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**An Examination of the Relationship Between Undergraduate Debt and Graduate School  
Enrollment for STEM and Business-Related Fields**

Stephanie Mayer

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Dissertation submitted in partial fulfillment of the  
requirements for the degree  
Doctor of Philosophy  
Department of Higher Education Leadership, Management, and Policy

Seton Hall University  
South Orange, NJ  
May 2021

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COLLEGE OF EDUCATION & HUMAN SERVICES  
DEPARTMENT OF EDUCATION LEADERSHIP MANAGEMENT & POLICY

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### APPROVAL FOR SUCCESSFUL DEFENSE

**Stephanie Mayer** has successfully defended and made the required modifications to the text of the doctoral dissertation for the **Ph.D.** during this **Summer 2021** Semester.

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## Abstract

There is a major limitation in this field of literature with limited studies conducted on the factors influencing graduate school enrollment for STEM and business fields after the 2008 Great Recession. During the Great Recession of 2008, approximately 2.8 million students decided to go back to school and pursue a master's degree. Since then, the cost of a four-year college degree increased by 25 percent and student debt increased by 107 percent (NCES, 2019). STEM and business fields increased by 15 percent during the Great Recession of 2008 in graduate degree programs, graduates, and workforce demand (Anderson, 2013; Okahana & Zhou, 2019; Pappano, 2011). Data drawn from the National Center for Education Statistics (NCES) Baccalaureate and Beyond 2016-2017 survey (B&B:16-17), a multinomial logistic regression was used, and variables were measured within the alignment of the Undergraduate College Choice Theory and Iloh's model. These variables included three major sections of variables: undergraduate student loan debt, student characteristics and college opportunity, and undergraduate institutional context. The sample used in this dissertation was focused on students that completed their baccalaureate requirements between 2015 and 2016, focused on enrollment to STEM and business-related fields. Major findings were focused on loans, age, race, regional location, and selectivity. There was little evidence of undergraduate loans remaining a major influence on graduate school enrollment. These finding provide support for the need to focus on issues in barriers based on race/ethnicity and financial factors towards enrollment in a graduate degree program in STEM and business-related fields.

*Keywords: enrollment, graduate school enrollment, undergraduate student loans, student loan debt, STEM, business, baccalaureate, universities*

## **Dedication**

*To my parents and family for always believing in my next adventure. Thank you for the endless love and support through each stage in this journey.*

*To my friends and PhD classmates. Thank you for being the positive light through each late night and endless working sessions. You all supported me in my career and personal life more than ever expected.*

*To my professors and mentor. Thank you for believing in me and my potential. You all continue to be amazing role models.*

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## **CHAPTER I**

### **Introduction**

#### **Objective**

College is more expensive than it has ever been, and students are forced to either take on financial debt, they may not be able to pay back, or not attend college and omit all the benefits of a college degree. This decision includes major risks in financial freedom and career path opportunities. The cost of college is a direct factor involved in measuring and observing college enrollment. It is safe to assume with the cost of college increasing, less students would be likely to enroll in further education. Surprisingly, during the Great Recession of 2008, approximately 2.8 million students decided to go back to school and pursue a master's degree. Since then, the cost of a four-year college degree increased by 25 percent and student debt increased by 107 percent (NCES, 2019). Many students with a baccalaureate were less sure if a bachelor's degree alone would benefit them during a recession (Silcox, 2020).

Journalists defined a master's degree as "the new bachelor's degree" for young workers that want to stand out in a competitive workforce (Anderson, 2013; Pappano, 2011). In 2015-16 roughly every two master's degrees were awarded for every five bachelor's degrees (Blagg, 2018). This continues to be the trend for students, causing more time spent on receiving degrees and increases of loan distribution to finance educational programs.

Recent studies on the relationship between economic trends and higher education indicated during economic downturns, people are more likely to go back to school and receive advanced degrees (Hoxby, 2014; Schneider & Ava, 2018). This trend stood true during the Great Recession of 2008. Enrollment into a master's degree program increased by 21 percent from 2007 – 2011 (NCES, 2019). Sequentially, enrollment in master's degree programs increased by

12 percent from 2015 – 2018 (NCES, 2019). It is very important to study the results from the Great Recession of 2008 as it could provide similar trends happening in the current economic state.

In 2011, American student loan debt exceeded one trillion dollars and the highest cohort default rate on federal student loans was established for more than 15 years (Berman, 2015; Denhart, 2013). This historic rate was caused by the rebuilding of the economy and labor markets after the Great Recession. This resulted in over 11 percent increase on student loan default rates (NCES, 2013). The large increase in student loan debt derives from academic year (AY) 2000- 2001 to 2010 – 2011.

After the Great Recession of 2008, cumulative outstanding student loan debt continued to increase while new student loan disbursements slowly dwindled. In constant 2011 – 2012 dollars, federal grant disbursements grew from \$10.4 billion to \$37.8 billion, more than doubling the number of recipients. Additionally, federal loan disbursements grew from \$43.3 billion to \$108.6 billion, more than tripling in number of recipients. Baccalaureate degree holders with over \$40 thousand in debt grew by 16 percent in constant 2012 dollars (NCES, 2013).

Student loan debt affects 43 million Americans in 2019, yet master's degree enrollments continue to increase (NCES, 2019). All major increases in graduate degree enrollment peaked between 2010 – 2011 from the results of the Great Recession of 2008 (NCES, 2020). STEM and business fields increased by 15 percent during the Great Recession of 2008 in graduate degree programs, graduates, and workforce demand (Anderson, 2013; Okahana & Zhou, 2019; Pappano, 2011). In recent data, STEM and business fields contributed to 31 percent of all total conferred master's degrees in academic year 2017 – 2018. In recent studies, major factors that contributed to graduate school enrollment included undergraduate student debt, institutional context, and

student characteristics (Baker, 2016; Cellini & Turner, 2019; Chen & Bahr, 2020; English & Umbach, 2016; Ma & Baum, 2016; Malcom & Dowd, 2012; Mullen et al., 2003; Rothstein & Rouse, 2011). It is imperative to understand the controllable factors that influence graduate school enrollment during and after an economic recession to create effective policies.

### **Enrollment Management**

The number of undergraduate students is slowly declining as the costs of college continues to increase. This has caused issues for enrollment management departments and financial spending for colleges (Nietzel, 2020). For many institutions, the financial stability is based off the number of students enrolled. The more students enrolled; the more likely higher profits will be reported for that academic year (Baum, et al., 2010). Due to the major declines in enrollment in undergraduate students, graduate school enrollment is beginning to be reviewed more in institutional strategic financial planning.

Many students pursue graduate and professional degrees in hopes to get a promotion, change careers, or receive more income. These graduate degree programs increased substantial in size and programs offered over the last 10 years (NCES, 2019). This has provided a focus on growing graduate degree programs in different institutions to reap the benefits of increasing enrollment and financial gains.

Studying and examining the factors that influence enrollment in graduate school provide several benefits for an institution. Most importantly financial gains are major influences and drivers of focus in looking at graduate school enrollment. STEM and business continue to be one of the top growing and in-demand graduate degree programs. The strategic focus on how to obtain more students should provide a major switch towards graduate school. The major issue is not many institutions are refocusing financial strategies in graduate school and there is a major

opportunity for financial gains and increases in student enrollment. This dissertation will provide the evidence to study trends of influencers on enrollment into graduate degree programs and continuation in examining this field.

### **Gaps in Literature**

There is a major limitation in this field of literature with limited studies conducted on the factors influencing graduate school enrollment for STEM and business fields after the 2008 Great Recession. Recent studies conducted on the factors influencing graduate school enrollment do not focus on STEM and business fields (Baker 2016; Cellini & Turner, 2019; Chen & Bahr, 2020; English & Umbach, 2016). STEM and business fields increased largely in graduate degree programs, graduates, and workforce demand since 2008 (Okahana & Zhou, 2019). The two studies that focused on STEM and business fields used the results from early 2000's datasets (Malcom & Dowd, 2012; Mullen et al., 2003). Due to these limitations, I chose to focus this dissertation on the gaps in literature involving specific variable measurements within undergraduate student loan debt, institutional context, graduate school enrollment in STEM and business fields and the use of a current nationally represented dataset post the 2008 Great Recession.

The final gap in the literature are studies conducted on influences undergraduate institutional context and graduate school has on enrollment to graduate degree programs in STEM and business fields. Institutional location is an additional limitation within the field. Studies lack the influence location of an undergraduate institution had on enrollment to graduate school. Perna's (2004) study was the only study that analyzed institutional location and found significant results. In recent publications, studies do not use institutional location as a factor in graduate school enrollment.

This dissertation seeks to fill the gaps in literature by using the B&B:16-17 dataset to provide results relevant from the Great Recession of 2008 with a focus on STEM and business fields. The results from this dissertation will fill the major gap in the literature focused on STEM and business fields. It will also include graduate financial costs and institutional context not provided in previous studies. Additionally, the results from this dissertation will examine the increases provided after the Great Recession of 2008 and examine historical trends reflective of the current economic state. This dissertation will also determine if undergraduate student debt, institutional context and student characteristics remain an influence when enrolling into graduate school for STEM and business-related fields.

### **Research Questions**

It is important to test variables such as graduate school attainment factors and college financial factors to understand if these factors remain reliable during and after an economic decline. This study seeks to explore or confirm the impact undergraduate student debt, institutional context and student characteristics have on an individual's decision to pursue a graduate degree program in STEM and business-related fields. It also seeks to explore influences undergraduate institutional context have towards graduate school enrollment. I attempt to fill this gap in the literature by focusing data after the Great Recession of 2008.

The research questions this study plans to answer include the following:

1. To what extent does student characteristics and undergraduate student loan debt influence graduate school enrollment in STEM and business-related fields?
2. To what extent does an individual's undergraduate institutional context influence graduate school enrollment in STEM and business-related fields?

## **Contributions to Theory and Practice**

There is growing evidence that shows increased student loan debt influences students to work in high-salary industries (Rothstein & Rouse, 2011). There is a barrier to entry for undergraduate students due to financial and academic performance, which encourages students to seek affordability (Carter, 1999; Malcom & Dowd, 2012; Mullen, Goyette & Soares, 2003; Sibulkin & Butler, 2011). There is a risk in either decision when pursuing a higher education degree. Affordability could make a student less competitive in the job market and paying for a more competitive education could cause financial harm in repayment and student debt burdens postbaccalaureate. The undergraduate college choice process has the potential to have long-term influence towards postbaccalaureate decisions.

