***
			(361.12)
Educators			10.15***
			(242.30)
Human Services			10.21***
			(455.75)
Arts & Humanities			10.20***
			(152.98)
Managers			10.40***
			(341.54)
Other Occupation			10.07***
			(335.58)
Enrolled in Grad School			-0.156***
			(-6.59)
Constant	8.590***	7.590***	-0.490***
	(141.77)	(27.88)	(-6.72)
Observations	11,850	11,850	11,850
R-squared	0.0002	0.0178	0.9775

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, "unemployed" occupation.

+ p<.10, * p<.05, ** p<.01, *** p<.001

APPENDIX C: 2012 Linear Regression Results

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
First-Generation	-0.334*	-0.110	0.092
	(-2.08)	(-0.68)	(0.66)
Female		-0.354**	-0.240*
		(-2.88)	(-1.98)
Low Income		-0.111	-0.067
		(-0.79)	(-0.55)
Black		-1.042***	-0.502*
		(-4.21)	(-2.37)
Hispanic		-0.585**	-0.055
		(-2.70)	(-0.28)
Asian		-1.935***	-1.111***
		(-5.64)	(-3.93)
Other		-0.764*	-0.335
		(-2.10)	(-1.05)
Age		0.001	0.004
		(0.05)	(0.36)
Employed Part-Time			1.547***
			(14.27)
Public 4-yr			0.225
			(1.33)
Private 4-yr			-0.129
			(-0.70)
Very Selective			-0.057
			(-0.44)
Minimally Selective			-0.180
			(-1.11)
STEM			-0.274
			(-1.46)

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Social Sciences			-0.523**
			(-2.81)
Humanities			-0.713***
			(-3.51)
Health			0.946***
			(4.33)
Business			0.182
			(0.99)
Education			0.343
			(1.58)
College GPA			-0.146
			(-1.21)
Mideast			0.396
			(1.56)
Great Lakes			0.573*
			(2.29)
Plains			0.587*
			(2.28)
Southeast			0.278
			(1.13)
Southwest			-0.150
			(-0.50)
Rocky Mountains			-0.094
			(-0.28)
Far West			-0.068
			(-0.25)
Clerical			6.108***
			(14.24)
Blue Collar			6.631***
			(16.79)

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Business Support			7.279*** (23.19)
Sales/Customer Service			6.224*** (17.55)
Legal Professionals			7.784*** (19.65)
Legal Support			5.953*** (19.27)
STEM Professionals			7.438*** (22.18)
STEM Support			7.445*** (24.55)
Educators			6.195*** (21.07)
Human Services			6.137*** (20.85)
Arts & Humanities			6.151*** (13.47)
Managers			7.387*** (25.81)
Other Occupation			6.049*** (18.81)
Enrolled in Grad School			-1.577*** (-9.05)
Constant	8.622*** (132.08)	9.067*** (26.77)	2.853*** (4.55)
Observations	11,430	11,430	11,430
R-squared	0.0010	0.0182	0.2285

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, "unemployed" occupation.
+ p<.10, * p<.05, ** p<.01, *** p<.001

APPENDIX D: 2018 Linear Regression Results

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
First-Generation	-0.179	0.0846	-0.006
	(-1.32)	(0.62)	(-0.33)
Female		-0.986***	-0.097***
		(-9.62)	(-6.11)
Low Income		-0.536***	-0.072***
		(-4.21)	(-4.28)
Black		-0.460*	-0.047+
		(-2.22)	(-1.81)
Hispanic		-0.472*	-0.064*
		(-2.34)	(-2.37)
Asian		-0.007	-0.037
		(-0.03)	(-1.06)
Other		-0.214	-0.013
		(-0.64)	(-0.32)
Age		-0.018	-0.001
		(-1.53)	(-0.81)
Employed Part-Time			-0.845***
			(-21.34)
Public 4-yr			0.014
			(0.63)
Private 4-yr			0.002
			(0.06)
Very Selective			0.078***
			(4.66)
Minimally Selective			-0.050*
			(-2.52)
STEM			0.141***
			(5.65)