The methodological contributions I provide to this field of study are using measurements and variables to provide a view of factors connected to graduate school enrollment on the student and undergraduate institution. This benefits the practice by providing a modern approach by combining Undergraduate College Choice Theory with Iloh's model (English & Umbach, 2016; Iloh, 2019; Perna, 2006). It provides a proactive view of graduate school enrollment and test factors influencing current graduate school candidates. Additionally, it adds to the field of research on STEM and business fields by reviewing data provided after an economic recession to provide trends for the current economic state. This dissertation is the first study to focus on STEM and business fields with reflection to the economic state and modern student.

## **Structure of the Dissertation**

The structure of the dissertation is as follows. Chapter II is the review of the literature. Chapter III outlines the conceptual framework of the study; Chapter IV analyzes the research methods and results. Finally, I end with Chapter V, the conclusions and policy recommendations.

## **Chapter II**

### **REVIEW OF THE LITERATURE**

#### **Literature Review**

This literature review synthesizes theories and three types of research which this study is drawn: students' characteristics and socioeconomic status (SES), student preparations and the influence of graduate financial aid and undergraduate student debt towards graduate school enrollment. I began the review by providing background literature on theories and models used within this study. This is followed by reviewed literature on socioeconomic and student characteristic influencers pertaining to graduate school enrollment. I then reviewed influences of student preparations towards graduate school enrollment. Next, I reviewed studies conducted on the relationship between undergraduate factors and financial aid and graduate school enrollment. Finally, I provided my views on the overall limitations of the literature available and conclude common themes and ways this study fills gaps presented in the literature.

#### **Theories & Models**

I proposed to analyze whether overall graduate financial aid and undergraduate student debt are correlated to graduate school qualified students' enrollment to graduate school programs in STEM and business-related fields, after controlling for various factors. Additionally, given gaps between college choice and student characteristics, I analyzed the possible interactions between graduate financial aid, undergraduate student debt, student preparations and student characteristics. This dissertation integrated aspects of college choice models from English & Umbach's (2016) model and Iloh's (2019) model examined relationships between graduate financial aid, undergraduate student debt, institutional characteristics and student characteristics and graduate school qualified graduate students' college choice decisions.

## **College Choice Theory Research**

The conceptual framework proposed to guide this dissertation is partly based off Hossler and Gallagher's (1987) three-phase college choice model. This model focuses on undergraduate choice which also applies to graduate school choice based on individual background characteristics. Each phase within the model incorporates organizational and individual factors that influence decisions on college enrollment. The first phase, predisposition phase, identifies the development stage where specific background characteristics related to aspirations of college. Such factors include SES, parental characteristics and attitudes of peers and families towards college. Within this dissertation, this phase identifies undergraduate experiences combined with SES and parental influences. The second phase, search, is the phase where students begin to seek information on postsecondary education. The search phase is influenced by performance requirements on college entrance exams, parental education, student's SES and availability of financial aid. The last phase, choice, is where a student will make the decision on the college they will attend and have evaluated all items involved during the search phase. The student's academic preparations and financial aid are heavily weighted within this phase (Hossler & Gallagher, 1987).

Perna's (2006) model provided the lens in which further researchers used to conduct their studies in the field of school choice decisions. The model built off gaps in research to measure college enrollment processes with forces that influence students' access and choice. The model used an analysis of undergraduate college choice decisions with whether enrollment is a decision placed into four contextual layers. The first layer includes habitus, the second involves school and community contexts, higher education contexts is the third, and the fourth includes social, economic and policy contexts. All layers interact with an individual's expected benefits and costs

towards college enrollment decisions. Furthermore, a strength in this model is the adjustability to use towards graduate school decisions. This is adjusted by modifying the second layer to undergraduate institution context and the third layer to graduate school context.

One of the most recent studies conducted by English and Umbach (2016) provided a new econometric model with a focus on graduate school choice. Their research contributes significantly to the literature by being the first to use a generalized hierarchical linear model with use of a comparison analysis between datasets. They analyzed graduate school ambitions, applications, and enrollment on a nationally representative dataset from the Baccalaureate and Beyond Longitudinal Study (B&B) dataset on the graduating class of 2000-2001. This model was influenced by Perna's (2006) model with a focus on undergraduate school choice. English and Umbach's model incorporated four layers that provided influence in a student's decision to attend a graduate school program. These layers include habitus, institutional context, graduate school context and macro social, and economic and policy context. The result of their research found significant influence between graduate school context and habitus (2016). These layers depict the study of student success as a longitudinal process and measured individually. The layers work as indicators to provide information on attainment and guide student success.

### ***Disadvantages***

One of the major disadvantages of Undergraduate College Choice Theory is the assumption that students have infinite choices to college. This assumption has been proven false in many studies that focus on the inequalities in higher education, specifically in studies focused on racial and social justice inequalities within higher education (Banks, 2017; Bhopal, 2017; Bustamante, 2019). Currently, many students are waiting to attend college or do not attend college at all. In fall 2019 the percent of first-time, full-time students enrolled over the age of 24

was 5.6percent of all first-time, full-time students enrolled in 4-year non-for-profit colleges and was 48.2percent for 4-year for-profit colleges. Additionally, the traditional student population (between ages 18 – 24) made up 90percent of all first-time, full-time enrollments in 4-year non-for-profit colleges and approximately 30percent of all 4-year for-profit colleges (Bustamante, 2019). Over a ten-year span, from 2007 – 2017, only 42 percent of eligible traditional students enrolled in college (Digest of Education Statistics, 2018).

Undergraduate College Choice Theory, when applied to the graduate context, does not provide context to the ability to have infinite choices to college. Graduate school requires several barriers to entry such as prerequisites in test scores, GPA, college credits and other applicational requirements. The choice to go to graduate school is limited to holders of a bachelor’s degree. Additionally, no studies have analyzed College Choice Theory in the recent decade against graduate college choice. Iloh (2019) was the only study to modernize the Undergraduate College Choice Theory to represent the current demographics of college-bound students.

Iloh (2019) challenged the Undergraduate College Choice Theory and created a new model (Iloh’s model of college-going decisions and trajectories) that provided a new direction in practice and important implications for making college-going information widespread and accessibility. Iloh discussed the issues with “choice” as it assumes race, location, gender, socioeconomic status, student’s prospective life and other factors of a student. Iloh’s model reviewed the relationship among three dimensions, information, time, and opportunity. The model stems away from “choice” as it assumes all students attend college directly after college and does not include non-traditional students that attended college right after high school or have other life circumstances. Iloh’s model presumed a modern appeal to college choice by not assuming everyone is given the same opportunities, and specific perspectives on college.

Currently undergraduate college choice theory looks at a little under 45 percent of all eligible traditional students enrolled in college (Bustamante, 2019). Iloh's model is a recommended to be used in all future research focused on college choice and enrollment. This dissertation replaces English and Umbach's first layer (habitus) with Iloh's model.

### **Student Characteristics**

The first section of literature frames around research involving student characteristics. Numerous studies provide evidence on differences among rich, poor, and different racial groups. Research showed parental characteristics, family income and racial identification provided influence on a student's college enrollment decisions. This literature reviewed on student characteristics analyzed factors focused on parental characteristics and identified racial groups with connection to income. By reviewing this literature, it can better understand the relationship between student's characteristics and enrollment to a graduate degree program.

### **Parental Characteristics Research**

Mullen, Goyette and Soares (2003) used a multinomial logistic regression to determine the relationship between parental education attainment level and a child's enrollment in a graduate degree program. Graduate degree program enrollment measurements were separated based on no enrollment, doctoral program enrollment, professional degree enrollment, Master of Business Administration (MBA) enrollment and master's degree enrollment. The database used in this study was the B&B:93/97 dataset. The results found that 2.6 percent of students enrolled in an MBA program had parents with a high school education or less and 3.6 percent of students had parents with more than a college degree. Controlling for academic performance, students with highly educated parents were more than three times likely to enroll in first-professional and doctoral program than are those whose parents had a high school degree or less. The study also

found parental education influenced enrollment to highly selective programs. This measurement of influence changed once educational ambition and career value were included into the model. The results of this addition identified a strong correlation between parental education and student's educational ambition. The authors indicated there was a relationship between institutional characteristics and students' socioeconomic status (SES) towards enrollment to a graduate degree program. These results provided evidence that parental education is directly related to postbaccalaureate decision-making.

Perna (2004) and Millett (2003) also found parental education attainment as an influential factor towards graduate school enrollment. Both studies measured influences of parental factors of cultural and social capital towards college enrollment. These studies used multilevel modeling to measure the influences towards college enrollment. Both also empathized the importance in measuring parental education attainments with research regarding college enrollment.

### **Race/Ethnicity**

African Americans are found in multiple studies as one of the main racial groups with low measurements in enrollment into a graduate degree program (Baker, 2016; English & Umbach, 2016; Johnson, 1996; Perna, 2004; Strayhorn, 2009). According to NCES, in 2016, approximately 15 percent of all graduate students identified as African American. This percent is less than half the percent of White and Asian students enrolled in graduate school. Based on the total graduate school enrollment, African Americans increased by 5 percent since 1976, while White graduate students decreased by over 20 percent. Sequentially, white graduate students were enrolled in graduate school at three times the amount of African American students (NCES,

2019). This trend provides minimal increases over 40 years of African Americans' attendance to graduate degree programs.

African American and Latino students hold excessive debt burdens (Price, 2004). This continues to hold true in recent studies focused on underrepresented students (Baker, 2016; English & Umbach, 2016; Scott-Clayton, 2018). Baker (2016) used a mixed method approach to examine undergraduate student debt's and postbaccalaureate educational aspirations, enrollment and early-career occupational choice and examined underrepresented students and their repayment options. The datasets used for this study were the Beginning Postsecondary Students (BPS): 04/09 and B&B 2007-2008 graduating cohort. Baker found a decrease in college aspirations if a student self-identified as African American, Latino, or other (American Indian, Alaskan Native, more than one race and other). Additionally, students with graduate aspirations in 2012 had higher prior incomes, SAT/ACT scores, and undergraduate GPAs. Students that reported a high salary (> \$65k) were less likely to be female, African American, older, have prior incomes when starting college and high SAT/ACT scores. Overall, Baker found students that attended graduate school did not have nearly as much debt as their peers that did not attend graduate school. Current studies support these findings indicated there is a small percentage of African Americans attending college (English & Umbach, 2016; NCES, 2019; Scott-Clayton, 2018). Financial need is the result of undergraduate student debt and low-income earnings prior obtaining an undergraduate degree (Baker, 2016).

Scott-Clayton (2018) found a projection of 70 percent of black borrowers defaulting on their student loans within 20 years, based on default rates by race of first-time enrollment in 1995-96 to 2003-04 (based on NCES data). Scott-Clayton and Li (2016) provided evidence of higher default rates for black graduates are contributed to postbaccalaureate decisions and

graduate degree enrollment to for-profit institutions and a poor labor market. Scott-Clayton (2018) also identified, in 2004, nearly 38 percent of all black first-time college students defaulted on their student loans within 12 years after graduating. This percent is more than three times the amount of their White counterparts. This provided evidence of inequalities within student loan repayments between racial groups.

Funding for a graduate degree program is one of the major deciding factors in enrollment to a graduate degree program for African Americans when compared to White counterparts (Scott-Clayton, 2018). Increasing financial funding packages for aspiring African American graduate students would decrease the need for student loans and increase enrollment of African American students to graduate degree programs (Baker, 2016; English & Umbach, 2016; Pooch & Love, 2001; Scott-Clayton, 2018).

### **Student Characteristics Conclusion**

Research found student's SES as a major factor associated with college access and enrollment. Factors such as parental education attainment and race influence a student's enrollment to a graduate degree program. Furthermore, income was an indicating variable in the application process to a graduate degree program. The research conducted proved student SES as a vital variable to future studies conducted on college enrollment. This dissertation examined student characteristics as an influence on graduate degree program enrollment.

### **Student Preparations**

The next section of the literature review involves student preparations for college. Hossler and Gallagher (1987) stated academic ability was an essential indicator towards influencing college enrollment. Literature involving student preparations focused on undergraduate GPA, major, institutional classification, and location as influential factors towards

graduate school enrollment. Research conducted on these factors highlighted the importance of the influence student preparations had on graduate degree program enrollment decisions.

### **Undergraduate Grade Point Average (GPA)**

An increase in GPA resulted in a positive correlation with graduate degree program decisions (English & Umbach, 2016; Fox, 1992; Heller, 2001; Millett, 2003; Zhang, 2005). English and Umbach's study (2016) found for every 1-point increase in undergraduate GPA there was a 0.40 percentage point increase in the odds of a student to pursue a graduate degree program. This indicates that students with higher GPAs have slightly more ambition to attend graduate school than those with lower GPAs. English & Umbach also found students (on the same GPA measurement scale) with higher GPAs, when compared to lower GPAs, had a 0.50 percentage point increase in the odds of applying to a graduate school program and a 0.70 percentage point increase in the odds of enrolling (2016).

Both Heller (2001) and Zhang (2005) found similar results that supported the increase in overall GPA increased the odds in enrollment in a graduate degree program. Heller (2001) studied the relationship between student loans, graduate school decisions and early-career choice. The study measured GPA based on each percentage point and focused on the differences between each GPA point. The overall results found GPA as an influence towards graduate school enrollment and concluded every 1-point GPA increase attributed to a 15.00 percent increase in predicting graduate school enrollment and a 22.00 percent increase in the odds of a student enrolling in graduate school.

Research also looked at measuring GPA by splitting GPA scores into separate categories (Millett, 2003; Mullen et al., 2003). GPAs were separated into four brackets. These brackets included 3.75 or higher (recognized as the reference group), 3.75 – 3.25, 3.24 – 2.75 and 2.74 or

lower. Millett (2003) used the B&B: 92:93 dataset and sampled students that were U.S. citizens, received their baccalaureate degree between July 1, 1992, and August 31, 1993, did not identify as American Indian or Alaskan Native and identified in the National Postsecondary Student Aid Study (NPSAS) interviews that they expected to earn a doctoral degree. Millett discovered that students that had a GPA of 2.75 or lower, when compared to the reference group, were 3.50 times less likely to apply to graduate school. Students with GPAs between 2.75 and 3.24 were 2.10 times less likely and students with GPAs between 3.25 and 3.74 were 1.50 times less likely to apply to graduate school when compared to the reference group. This study tested variables within socioeconomic background, selectivity of undergraduate institution, college experiences, opportunity costs to attend graduate school, graduate financial aid offered, and application and/or enrollment to graduate school. Overall, the results of Millett's study indicated GPA as not significant in predicting enrollment to graduate school. Mullen et al. (2003) also separated GPA into brackets for their study. Their analysis on GPA was separated into ten equal brackets. They discovered that GPA had a positive relationship to graduate school enrollment. The results revealed that for each increase in GPA bracket there was a 13.00 percent increase in enrollment to a master's degree, 20.00 percent increase in an MBA program and 37.00 percent increase in a doctoral program focused on research. Additionally, Mullen et al. (2003) discovered that gender, undergraduate GPA, college admission scores, undergraduate major, undergraduate institution context and student's ambition to attend graduate school had significant influence towards the odds of enrolling in a graduate degree program.

English and Umbach's (2016) study examined the interactions of an individual's background with traits inherent from their undergraduate institution to indicate their decision to enroll in graduate school or not. Variables tested in this study include a student's race, ethnicity,

gender, undergraduate indebtedness, undergraduate major, undergraduate GPA, parental characteristics, institutional quality, and institutional type. Their results were consistent with Mullen et al. (2003) in those students with higher undergraduate GPAs, specific identified undergraduate majors, parents with higher social and cultural capital, and attendance to a highly intensive research classified undergraduate institution were more likely to have ambition, apply to and enroll in graduate school.

### **Undergraduate Academic Major**

A student's undergraduate academic major is a vital factor in predicting graduate school enrollment. Millett's (2003) study examines data from B&B on post baccalaureate decisions of 1992-93 bachelor's degree graduates and examined their enrollment to graduate school.

Undergraduate majors in pure research fields; humanities, foreign languages, biology, and chemistry, were 2.10 times more likely to apply to graduate school when compared to undergraduate majors in applied fields (health fields, engineering, and business). English and Umbach (2016) found that majoring in humanities, social/behavioral sciences, math, or physical sciences, when compared to business, increased the odds in a student's ambition, application, and enrollment to graduate school.

Zhang (2005) studied the relationship between an undergraduate degree's major and pursuit in advanced education. Zhang used the B&B:93/97 dataset based on students that received their bachelor's degree in 1992 or 1993. Data was tested using a binomial logit model and indicated choices in graduate enrollment or not, master's program or doctoral program, and graduate degree or not. The results of the study identified business majors as least likely to pursue a graduate education; while natural sciences, mathematics and psychology were the most likely to attend a graduate program. Zhang concluded that business majors have a higher

opportunity cost in pursuing career driven work experience compared to pursuing a graduate degree. Mullen et al. (2003) also used the same dataset but used a multinomial logistic regression model testing indirect and direct influential variables towards enrollment to graduate programs. Their results also found natural sciences, mathematics, and psychology majors more likely to pursue a graduate degree, when compared to undergraduate majors defined as other. They also found, when analyzing master's programs only, a statistically significant relationship between enrollment and undergraduate majors in engineering, biology, science, math, humanities, psychology, education, history, and public affairs.

### **Undergraduate Institution Classification**

The Carnegie Classification is a prominent structure for classifying colleges and universities in the United States since 1970. This structure was provided for research identification, measurement purpose and tools for institutional comparison. The classifications within the structure include all accredited and degree-granting institutions in the United States represented in IPEDS (The Carnegie Classification of Institutions of Higher Education, 2017).

The Carnegie Classification of an institution is an influential factor in the decision to attend a graduate degree program. During application and enrollment process for a student, an institution's classification is viewed as a factor in the college decision process. Most importantly, a student that attends an undergraduate institution that had graduate and doctoral programs are more likely to be influenced by their institution to attend a graduate degree program (English & Umbach, 2016; McDonough, 1997; Perna, 2004).

Literature on institutional classifications consistently found positive relationships toward enrollment to a graduate degree program. Research completed on a national level involving the impact of undergraduate institutional classifications and graduate school enrollment was

competed by Eide et al. (1998). The study combined the high school graduate class of 1972 in the NLS database with data from 1980 and 1982 of the High School and Beyond survey. The study measured institutional quality by admission selectivity (published by Barron's college guide) with Carnegie classified institutions. Their data included institutions defined by Carnegie classifications as research I, research II, and all non-research institutions. This was analyzed using a multinomial logit analysis which found students from private research I and II undergraduate institutions were more likely to enroll in graduate school. Additionally, results found in Perna's (2004) study indicated students that attended research I institutions during their undergraduate degree were 2.50 times more likely to enroll in a graduate degree program. Also, students that attended a liberal arts institution during their undergraduate degree were 2.30 times more likely to enroll in a graduate degree program when compared to students that attended institutions classified as other institutions (non-research institutions).

Mullen et al. (2003) used the B&B: 92:93 dataset and found that students that attended a less competitive undergraduate institution were half as likely to apply and enroll in graduate school compared to those that attended a highly selective undergraduate institution. Mullen et al., also found the more competitive the undergraduate school, the more likely a student will enroll in graduate school. Zhang (2005) also found similar results that students from more competitive undergraduate institutions were 10.00 percent more likely to enroll in graduate school than those from less competitive undergraduate institutions. Overall, these studies support the strong influence undergraduate institutional classifications have on graduate school enrollment decisions.

A qualitative study conducted by DeAngelo (2009) explored undergraduate institution's classification and a student's graduate school aspirations. The study focused on underrepresented

minorities that attended non-research institutions. The findings in this study identified students that were conducting research at non-research institutions during their undergraduate degree were more likely to have higher ambitions and attend graduate school regardless of race. This provides evidence that undergraduate institutional classifications have an emotional influence on graduate degree enrollment processes.

### ***Undergraduate Institution Location***

Perna (2004) found significant results in undergraduate school location. Their study found students that went to college in the same state they resided, provided a significant indicator of their enrollment to a graduate degree program. Students were almost one and a half times as likely to enroll in a graduate program within their residential state when attending college within their residential state, compared to students attending undergraduate institutions in different states. Throughout the literature pertaining to location, Perna was the only researcher that analyzed institution location as a variable in testing graduate school enrollment.

### **Student Preparations Conclusion**

Research on graduate school choice and obtainment is constructed from college choice and student persistence literature (Kallio, 1995). There were disjointed reviews in prior research with the combination and use of multiple conceptual and theoretical frameworks (Perna, 2004). There were very few studies that draw data from nationally representative sample populations. However, there were a great number of studies that provided additional information on graduate school choice process (Baker, 2016; English & Umbach, 2016; Heller, 2001; Millett, 2003; Mullen et al., 2003; Perna, 2004; Zhang, 2005). These studies were the first in capturing the relationship between demographical factors, parental influence factors, undergraduate

institutional classifications, undergraduate major, and undergraduate GPA. Overall, student preparations were major factors in influencing enrollment in a graduate degree program.

### **Financial Aid and Undergraduate Factors**

Throughout this final section I reviewed literature on the impact college price had on the prediction of graduate school enrollment decisions. I began this section by explaining motivators that cause students to borrow, studies on undergraduate debt and the relationship between undergraduate debt and graduate school decisions. This is proceeded with literature on financial aid involved in graduate school and opportunity costs students had based on the decisions to pursue a graduate degree.