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Social Sciences			0.031
			(1.27)
Humanities			-0.057*
			(-2.13)
Health			0.239***
			(8.33)
Business			0.159***
			(6.26)
Education			-0.003
			(-0.10)
College GPA			0.070***
			(4.47)
Mideast			0.063*
			(2.21)
Great Lakes			-0.016
			(-0.53)
Plains			-0.112**
			(-3.27)
Southeast			-0.059*
			(-2.17)
Southwest			-0.001
			(-0.03)
Rocky Mountains			-0.058
			(-1.49)
Far West			0.106***
			(3.49)
Clerical			10.73***
			(192.25)
Blue Collar			10.94***
			(179.33)

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Business Support			11.16*** (419.32)
Sales/Customer Service			11.08*** (218.17)
Legal Professionals			11.43*** (217.50)
Legal Support			10.80*** (340.65)
STEM Professionals			11.21*** (408.30)
STEM Support			11.28*** (477.59)
Educators			10.93*** (521.55)
Human Services			11.07*** (548.55)
Arts & Humanities			10.96*** (221.57)
Managers			11.25*** (489.77)
Other Occupation			11.02*** (348.32)
Enrolled in Grad School			-0.054+ (-1.77)
Constant	9.741*** (168.01)	10.92*** (39.16)	-0.173* (-2.43)
Observations	11,430	11,430	11,430
R-squared	0.0004	0.0262	0.9832

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, "unemployed" occupation, "unemployed" work sector.
+ p<.10, * p<.05, ** p<.01, *** p<.001

APPENDIX E: 2009 Hurdle Model Results

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
First-Generation	0.065**	0.003	-0.023
	(2.59)	(0.11)	(-1.09)
Female		-0.153***	-0.055**
		(-7.46)	(-3.04)
Low Income		-0.097***	-0.068***
		(-4.26)	(-3.82)
Black		-0.044	-0.032
		(-1.12)	(-1.00)
Hispanic		-0.089**	-0.047+
		(-2.62)	(-1.74)
Asian		0.148**	0.047
		(2.91)	(1.07)
Other		-0.048	-0.032
		(-0.85)	(-0.71)
Age		0.031***	0.021***
		(15.36)	(13.25)
Employed Part-Time			-0.687***
			(-24.76)
Very Selective			0.036+
			(1.87)
Minimally Selective			-0.006
			(-0.31)
STEM			0.043
			(1.44)
Social Sciences			-0.053+
			(-1.93)
Humanities			-0.181***
			(-5.46)

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Health			0.346***
			(10.68)
Business			0.078**
			(3.04)
Education			0.044
			(1.21)
College GPA			0.017
			(0.99)
Mideast			0.110**
			(2.82)
Great Lakes			0.020
			(0.52)
Plains			0.017
			(0.41)
Southeast			0.051
			(1.37)
Southwest			0.132**
			(3.19)
Rocky Mountains			0.056
			(1.17)
Far West			0.119**
			(2.98)
Clerical			0.116*
			(2.56)
Blue Collar			0.208***
			(3.33)
Business Support			0.487***
			(13.73)
Sales/Customer Service			0.078+
			(1.90)

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Legal Professionals			-0.260
			(-1.17)
Legal Support			0.070*
			(1.99)
STEM Professionals			0.499***
			(11.82)
STEM Support			0.483***
			(11.98)
Educators			0.153***
			(3.83)
Human Services			0.119***
			(3.41)
Arts & Humanities			0.134+
			(1.89)
Managers			0.311***
			(7.86)
Enrolled in Grad School			-0.203***
			(-7.40)
Constant	10.21***	9.588***	9.550***
	(899.93)	(183.59)	(127.03)
selection_ll			
First-Generation	0.027	0.095	0.050
	(0.46)	(1.60)	(0.82)
Female		0.011	0.020
		(0.25)	(0.43)
Low Income		-0.119*	-0.168**
		(-2.34)	(-3.19)
Black		-0.171*	-0.134
		(-2.16)	(-1.61)
Hispanic		-0.150*	-0.120
		(-1.98)	(-1.51)