#### **Motivators to Borrow**

The purpose of studying undergraduate loans is to understand the financial implications debt had on graduate school decisions. Throughout this section I reviewed literature on motivators that cause students to borrow, and the relationship between undergraduate debt and graduate school decisions. The purpose of this dissertation does not provide a focus on why students borrow, but there is a need to understand briefly why students borrow to understand undergraduate indebtedness as a factor to influence graduate school enrollment.

Higher education grew in both costs and enrollment over the past decade. According to the Urban Institute (Blagg, 2018), since 2008 bachelor's degree obtainment increased by over 47.00 percent. Additionally, college price increased by over 44.00 percent since 2008. In the recent decade, Avery and Turner (2012) discovered increases in federal student loans were due to increases in student enrollment to private institutions and those that rely on loans to finance their undergraduate degree. Current data provides a peak in federal student loans in 2011, and a decrease from 2013 – 2019 (College Board, 2019). Houle (2013) also found similar results

regarding private institutions using a multivariate analysis on predictor variables for student borrowing collected by the National Longitudinal Study of Youth in 1997. Houle conducted an ordinary least square estimation on parental SES and race. The results indicated a strong relationship between parental SES and private institutions and institutions with more than average tuition prices and borrowing (2013).

Baum and O'Malley's (2003) research found no significant relationship between an institution's sector and undergraduate amount borrowed. The dataset used in this study was the National Student Loan Survey (NASLA) focused on debt burdens in 2002. This dataset only included students that had at least one federal student loan and were not in deferment or forbearance on their loan(s). The dataset did not include state grant aid, which was included in Monks's (2014) study. Monks studied institutions based on sector while Baum and O'Malley analyzed each institution individually. The research conducted by Monks (2014) studied the relationship between institutional sector and average student debt. It used data from the 2011 College Board Annual Survey of Colleges merged with financial aid data from the National Association of State Student Grant Aid Programs. Their results failed to find any relationship between student debt and private, not-for profit, four-year institutions.

Current studies found graduates from for-profit institutions suffer the most financial and did not receive substantial gains in income from going to college upon graduation (Cellini & Turner, 2019; Scott-Clayton, 2018). In several studies, bachelor's degree recipients from for-profit institutions were used to analyze student debt influences on enrollment to graduate school. Cellini and Turner (2019) used data from the U.S. Department of Education and included federally aided bachelor's degree graduates from for-profit postsecondary institutions between 2006 and 2008 merged with data from the Internal Revenue Services from 1999-2014. They

conducted a matched comparison group difference-in-differences design and found graduates of for-profit institutions were 1.50 percentage points less likely to be employed. Additionally, these graduates had lower earnings overall by 11.00 percent, compared to graduates of public institutions. The annual earnings of graduates from for-profit institutions did not pay off when compared to average student debt burdens. Scott-Clayton (2018) found similar results on for-profit students and examined the same data over a 20-year period. The data was examined from when students entered college to when they repaid loans using cohorts of 1995-96 and 2003-04. Results of this study found that for-profit students were more likely to borrow and defaulted at twice the rate of public two-year borrowers. Both studies provide evidence in the financial burdens graduates of for-profit institutions had regarding student debt and earned income. Additionally, studies conducted by Miller (2017) and Looney & Yannelis (2015) measured default rates of students, five years after entering repayment, their studies both identified that approximately 30.00 percent of all borrowers (regardless of sector) would default on their student loans.

### **Undergraduate Student Debt**

Literature that studied undergraduate debt and the influence it had on graduate school enrollment were contradicting. Many studies found increased amounts of undergraduate student debt indicated negatively towards graduate school ambition, application, and enrollment (Baker, 2016; Baum & Sanders, 1998; Baum & Schwartz, 1998; Choy & Gies, 1997; Fox, 1992; Heller, 2001; Malcom & Dowd, 2012; Millett, 2003; Weiler, 1994; Zhang, 2013). While other studies found no significant relationship in undergraduate debt accumulation on graduate school ambition, application, and enrollment (Barid, 1973; Carter, 1999; Chen & Bahr, 2020; Choy,

2000; Ekstrom et al., 1991; English & Umbach, 2016; Perna, 2004; Rothstein & Rose, 2011; Schapiro et al., 1991; Weiler, 1991).

Studies conducted in the early 90s indicated there were no statistically significant relationships between undergraduate debt and its influences on graduate school enrollment (Fox, 1992; Schapiro et al., 1991; Weiler, 1991). In a study conducted by Weiler (1991), data from the 1980 High School and Beyond survey was used to analyze the influence undergraduate indebtedness had on graduate school enrollment decisions. The study concluded no statically significant evidence of influence indebtedness had on graduate school enrollment decisions. Additionally, Schapiro et al. (1991) found no statistically significant influences indebtedness had on enrollment decisions to graduate school. Their study had a major limitation in their analysis of postbaccalaureate students from only 32 elite universities. Fox (1992) also continued to find no relationship between indebtedness and graduate school enrollment decisions.

Millett (2003) researched the presence of indebtedness based on the level of debt accrued from undergraduate degrees. This study used the B&B 92:93 dataset and examined accumulated debt categorized as no debt, less than \$4,999, \$5,000 - \$9,999, \$10,000 – \$14,999 and \$15,000 or more. Results indicated students with more than \$5,000 in accumulated student debt were the most likely to not apply to graduate school when compared to students without debt. These findings indicate that the amount of student debt is not a deciding factor in enrollment to a graduate degree program.

A current study conducted by Chen and Bahr (2020) used B&B:08-12 data and the marginal mean weighting through stratification method to examine how undergraduate debt affects graduate school application and enrollment. The results found minimal connections between undergraduate debt and graduate school application or enrollment. Over 77.00 percent

of their population examined enrolled in a master's degree program, which identified no significant relationship between undergraduate debt and likelihood of enrollment within 1 or 4 years after baccalaureate degree was received. Differences in educational debt did not predict enrollment nor application to a graduate program. Additionally, undergraduate indebtedness was recorded as an ordinal variable in five separate categories and used the National Student Loan Data System (NSLDS) for undergraduate indebtedness. This is one of the first studies to use B&B:08-12 data to examine the relationship between undergraduate debt and graduate school enrollment.

### ***Factors Associated with Undergraduate Student Debt***

Zhang (2013) found that for every \$1,000 increase in student loan debt from public undergraduate school the likelihood of attending graduate school decreases by 2.70 percent. When studying private undergraduate institutions; there were no significant results. The study used B&B:93/97 data to examine causal effects undergraduate debt had on graduate school selection, enrollment, marriage, early-career choice, and homeownership. Zhang only studied students that had earned a baccalaureate degree within the United States. Similarly, Rothstein and Rouse (2011) studied variables to estimate the potential influence of undergraduate student debt had on postbaccalaureate decisions using an exogeneity assumption. The results from this study also provided evidence on undergraduate student debt as an influencer towards graduate school enrollment.

One finding on indebtedness towards students' background characteristics was studied by Morelon-Quainoo et al. (2009). Their study indicated that undergraduate indebtedness influenced graduate school enrollments based on a student's race. Their results indicated that underrepresented minority groups were less likely to pursue a graduate degree if they accumulated

high amounts of undergraduate student debt. Additionally, Scott-Clayton (2018) found Black students with a bachelor's degree alone defaulted in their student loans at five times the rate of White students with bachelor's degrees. This study also found nearly 38 percent of first-time Black college students in 2004 defaulted on their student loans within 12 years. This percent is more than three times as high as White counterparts.

Malcom and Dowd (2012) examined the influence undergraduate student debt had on specific racial groups and their enrollment to graduate degree programs in STEM fields. The data used for this study included the 2003 National Survey of Recent College Graduates (NSRCG), Integrated Postsecondary Education Data System (IPEDS) and the Institute for College Access and Success. Researchers categorized average student debt into three categories: heavy borrowers, typical borrowers and never borrowed. They used a nonlinear approach in measuring student debt, similarly with studies by Dwyer et al. (2012) and Hillman (2015). The data provided different results regarding debt and specified racial groups. African Americans and Whites were the most likely to borrow the most for their undergraduate degree in a STEM field major when compared to Latinos and Asians. Overall, results in the study indicated a negative relationship between higher accumulated debt and White and Latino students' graduate school enrollment. African American and Asian students had no significant relationship in higher accumulated debt and graduate school enrollment. Limitations of this study included proper measures of student ambitions and financial aid. The lack of student ambition measurements did not include measures on a student's early educational aspirations, high-school academic achievement and course interest patterns. Limitation on financial aid measurements in the study included the NSRCG data. The variable on financial aid in the NSRCG data does not include the amounts of non-loan aid provided and amount per each loan type. The amount of non-loan aid

provides an understanding of the costs placed on students to finance. This causes an inaccurate depiction on financial aid measurements used within the study.

Researchers indicated mixed results on the relationship between undergraduate debt and enrollment to a graduate degree program were due to indirect influences. Chen & Bahr (2020) found no differentiations between race/ethnicity, family income, or first-generation baccalaureate recipient status towards education debt and graduate school application or enrollment. Studies conducted by Scott-Clayton (2018), Cellini and Turner (2019) and Ma and Baum (2016) all controlled for sector, racial groups and SES, also found undergraduate debt as a major influencer in postgraduate decision making, but none found a significant relationship towards enrollment.

### **Graduate Financial Aid**

Studies conducted on the influences graduate school grants, scholarships and loans have on a student to enroll provide significant results. Regardless of year conducted, these studies indicated financial factors as a main influence on graduate school enrollment. Weiler (1991), Kallio (1995) and Millett (2003) found positive influences financial aid offerings had towards enrollment in graduate school. In a qualitative study conducted by Morelon-Quainoo et al, (2009) students were asked to discuss the influence graduate financial aid packages had on their decision to enroll in a graduate degree program. The results also provided evidence that financial aid was highly correlated to decisions to attend graduate school. A major disadvantage of this study was questions provided did not identify financial aid as loans, grants or scholarship and was strictly based on the perception of the participant. Additionally, this study did not indicate the amount of student debt each participant had accumulated. This information provides a better understanding of each participant interviewed and their opinions on having loans or grants towards a graduate degree program.

Rothstein and Rouse (2011) examined the effects a no-loan policy at an elite institution had on future earnings based on job field concentrations. Students were offered free tuition in 2001 and were compared to students after 2001 who were not included in the no-loan policy. The data in this study was limited to the use of administrative data from one institution in years 1999 – 2006. Rothstein and Rouse incorporated variables that estimated the causal effects undergraduate debt had towards graduate school ambitions, job attainment after graduation, job industry wage levels and salaries provided to early-career occupations.

### **Opportunity Costs**

Research conducted on the influence opportunity costs had on the decision to enroll in graduate school made use of the human capital theory through analyzing potential lifetime earnings. Human capital theory suggests investments in people derive economic benefits in people and society. Education is measured as a people's investment and is perceived as contribution to health and nutritional improvements in people (Sweetland, 1996). Studies reviewed opportunity costs as pursuing a job postbaccalaureate and the effects earnings have lifelong versus the potential lifetime earning involved after pursuing a graduate degree. Literature on this topic is extremely limited and does not incorporate current labor market earning based on degree obtained. Studies measured the pursuit of earnings had on enrolling in graduate school or entering the job market postbaccalaureate.

Weiler (1991) discovered that students with incomes of less than \$100,000 were less likely to enroll in a graduate degree program when compared to students with incomes of \$100,000 or more. A large limitation to this study is the measurement of income earnings based on subdivisions of different income classes. Millett (2003) also found a significant relationship between income earnings and graduate school enrollment. Millett discovered students with lower

expected earnings in the job market postbaccalaureate were two times as likely to apply to graduate school.

Bedard and Herman (2008) studied opportunity costs based on undergraduate majors' labor market. They examined students from the 1993-2001 National Survey of Recent College Graduates (NSRCG) with undergraduate majors in computer science and mathematics, engineering, life sciences, physical sciences, and social sciences. Labor market measurement was derived from data from the Bureau of Labor Statistics Local Area Unemployment Statistics program. The results of this study found no statistically significant relationship between an undergraduate major's labor market with higher unemployment rates and graduate school enrollment.

### **Financial Aid and Undergraduate Factors Conclusion**

Literature on undergraduate debt and major showed mixed results in the influence it had on students' decisions to enroll in graduate school. This dissertation sought to fill the gap of literature using post 2008 (Great Recession) data. It additionally sought to understand the relationship between undergraduate student debt and enrollment to a graduate degree program. I hypothesize, based on current increases in college tuition for both undergraduate and graduate institutions and literature finding, that accumulation of undergraduate student debt will influence a student's enrollment in a graduate degree program.

### **Literature Limitations**

The main limitation in the literature is limited studies conducted on the changes in graduate school enrollment for STEM and business fields after the 2008 Great Recession on STEM and business fields, as these fields increased largely in graduate degree programs, graduates, and workforce demand since 2008 (Okahana & Zhou, 2019). Studies conducted

directly on STEM and business fields are very limited and use data metrics from 2003 (Malcom & Dowd, 2012). The most recent study conducted by Chen & Bahr (2020) used the most recent B&B database to examine the trends in the relationship between undergraduate debt and graduate school enrollment after the 2008 Great Recession and major increases in tuition in the late 2000s into the early 2010s. I built upon studies like Chen & Bahr (2020) and Perna (2004) to include institutional location as an institutional characteristic and a focus on STEM and business-related fields. This dissertation emphasized the of testing variables such as graduate school attainment factors and college financial factors to understand if these factors remain reliable during and after an economic decline.

Another limitation of the literature is within institutional characteristics. There are several studies that review institutional quality and the effects an undergraduate institutional sector and classification had on a student's enrollment to graduate school. The gap in the literature revolved around the research completed on institutional location and demographics of student populations. Studies did not provide the influence location of an undergraduate institution had on enrollment to graduate school.

Additionally, there is a gap in the literature involving the influence financial burden of graduate school costs had on enrollment when controlling for undergraduate student loan debt. Studies were not completed on the influence graduate school costs had on a student's enrollment to a specific graduate degree program when controlled for undergraduate indebtedness. This research is very important to confirm if all around costs to finance an undergraduate and graduate degree are important influencers in the decision to pursue a graduate degree program.

The final limitation within the literature was the data captured to measure student's enrollment to graduate school. A limitation to this data is capturing all students that decide to

enroll in a graduate degree program. Datasets have a finite timeframe on when students make postbaccalaureate decisions. There are no current datasets that analyze postbaccalaureate decisions more than 5 years after graduating from an undergraduate degree program. This causes limitations in all studies when measuring decisions in pursuit of a graduate degree program by limiting measurements into a specific timeframe.

### **Conclusion**

The literature within this topic provides evidence for the need to continue research on the influencers that affect enrollment to graduate school. Overall, there were several mixed findings on the influence multiple variables have on the decision to pursue a graduate degree program. There is strong evidence that undergraduate GPA, institutional classification, indebtedness, and undergraduate academic major influence the graduate school decision process. Additionally, there are several limitations in the results of studies reviewed (as mentioned above). I filled the gaps presented in the literature through use of the most recent dataset published by B&B and incorporate variables resulted in mixed finding throughout studies presented in the literature. This provided updated results to the body of literature for all variables and factors that influence enrollment to STEM and business-related graduate degree programs.

## **Chapter III**

### **DESIGN AND METHODOLOGY**

This dissertation comprehensively examined and analyzed data drawn from the National Center for Education Statistics (NCES) Baccalaureate and Beyond 2016-2017 survey (B&B:16-17). The sample used in this dissertation was focused on students that completed their baccalaureate requirements between 2015 and 2016. Additionally, the sample focused on students that enrolled in a graduate degree program in business, STEM, other majors, and those that did not enroll in any graduate degree program. The research questions this dissertation answered include the following:

1. To what extent does student characteristics and undergraduate student loan debt influence graduate school enrollment in STEM and business-related fields?
2. To what extent does an individual's undergraduate institutional context influence graduate school enrollment in STEM and business-related fields?

#### **Data Source**

The B&B:16-17 survey is derived from a nationally representative initial sample of approximately 19,000 students. It is required to examine students that completed their baccalaureate degree between July 1, 2015, and June 30, 2016, and were awarded their degree prior to July 1, 2016. This nationally represented survey of postsecondary students includes comprehensive information on bachelor's degree recipients' undergraduate experiences, community involvement, demographics, occupation field, income, workforce participation, and debt repayment. The B&B:16-17 utilized the 2016 cohort and re-interviewed these participants in 2017. The B&B is conducted by the National Center for Education Statistics (NCES) in the U.S. Department of Education. This longitudinal data allows analysis of student's transitions out

of college and progress towards post-baccalaureate decisions in graduate-level education and within the workforce (NCES, 2018). Data was taken from the National Postsecondary Student Aid Study (NPSAS:16) to produce a nationally representative sample. The purpose of the B&B is to provide an initial follow-up for researchers and policymakers on information regarding student debt, financial repayments, postbaccalaureate enrollment and employment outcomes after one year of bachelor's degree completion. The B&B survey was the best dataset to use for this dissertation due to available metrics provided on student indebtedness after completion of a bachelor's degree. The strength in using the B&B survey data in this study are the specific measurements provided after an undergraduate degree and direct measurements regarding graduate school enrollment.

### **Data and Sample**

The target population for the B&B:16/17 was all students who completed a baccalaureate degree during the 2015-16 academic year with the United States at any postsecondary institution and was included in the NPSAS:16. The B&B:16/17 survey was conducted into six areas; background, undergraduate education, financial aid, teaching, postbaccalaureate employment, and postbaccalaureate education and training. The final sample collected totaled 28,800 and the weighted response weight equated to 71.00 percent (NCES, 2020).

Steps were taken to prepare the dataset used for a proper sample and analysis. Of pertinence to this dissertation, respondents within the dataset were required to have answered their postbaccalaureate education status and enrollment status from the B&B survey. The total number of respondents collected from this included 19,490.

The validated sample of this dissertation consisted of 9,700 qualified students and valid cases for graduate school enrollment who earned their baccalaureate degrees in the 2016

academic year. There I retained all students in the analytical sample for analyzing graduate school enrollment into a master's degree program within 12 months after completing a baccalaureate degree. Further details on descriptive statistics for the analytical sample are found in Table 1 and 2.

The analytical sample consisted of 22.70 percent of baccalaureate graduates had a bachelor's degree in a STEM related field and 13.20 percent had a bachelor's in business. Gender was identified as male represents 39.70 percent and female 60.30 percent of the total sample. Race was identified as 62.00 percent White, Black and African American as 12.80 percent, Hispanic or Latino as 14.20 percent, Asian as 6.50 percent, American Indian or Alaska Native as 0.50 percent, Native Hawaiian/other Pacific Islander as 0.40 percent, and more than one race as 3.50 percent. The average accumulative debt was estimated at \$13,000 with 45.60 percentage being zero debt and a range of \$77,020. Additionally, 27 years of age was the average age identified. Around 23.30 percent of students enrolled in a master's program and 44.20 percent of all students identified their highest expected degree received was a master's degree.

### **Recoding**

Once all variables were exported from the B&B: 16/17, data was reviewed for errors and proper coding. There were fourteen total variables used to clean, recode and imputation of data values to fit the purpose of the study. The variables used include, age as of December 31, 2015 (AGE), highest level of education expected ever (B1EXPEVR), overall GPA for 2015-2016 bachelor's degree (B1GPA), highest degree enrollment within 12 months after bachelor's degree completion (B1HDEG), highest degree enrollment based on major or field of study within 12 months after bachelor's degree completion (B1HDGMAJ), undergraduate major (B1MAJORS23), marital status (B1MARRM12), Carnegie classification 2010 (CC2010C),

NPSAS undergraduate institutional region (OBEREG), parent's highest education level (PAREduc), race (RACE), attended undergraduate institution in state of legal residence (SAMESTAT), undergraduate institution selectivity (SELECTV3), and total loans (TOTLOAN2).

To have a dataset with only outcomes pertaining to master's degrees, multiple imputation was used. Values were removed from the dataset that did not identify the highest degree or certificate program enrolled within 12 as a master's degree. Multiple imputation has a major advantage in avoiding statistical issues and was used in distinct regression procedures. NCES used this imputation method to fill in missing values to create a completed dataset based on observed values.

After multiple imputation was completed, dummy variables were created to represent subgroups within the sample. This allowed for major variables with multiple categories to be condensed into fewer categories. Marital status was recoded as single, never married, married and other. The other category defined as separated, divorced, and widowed. The next variable recoded was the highest education level expected as bachelor's degree, master's degree, graduate level course, no graduate degree or certificate, post-baccalaureate certificate, post-master's certificate, and doctoral degree in professional and research/scholarship. Additionally, undergraduate major and major field of study of highest degree enrolled within 12 months was recoded into three categories STEM, Business and other major. STEM included computer science, information science, engineering, engineering technology, biology, physical sciences, science technology, mathematics, and agricultural sciences. Business included the major defined as business. Other major included general studies and other, social sciences, psychology, humanities, history, manufacturing, construction, repair and transportation, military technology

and protective services, health care fields, education, architecture, communications, public administration and human services, design and applied arts, law and legal studies, library sciences, and theology and religious vocations. Finally, regional location was recoded into eight categories, New England, Midwest, Great Lakes, Plains, Southeast and Puerto Rico, Southwest, Rocky Mountains and Far West. After all data was completed to fit the model, with all 14 variables, the final sample consisted of 9,700.