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Asian		-0.555***	-0.479***
		(-6.12)	(-5.28)
Other		0.287**	0.365**
		(2.58)	(3.13)
Age			0.010+
			(1.94)
College GPA			0.012
			(0.24)
Mideast			-0.017
			(-0.16)
Great Lakes			0.156
			(1.47)
Plains			0.220+
			(1.87)
Southeast			0.036
			(0.35)
Southwest			-0.008
			(-0.07)
Rocky Mountains			0.068
			(0.49)
Far West			-0.048
			(-0.45)
Enrolled in Grad School			-0.632***
			(-12.50)
Constant	1.001***	1.073***	0.904***
	(41.51)	(26.90)	(4.09)
Constant	-0.414***	-0.449***	-0.666***
	(-27.98)	(-29.04)	(-36.35)
Observations	11,850	11,850	11,850
Pseudo R-squared	0.0005	0.0280	0.1841

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, other occupation, other work sector.
+ p<.10, * p<.05, ** p<.01, *** p<.001

APPENDIX F: 2012 Hurdle Model Results

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
First-Generation	0.013	0.011	0.002
	(0.52)	(0.42)	(0.08)
Female		-0.192***	-0.099***
		(-9.36)	(-5.84)
Low Income		-0.134***	-0.084***
		(-5.39)	(-4.08)
Black		0.009	-0.000
		(0.27)	(-0.01)
Hispanic		-0.071+	-0.041
		(-1.96)	(-1.34)
Asian		0.138*	0.013
		(2.53)	(0.35)
Other		0.056	0.040
		(0.97)	(1.02)
Age		0.012***	0.010***
		(6.48)	(6.07)
Employed Part-Time			-0.925***
			(-25.16)
Very Selective			0.054**
			(2.74)
Minimally Selective			-0.021
			(-0.95)
STEM			0.163***
			(5.10)
Social Sciences			0.011
			(0.44)
Humanities			-0.055
			(-1.63)

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Health			0.361***
			(10.10)
Business			0.139***
			(5.26)
Education			0.008
			(0.25)
College GPA			0.078***
			(4.32)
Mideast			0.105**
			(3.16)
Great Lakes			-0.022
			(-0.66)
Plains			-0.015
			(-0.41)
Southeast			-0.042
			(-1.32)
Southwest			0.068+
			(1.86)
Rocky Mountains			-0.071
			(-1.10)
Far West			0.132***
			(3.55)
Clerical			-0.090*
			(-2.00)
Blue Collar			-0.147
			(-1.29)
Business Support			0.214***
			(6.49)
Sales/Customer Service			0.005
			(0.11)

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Legal Professionals			0.224*
			(2.24)
Legal Support			-0.097**
			(-2.82)
STEM Professionals			0.250***
			(5.66)
STEM Support			0.231***
			(6.06)
Educators			-0.020
			(-0.58)
Human Services			0.0209
			(0.62)
Arts & Humanities			0.022
			(0.30)
Managers			0.133***
			(3.37)
Enrolled in Grad School			-0.019
			(-0.78)
Constant	10.59***	10.44***	10.11***
	(915.99)	(214.62)	(132.61)
selection_ll			
First-Generation	-0.116*	-0.038	-0.048
	(-2.23)	(-0.70)	(-0.87)
Female		-0.070	-0.074+
		(-1.64)	(-1.70)
Low Income		-0.001	-0.029
		(-0.02)	(-0.60)
Black		-0.340***	-0.322***
		(-4.70)	(-4.20)
Hispanic		-0.184**	-0.115
		(-2.62)	(-1.57)

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Asian		-0.606***	-0.555***
		(-6.92)	(-6.24)
Other		-0.269*	-0.228*
		(-2.47)	(-2.08)
Age		-0.003	-0.005
		(-0.60)	(-1.13)
College GPA			-0.058
			(-1.24)
Mideast			0.191*
			(2.17)
Great Lakes			0.436***
			(4.80)
Plains			0.415***
			(4.13)
Southeast			0.304***
			(3.55)
Southwest			0.129
			(1.29)
Rocky Mountains			0.170
			(1.43)
Far West			0.168+
			(1.87)
Enrolled in Grad School			-0.544***
			(-10.25)
Constant	0.894***	1.084***	1.188***
	(39.32)	(9.67)	(6.07)
Constant	-0.459***	-0.479***	-0.705***
	(-17.24)	(-17.51)	(-19.90)
Observations	11,850	11,850	11,850
Pseudo R-squared	0.0004	0.0191	0.1746