### **Dependent Variable**

The main dependent variable examined in this dissertation was enrollment into a graduate degree program focused on STEM, business-related fields, all other fields of study or not enrolled. Many studies focused on graduate school enrollment and college debt used aspirations, enrollment and/or application into graduate school as a multivariate measurement (Baker, 2016; Chen & Bahr, 2020; Perna, 2004). Since there were disparities on measuring aspirations and many studies defined aspiration in different ways, this dissertation did not use aspiration nor application as a measurement of enrollment to graduate school. The measurement of graduate school enrollment was measured in this dissertation as a dichotomous variable as enrolled or not enrolled within 1 year after completing a baccalaureate degree. Degree major was provided based on enrollment in a master's degree within 1 year after graduating a bachelor's degree program. It was measured as indicating enrolled in other major, enrolled in STEM, enrolled in business-related field major and not enrolled in master's degree program as the reference group. Those that started in any other graduate program besides a master's degree program was not included in the sample. This dissertation defines STEM majors, based on NCES, within the fields of computer science, information science, engineering, engineering technology, biology, physical sciences, science technology, mathematics, and agricultural sciences (Chen, 2013).

Business major included all business concentrations and defined as a business degree based on the NCES.

### **Independent Variables**

The primary independent variable in this dissertation was undergraduate indebtedness. This variable was defined as a continuous variable, measured in \$1,000. It focused on all educational loans received during the 2015-16 academic year, after the completion of a baccalaureate degree. The loans metric was measured based off the total of federal (included Parent PLUS loans), state, and institutional from the National Student Loan Data System (NSLDS), and includes private, self-reported educational loans. All loans were self-reported and augmented by matched records from the NSLDS.

Undergraduate indebtedness was measured in specific studies as a dichotomous variable as debt or without debt (Baum & Sanders, 1998; Malcolm & David, 2012; Rothstein & Rose, 2011). This measurement is unrealistic today due to the larger range in total debt accumulated within a baccalaureate degree over the past decade. Based in the NCES (2012) report, students that graduated in 2011-2012 academic year with a baccalaureate degree held student debt between \$0 – and amount greater than \$40,000. The amount of loans accumulated was broken into five categories where over 80.00 percent of all students held more than \$40,000 in student loan debt. Compared to student loan debt reported by the 1992-1993 cohort, average student debt was less than \$15,000 (Choy & Li, 2006). Studies that used the dichotomous variable measurement for undergraduate indebtedness were not able to account for the variability of the metric. In this dissertation, undergraduate indebtedness was measured as a continuous variable. All metrics recorded on undergraduate student loan debt was received as of 2015-16 AY.

Based off the models of Iloh (2019), English and Umbach (2016) and Perna (2006) the conceptual framework used in this dissertation included the following variable categories: student demographics and college opportunity, undergraduate institutional context, academic preparations, and financial resources.

Student demographics and college opportunity were measured based on age, gender, marital status, student attended undergraduate institution within resident state, undergraduate major, highest level of education expected, enrolled in postbaccalaureate education, parental/guardian's highest education level achieved and race/ethnicity. The age variable was measured as a continuous variable from reported federal financial aid applications or student interview as of December 31, 2015. When reviewing age, studies did not find any significant relationships with age. This was due to previous cohorts that did not contain large percentage of non-traditional students (NCES, 2011). This metric was included in this dissertation due to the major increase in non-traditional students since 2011 through online degree programs (Jesnek, 2012; Stone, et al., 2016; Ellis, 2019). Gender was measured binary as male as the reference and female reported in student interviews or student records. Marital status was measured as a categorical variable as single, never married, married as the reference group, and other reported in student interview 12 months after completion of bachelor's degree. Student attended undergraduate institution within their resident state was measured as a categorical variable as yes, no, and foreign or international student as the reference group, based on legal residential status in the federal financial aid application or student interview. The institutional state was retrieved from the 2015-16 IPEDS Institutional Characteristics Header data collection. Undergraduate major was measured into a series of dummy variables based on other majors as the reference group, and STEM and Business. The highest level of education expected was

measured as a categorical variable and measured as bachelor's degree as the reference group, master's degree, graduate level course, no graduate degree or certificate expected, postbaccalaureate certificate, post-master's certificate, and doctor's degree in professional & research/scholarship based on student interviews. Items that identified as anything less than a bachelor's degree were recoded as missing. Students enrolled in a graduate degree program was measured as binary as no and yes, based on 12 months after bachelor's degree completion provided in student interviews. The highest education level achieved by parents/guardians was measured based on bachelor's degree as the reference group, some college but no degree, associate degree, vocational/technical, high school diploma or equivalent, did not complete high school, do not know either parent's education level, master's degree, or equivalent, doctoral degree – professional practice, and doctoral degree-research/scholarship provided in the 2016 FASFA or student interviews. Parental education was only viewed as a significant variable with studies completed in the early 2000s (Mullen et al., 2003; Perna 2004; Millett, 2003). This metric was measured to identify trends in previous studies against current data. Finally, race/ethnicity was categorized into a series of dummy variables with White being the reference group and African American, Hispanic/Latino, Asian, American Indian/Alaska Native, Native Hawaiian/other Pacific Islander and more than one race, based on student records or student interviews. These demographic variables follow the same metrics in previous studies conducted. Many studies found major differences in student loan debt based on race.

Undergraduate institutional context was based on the 2010 Carnegie classification, highest level of offering at NPSAS institution, selectivity, and regional location of an undergraduate institution. Carnegie classification was identified as research & doctoral, master's, baccalaureate, and special focus & other as the reference group based on the Carnegie

classification of undergraduate institution variable. Selectivity was measured as a categorical variable as very selective, moderately selective, minimally selective, and open admission as the reference group, based on the IPEDS data for all 4-year institutions. Additionally, this variable measured private, for-profit institutions into appropriate selectivity groups, instead of separating based on category. Regional location of undergraduate institution was identified into a series of dummy variables with Far West as the reference group, Mideast, New England, Great Lakes, Plains, Southeast and Puerto Rico, Southwest, and Rocky Mountains based on the IPEDS 2015-16 Institutional Characteristics Header file. Undergraduate institutional location provides an area view of the data results for enrollment. The measuring of this variable within graduate school enrollment was a major gap in the current literature which this dissertation fills.

Academic preparations used undergraduate GPA as the major metric of measurement. This was measured into separate brackets based on the studies conducted by Mullen (2003) and English and Umbach (2016). Other studies used GPA as a continuous variable (Heller, 2001; Zhang, 2005). Undergraduate GPA resulted in all studies as the higher the GPA, the more likelihood of graduate school enrollment. This dissertation measured undergraduate GPA as a continuous variable based on student interviews.

### **Methodology**

The multinomial logistic regression benefits the study of graduate school enrollment based on the ability to test several variables against a binary dependent variable. Graduate school enrollment needs to be tested against many different variables due to the number of factors that directly influence a student's decision to enroll into college (English & Umbach, 2016; Hossler & Gallagher, 1987; Iloh, 2019; Perna, 2006). A multinomial logistic regression is described as an extension of a binary logistic regression, which provides more than one category of a dependent

variable. Similarly, to a binary logistic regression, it uses the maximum likelihood estimation to analyze the probability of statistical relationships between different categories (Schwab, 2002).

Mullen et al. (2003) conducted a major study on postgraduate educational enrollment using a multinomial logistic regression. Their study focused on the influence parental educational achievement had on postgraduate education enrollment by also testing multiple factors as influencers towards enrollment. The benefit of the use of the multinomial logistic regression allowed for an analysis of multiple dependent variables.

An alternative to the multinomial logistic regression is discriminant function analysis. This analysis requires the assumptions of normality, linearity, or homoscedasticity are met within the data being analyzed. A major advantage of the multinomial logistic regression is that it does not require or make assumptions on dependent or independent variables and assumes a non-perfect separation on independent variables (Schwab, 2002). It is important when studying graduate school enrollment to ensure non-perfect separation on independent variables. This is especially important when analyzing the relationship between multiple categories of variables and enrollment decisions. The multinomial logistic regression was used for this dissertation due to the advantage of not making assumptions on the variables presented in the model.

### **Methodological Strategy**

The analytic strategy for this dissertation comprised of two parts. First, simple descriptive statistics were calculated and analyzed. This analysis allows the sample data used to be presented in a straightforward interpretation. This describes the overall limitations of the data and identify potential relationships between the different variables.

In the second part of the analysis, I examined the results of the multinomial logistic regression. This allowed for the analysis of multiple independent variables. In this case, there

were eight independent variables tested against graduate school enrollment. Each variable was entered into the model and placed into four different categories of variables to highlight the direct and indirect influences each variable had on graduate school enrollment. This was based on the framework and use of the College Choice Theory. The variable category was the amount of undergraduate indebtedness. The second variable category included student demographics variables of ages, gender, race, and parental educational attainment. The third variable category included institutional context variables of Carnegie classification and regional location of an undergraduate institution. The final and fourth variable category included academic preparation variable of undergraduate GPA.

Researchers reported high-school GPA and direct subject testing are stronger predictors than the SAT or ACT. Additionally, these tests prove to have inequalities for different social demographics and backgrounds (Geiser & Studly, 2002). This dissertation did not include standardized test scores, such as the GMAT or GRE, to measure academic preparation.

### **Descriptive Statistics**

Descriptive statistics were conducted to summarize the sample used for analysis. This provided clarity within the data and provided the basic measurements of all variables. The weighted means, standard deviations and maximum, minimum, and standard error were measured for each variable provided in the model and separately identified based in categorical and continuous variables. The dependent variable (B1HIDGMAJ) measured in this dissertation indicated the major or field of study respondents' graduate program enrollment were in within 12 months after bachelor's degree completion. Tables 1 and 2 provide the results for all descriptive statistics of all variables used within this dissertation.

## **Undergraduate Indebtedness**

The descriptive statistics provided on undergraduate indebtedness measured the total amounts of all loans including federal Parent PLUS loans received in the 2015-16 academic year. This variable was labeled in the B&B database as TOTLOAN2 and is equal to the sum of all federal loans, state loans, institutional loans, and other private loans. The benefit in using one year's worth of total loans is the ability to provide the direct costs in a smaller timeframe. It also provides enrollment based on per dollar amount of student debt. The results from using this loan variable provides opportunity in reviewing loans in a shorter timeframe and smaller scale (Woo, 2011). The average amount of loans equaled to an estimated \$1,300 from the total of 9,700 respondents. The maximum total amount of loans was \$16,300 and the minimum total amount of loans was \$0 out of the total sample analyzed. The percentage of students that had some amount of loans was approximately 54.40 percent and among all students, 45.60 percent reported zero amount of loans. This variable was measured as a continuous variable and recoded as per \$1,000.

## **Student Characteristics and College Opportunity**

The variables measured and analyzed within student characteristics and college opportunity include age, gender, marital status, student attended undergraduate institution within resident state, undergraduate major, highest level of education expected, parental/guardian's highest education level achieved a race/ethnicity.

Age was measured as a continuous variable and included an average age of 27 with the maximum age analyzed as 79 years old and minimum age as 19 years old. This variable was labeled AGE and tracks the respondents' age as of 31<sup>st</sup> of December 2015. Gender, labeled GENDER, included 39.70 percent identified as male and 60.30 percent identified as female, with the reference group identified as male. Marital status identified 79.90 percent as single, never

married, 19.00 percent as married, and 1.10 percent as other. The reference group was determined as those that identified as married. This variable was labeled as B1MARRM12 focused on marital status 12 months after the completion of a bachelor's degree. Students that attended an undergraduate institution within their residential state totaled 71.00 percent, students that did not attend an undergraduate institution outside of their residential state totaled 26.10 percent and all foreign and international students totaled 2.00 percent. This variable was labeled as SAMESTAT with the reference group identified as foreign/international. Undergraduate major identified as STEM 22.70 percent, Business-related fields totaled 13.20 percent and all other majors totaled 64.10 percent. This was labeled as B1MAJOR23 with the reference group identified as other major. The highest level of education a student expected to achieve provided 32.40 percent identified as being a bachelor's degree, 2.00 percent as graduate level course, no graduate degree or certificate expected, 1.10 percent as post-baccalaureate certificate, 44.20 percent as a master's degree, 1.80 percent as a post-master's certificate, and 18.50 percent as a doctoral degree: professional and research/scholarship. This was labeled as B1EXPEVR with the reference group identified as bachelor's degree. The highest level of education a student's parental/guardian achieved included 0.30 percent as did not know either parent's education level, 4.90 percent as did not complete high school, 15.80 percent as high school diploma or equivalent, 5.30 percent as vocational/technical training, 8.00 percent as associate degree, 14.90 percent as some college but no degree, 25.90 percent as bachelor's degree, 16.70 percent as master's degree or equivalent, 4.40 percent as doctoral degree-professional practice and 4.00 percent as doctoral degree-research/scholarship. This was labeled as PAREduc and the reference group was those that identified as bachelors. Finally, race/ethnicity represented 62.00 percent as White, 12.80 percent as Black or African American, 14.20 percent as Hispanic or

Latino, 6.50 percent as Asian, 0.50 percent as American Indian or Alaska Native, 0.40 percent as Native Hawaiian/other Pacific Islander and 3.50 percent a more than one race. This was labeled as RACE and the reference group was those that identified as White.

### **Undergraduate Institutional Context**

The variable measured and analyzed within undergraduate institutional context included 2010 Carnegie classification, selectivity, and regional location of an undergraduate institution.

The 2010 Carnegie classification included undergraduate institutions as 31.30 percent as research and doctoral, 39.60 percent as Master's, 18.20 percent as baccalaureate and 10.90 percent as special focus and other. This was labeled as CC2010C and the reference group was identified as special focus and other. Selectivity provided 18.20 percent as very selective, 43.90 percent as moderately selective, 13.70 percent as minimally selective and 23.60 percent as open admission.

This was labeled as SELECTV3 and the reference group was identified as open admission.

Regional location of an undergraduate institution included 5.00 percent located in New England, 16.90 percent located in Mideast, 15.50 percent located in Great Lakes, 8.00 percent located in Plains, 24.60 percent located in Southeast and Puerto Rico, 11.50 percent located in Southwest, 5.40 percent located in Rocky Mountains, and 13.20 percent located in Far West. This was labeled as OBEREG and the reference group was identified as far west.

### **Academic Preparation**

The only variable that measured academic preparation included GPA of undergraduate degree. The average GPA was identified as 3.34 out of a 4.00 scale, the maximum GPA was 4.00 and minimum GPA was 2.00. This was labeled as B1GPA.

## Study Limitations

This dissertation provided to the field of undergraduate indebtedness and graduate school enrollment and continued to use a multinomial logistics regression. This was an advantage for the field of study, as it updates research previously conducted, but a limitation within the analysis in the linear boundaries created. The multinomial logistics regression assumes linearity between the dependent and independent variables. Non-linear formulas and calculations cannot be solved with the logistic regression due to the linear decision plane (Schwab, 2002). The results of this analysis did not determine unpredictable relationships between variables.

The next limitation in this study was the use of B&B data's timeframe of surveying students 1 year after graduation of a bachelor's degree. This limits the long-term outcomes for graduate school enrollment based on the limitations of the B&B dataset. There were variables in this analysis that did not measure the postponement of graduate school enrollment several years after the completion of their baccalaureate program. Additionally, students that postponed their enrollment into graduate school have different characteristics than students that enrolled earlier (Baker, 2016; Bedard & Herman, 2008). The 1-year timeframe observed in the B&B surveys may not capture the full graduate school enrollment decision process if delayed beyond one year after graduation from a bachelor's degree. A longer timeframe would provide support to the limitations in future research. Recent studies focused on 2 – 4 years after graduation of a bachelor's degree (Baker 2016; English & Umbach, 2016). There was a limitation on examining 1-year after graduation within recent datasets, Chen & Bahr (2020), being one study using data 1 and 4 years after graduation. The 1-year timeframe after bachelor's degree graduation provides immediate results of postbaccalaureate decisions and provides major results for enrollment management departments for recruitment campaigns.

Finally, this dissertation did not differentiate between the level of graduate degree programs, such as master's degree programs versus doctoral degree programs. The focus of this study was directly related to master's degree programs only. Additionally, this dissertation did not observe the effects loans had on all student postbaccalaureate decisions, only conditional on graduation and enrollment into graduate degree programs. Therefore, this analysis did not provide the overall effects of educational debt and only observes the decisions of graduate school enrollment after the completion of a baccalaureate degree.

## **Chapter IV**

### **RESEARCH METHODS AND RESULTS**

This chapter provides a comprehensive review of the B&B:16/17 database, analysis sample, and analytic strategy. The results of this dissertation were summarized within this chapter and provided details on the data analysis conducted. First, this chapter reviews the research questions this dissertation hoped to answer. In addressing the first research question, the following section explores the student characteristics and undergraduate loan variables tested against the enrollment into graduate school for STEM and business-related fields. Next, the second research question is reviewed, and undergraduate institutional context variables are measured against the enrollment into graduate school for STEM and business-related fields. The chapter concludes with a summarization of results.

#### **Research Questions**

As discussed, this dissertation attempts to identify the relationship between master's degree enrollment and undergraduate student debt. Using the B&B:16/17 dataset, descriptive statistics and multinomial logistic regression, the following research questions were addressed:

1. To what extent does student characteristics and undergraduate student loan debt influence graduate school enrollment in STEM and business-related fields?
2. To what extent does an individual's undergraduate institutional context influence graduate school enrollment in STEM and business-related fields?

#### **Results**

The result of this analysis was comprised of two parts. The first part provided the findings of the multinomial logistic regression. These results advise answers to the research

questions provided in this dissertation. The second part provided the findings based on each research question.

### **Multinomial Logistic Regression**

The results of the multinomial logistic regression found several statistically significant variables. In tables 3 -5, the relationships between each variable and enrolled in STEM, Business and other major in a graduate degree program versus not enrolled were listed in detail. The relationship of each variable varies in strength, depending on the type of graduate degree program enrolled in.

Based on the likelihood ratio test, the model represents a significant improvement in fit relative to a null model and at least on population slope is non-zero. Additionally, based on McFadden's  $R^2$  goodness of fit, the full model containing all predictors represents 54.70 percent improvement in fit relative to the null model. Finally, the Pearson chi-square test suggested a good fit model ( $p=1.00$ ).

In the overall model, age, gender, attending undergraduate institution within the same state, undergraduate major, highest education expected, enrolled in a postbaccalaureate education, race/ethnicity, the 2010 Carnegie classification, and selectivity were all statistically significant variables. The overall classification accuracy for the model was 90.60 percent. The multinomial logistic regression measured each enrollment in a graduate degree program based on major in STEM, business, other majors and not enrolled in a graduate degree program as the reference group.

Statistically significant variables when measured against enrolled in a STEM graduate degree program included, gender, marital status, race/ethnicity as Asian, highest level of education expected as bachelor's, master's and graduate level course, no graduate degree or

certificate expected, having an undergraduate major in STEM, accumulated undergraduate debt, 2010 Carnegie classification, Selectivity identified as very selective and minimally selective, and regional location of the undergraduate institution within New England, Mideast and Southwest.

Statistically significant variables when measured against enrolled in a business graduate degree program included, age, gender, race/ethnicity identified as Black or African American, highest level of education expected as bachelors and master's, undergraduate major in business, 2010 Carnegie classification identified as Master's, and selectivity identified as very selective, moderately, and minimally selective.

Statistically significant variables when measured against enrolled in other defined graduate degree programs included, attended undergraduate institution within the student's residential state or outside of residential state, highest level of education expected as Master's degree, graduate level course, no graduate degree or certificate expected, and post-baccalaureate certificate, undergraduate major, 2010 Carnegie classification identified as research and doctoral and master's, institutional selectivity, and regional location as New England and Mideast.

### **Research Question I**

The results of the multinomial logistics regression showed student characteristics had a statistically significant relationship to graduate school enrollment in STEM and business-related fields. The major variables that provided a higher likelihood of enrollment to STEM or business-related fields were age, gender, marital status, race/ethnicity, highest level of education expected, undergraduate major, total undergraduate loans, and 2010 Carnegie classification. Below, I broke down the results based on each multinomial outcome variable.

## **STEM Enrollment**

The results of the multinomial logistic regression regarding STEM enrollment revealed a statically significant relationships towards multiple variables. The gender variable ( $p < .001$ ) for female was statistically significant towards enrollment into a STEM graduate degree program. This provided evidence of a positive correlation between females and STEM enrollment and males and STEM enrollment, provided the increase in females is related to an increase in STEM enrollment. Not surprisingly, undergraduate degree majors identified as STEM was statistically significant compared to business and all other majors. This also had a positive correlation to STEM enrollment, showing the increase in students with an undergraduate degree bought an increase in STEM enrollment. Additionally, the highest level of education expected showed statistically significant relationships in bachelor's degree ( $p < .001$ ), a master's degree ( $p < .001$ ), and graduate levels course, no graduate degree or certificate expected ( $p < .05$ ). Also, undergraduate student loan debt had a statistically significant ( $p < .05$ ) relationship towards STEM degree enrollment. Finally, race/ethnicity was only statistically significant for those that identified as Asian ( $p < .05$ ).