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, other occupation.
+ p<.10, * p<.05, ** p<.01, *** p<.001

APPENDIX G: 2018 Hurdle Model Results

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
First-Generation	-0.083**	-0.028	-0.0078
	(-3.27)	(-1.06)	(-0.36)
Female		-0.271***	-0.109***
		(-13.88)	(-6.10)
Low Income		-0.165***	-0.082***
		(-7.08)	(-4.26)
Black		-0.065*	-0.061*
		(-2.00)	(-2.03)
Hispanic		-0.110**	-0.064*
		(-2.97)	(-2.05)
Asian		0.113*	-0.049
		(2.32)	(-1.24)
Other		-0.001	-0.028
		(-0.01)	(-0.60)
Age		-0.001	-0.002
		(-0.64)	(-1.04)
Employed Part-Time			-0.843***
			(-21.32)
Very Selective			0.089***
			(4.70)
Minimally Selective			-0.061**
			(-2.73)
STEM			0.162***
			(5.74)
Social Sciences			0.037
			(1.32)
Humanities			-0.065*
			(-2.10)

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Health			0.279***
			(8.25)
Business			0.187***
			(6.41)
Education			-0.006
			(-0.19)
College GPA			0.078***
			(4.44)
Mideast			0.072*
			(2.24)
Great Lakes			-0.014
			(-0.41)
Plains			-0.125**
			(-3.26)
Southeast			-0.063*
			(-2.02)
Southwest			0.005
			(0.14)
Rocky Mountains			-0.058
			(-1.31)
Far West			0.126***
			(3.63)
Clerical			-0.293***
			(-4.62)
Blue Collar			-0.088
			(-1.30)
Business Support			0.126**
			(3.00)
Sales/Customer Service			0.050
			(0.83)

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Legal Professionals			0.390***
			(6.53)
Legal Support			-0.227***
			(-5.19)
STEM Professionals			0.167***
			(4.08)
STEM Support			0.242***
			(6.30)
Educators			-0.090*
			(-2.37)
Human Services			0.036
			(0.98)
Arts & Humanities			-0.067
			(-1.16)
Managers			0.214***
			(5.65)
Enrolled in Grad School			-0.060+
			(-1.67)
Constant	11.05***	11.27***	10.85***
	(1007.50)	(218.79)	(134.81)
selection_ll			
First-Generation	-0.048	0.050	0.048
	(-0.81)	(0.81)	(0.78)
Female		-0.361***	-0.373***
		(-7.04)	(-7.24)
Low Income		-0.173**	-0.168**
		(-3.23)	(-3.11)
Black		-0.171*	-0.167*
		(-2.14)	(-2.02)
Hispanic		-0.166*	-0.121
		(-2.05)	(-1.47)

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Asian		-0.050	-0.025
		(-0.49)	(-0.25)
Other		-0.096	-0.069
		(-0.69)	(-0.50)
Age		-0.008	-0.008
		(-1.58)	(-1.56)
College GPA			0.032
			(0.61)
Mideast			0.182+
			(1.91)
Great Lakes			0.189*
			(1.99)
Plains			0.171
			(1.59)
Southeast			0.157+
			(1.82)
Southwest			-0.035
			(-0.33)
Rocky Mountains			0.094
			(0.75)
Far West			0.076
			(0.79)
Enrolled in Grad School			-0.203*
			(-2.29)
Constant	1.185***	1.664***	1.455***
	(45.41)	(13.80)	(6.78)
Constant	-0.454***	-0.486***	-0.695***
	(-26.20)	(-26.87)	(-43.85)
Observations	11,850	11,850	11,850

	(1) FGCS	(2) FGCS + Personal	(3) FGCS + All
Pseudo R-squared	0.0010	0.0308	0.1831

Observations rounded to nearest ten, per NCES guidelines. *t* statistics in parentheses. Reference categories are male, white, other institution type, moderately selective, other major, northeast, other occupation.
+ p<.10, * p<.05, ** p<.01, *** p<.001