Among findings under the STEM graduate degree enrollment, undergraduate major and race provided interesting results regarding odds. When analyzing undergraduate major, most students that enroll in a STEM graduate degree program had an undergraduate major in STEM fields. The odds of a student enrolling in a STEM graduate degree program were 8.30 times more likely when a student had an undergraduate degree in STEM compared to all other majors. In reviewing undergraduate student loans accumulated, for every \$1,000 increase a student accumulated, they were 3.68 times likely in the odds to enroll in a STEM graduate degree program than any other graduate degree program. Additionally, a major finding involved the

identification of race/ethnicity. One that identified their race/ethnicity as Asian were 29.00 percent more likely in the odds to enrolling in a STEM graduate degree program compared to any other race/ethnicity. In previous studies, race was identified as a major indicator of enrollment, when controlling for undergraduate student debt for those that identified as Black/African American or Latino (Baker, 2016; English & Umbach, 2016; Johnson, 1996; Perna, 2004; Strayhorn, 2009). This result is a major finding for the field of literature when analyzing STEM enrollment.

### **Business Enrollment**

When analyzing business enrollment, there were similar results compared to STEM enrollment. There were several variables that provided a statistically significant relationship towards enrollment into business master's degree program. The age variable was statistically significant ( $p < .05$ ) which provides an interesting analysis for future research. The relationship between Business enrollment and age had a positive correlation and showed the increase in age was relative to an increase in business enrollment. Most of the sample was between the age of 20 – 25 years old. Unsurprisingly and like STEM results, undergraduate degree major in business was statistically significant ( $p < .001$ ) and showed a positive correlation to business enrollment. Finally, interesting findings were in highest level of education expected and race/ethnicity. The highest expected education level showed those that identified a bachelor's degree as their highest education level was statistically significant ( $p < .01$ ). Additionally, those that identified as Black/African American was statistically significant ( $p < .05$ ). This could provide interesting connections towards Black/African American students and their educational goals.

In analyzing the probabilities within the results of business enrollment, interesting findings were within undergraduate major, highest education level expected and race/ethnicity.

Similar, again, to STEM enrollment results, undergraduate major in business provided the highest odds of enrollment. Those that had an undergraduate degree in business were 6.890 times more likely in the odds to enroll in a business degree program than all other majors. Those that identified bachelors as their highest education level expected were 3.740 times likely in the odds to enroll in business than those that identified their highest education level as anything other than bachelors. Finally, those that identified a Black/African American were 23.60 percent less likely in the odds to enroll in business than any other race/ethnicity. This finding followed the findings in previous literature in the inequalities in education place on Black/African American students (Baker, 2016; English & Umbach, 2016; Perna, 2006; Scott-Clayton, 2018).

### **Other Major Enrollment**

The results of those that enrolled in other majors that weren't STEM or business provided the most interesting results. When looking at undergraduate major, all majors were statistically significant ( $p < .001$ ) and provided a positive correlation to enrollment. Additionally, the highest level of education expected that showed statistically significant relationships were bachelor's degree ( $p < .001$ ), master's degree ( $p < .001$ ), graduate course and not graduate degree or certificate expected ( $p < .05$ ) and post-baccalaureate certification ( $p < .05$ ). These all resulted in a positive correlation between each and enrollment into other majors. Finally, the most interesting findings were total loans and those that attended undergraduate institution within their residential state. Total amount of undergraduate loans was statistically significant ( $p < .001$ ), providing a major result to the literature and enrollment management. This provided enrollment into any other major besides STEM and business proves financial status as a factor in enrolling in graduate level programs. Those that attended an undergraduate institution within their residential state and those that attended outside of their residential state were statistically significant ( $p < .01$ ). This

result provided a major finding to the literature by measuring students that attended undergraduate institutions within their residential state. This was not measured in graduate enrollment for more than a decade.

The results of all other majors revealed major findings in several variables as influential. The odds ratios provided major results for multiple variables. Specifically, total amount of undergraduate loans and those that attended an undergraduate institution within their residential state or not. The total amount of undergraduate loans provided for every \$1,000 increase a student accumulated; they were 5.04 times more likely in the odds to enrollment in other majors than Business or STEM. Previous studies on undergraduate loans provided mixed results. This dissertation provided similar mixed results based on the major chosen for enrollment. Students that attended undergraduate institution within their residential state were 2.830 times likely in the odds to enroll than those that attended an undergraduate institution outside of their residential state. Additionally, those that did not attend an undergraduate institution within their residential state were 2.370 more likely in the odds to enroll than those that attended an undergraduate institution within their state. These results showed location of an undergraduate institution within their residential state was not a major factor towards enrollment.

### **Research Question II**

All variables measured in undergraduate institutional context category provided a statistically significant relationship to enrollment into STEM or business-related field. The 2010 Carnegie classification identified all classification as having an influence on enrollment into a STEM program. Regarding business-related fields, research/doctoral and master's institutions were identified as an influence. Selectivity for STEM found those that went to a moderately selective and minimally selective undergraduate institutions were more likely to enroll. For

business-related fields, very selective and moderately selective undergraduate institutions were influential in graduate degree program enrollment. Regional location or an undergraduate institution was only a major factor for STEM enrollment based on New England and Mideast regions. Below, I broke down the results based on each multinomial outcome variable.

### **STEM Enrollment**

The analysis on STEM enrollment and characteristics of undergraduate institutions found a relationship with the 2010 Carnegie classification, regional location, and selectivity. The results showed statistically significant relationships and positive correlations between those that attended an undergraduate institution identified as doctoral ( $p < .001$ ), master's ( $p < .001$ ), special focus and other ( $p < .001$ ), and baccalaureate ( $p < .05$ ) and enrollment to a STEM program. Additionally, regional location was shown as statistically significant and positive correlations between undergraduate institutions located in New England ( $p < .01$ ), Mideast ( $p < .01$ ), and Southwest ( $p < .05$ ) and those that enrolled in a STEM program. Finally, selectivity of institutions that identify as very selective ( $p < .001$ ) and minimally selective ( $p < .01$ ) were statistically significant. These results show a lot of information regarding institutional context as a major influence towards STEM enrollment.

In analyzing the probabilities of these variables, interesting findings were found within the 2010 Carnegie classification and region. Undergraduate institutions that were identified as master's by the 2010 Carnegie classification had 3.68 times increased in odds in enrollment than those that attended any other institutional 2010 Carnegie classification. Those that attended an undergraduate institution in the New England region had 46.40 percent increased odds of enrolling in a STEM master's degree program compared to any other region. Finally, those that

attended an undergraduate institution in the Mideast region had 33.10 percent and Southwest 29.80 percent increased odds in enrollment compared to any other region.

### **Business Enrollment**

The results on business enrollment and characteristics of undergraduate institutions found influences on the 2010 Carnegie classification and selectivity. There was a statistically significant relationship and a positive correlation between those that attended an undergraduate institution identified as master's ( $p < .001$ ) and business enrollment. Also, selectivity was shown statistically significant and positive correlations for those that attended an undergraduate institution as moderate selective ( $p < .01$ ) and minimally selective ( $p < .001$ ) and enrollment into a business program.

The results were interesting in the selectivity variable. The likelihood of one that attended a moderately selective undergraduate institution was 44.80 percent increase in the odds in enrolling in a business-related master's degree program. Those that attended a minimally selective undergraduate institution had 25.90 percent increased odds in enrollment. These results indicate the selectivity of an undergraduate institution had a strong influence on enrollment for business enrollments. It provides evidence that undergraduate institutional context is still a major influence on enrollment.

### **Other Major Enrollment**

All results for other major enrollment for undergraduate institutional context showed major statistically significant relationships in all variables categorized under undergraduate institution context. Analyzing these results found statistically significant relationships and positive correlations between the 2010 Carnegie classification identified as research and doctoral ( $p < .001$ ) and master's ( $p < .001$ ) and enrollment into other majors. The selectivity variable

resulted in statistically significant relationships and positive correlations between all selectivity metrics; very selective ( $p < .001$ ), moderately selective ( $p < .001$ ), minimally selectivity ( $p < .001$ ), and open admission ( $p < .001$ ) and enrollment into other majors.

The analysis on probabilities provided additional findings in the 2010 Carnegie classification. Those that attended an undergraduate institution that was identified as research and doctoral were 2.25 times increased in the odds of enrolling. Additionally, those that attended an undergraduate institution identified as master's were 2.67 times increased in the odds of enrolling.

### **Key Findings**

The results of this dissertation provided several statistically significant relationships between the dependent and independent variables. The key findings to focus on in this study involve the relationship between graduate school enrollment and loans, age, race, region, and selectivity. These findings provide growing evidence for further research and focus on graduate school enrollment in STEM and business fields.

Undergraduate loans were statistically significant within students that enrolled in a STEM graduate degree program. Throughout the current literature there were mixed results on the relationship debt and financial factors and graduate school enrollment (Barid, 1973; Carter, 1999; Chen & Bahr, 2020; Choy, 2000; Ekstrom et al., 1991; English & Umbach, 2016; Perna, 2004; Rothstein & Rose, 2011; Schapiro et al., 1991; Weiler, 1991). This continues to remain mixed within this dissertation. The results of this dissertation indicated the increase in undergraduate student loans indicated the increased likelihood of a student enrolling in a graduate degree program focused on STEM. Further studies need to continue this study on loans as different policies could cause direct influences on enrollment. The COVID student loan

forgiveness programs beginning to be in discussion, could be a major factor in enrollment to graduate school. With the potential to remove financial barriers from undergraduate student loan debt, there is a potential to show results in higher enrollment in graduate school for all fields and majors (Dowling et al., 2020; Miller et al., 2020).

The age of a student was indicated as statistically significant for those enrolling in a graduate degree program in business. The overall majority age of the sample used was between 20-25 years old. The finding indicated that the age of a student provided evidence of influence over the enrollment into a graduate degree program in business. In previous studies, age was not indicated as a major indicator for enrollment. This finding adds to the literature in analyzing in more detail the variables to analyze when defining student characteristics.

The identified race/ethnicity of a student provided major findings in this study. When looking at STEM, students that identified as Asian were more likely to enroll in a graduate degree program in STEM. This provides a major barrier for other race/ethnicities and a highlight on the inequalities that may occur in graduate degree programs in STEM. In analyzing business, Black students were less likely to enroll in a graduate degree program in business. This raises a lot of questions into what barriers are causing inequalities for specifically students that identify as Black. In previous studies the GMAT was a major indicator of a barrier for Black students to enroll in graduate school and any further education after completion of their bachelor's degree (Singh & Chakravarty, 2018). This continues to be the assumptions that there are major barriers for Black students when it comes to furthering education.

The region of an undergraduate institution provided a statistically significant relationship towards STEM graduate school enrollment. This was identified through the regions New England, Mideast, and Southwest. It was identified that students that attended undergraduate

institutions within these regions were more likely to enroll in a graduate degree program in STEM. This result provides interesting findings when analyzing the influence location has on a student. It was shown in previous studies the importance of location towards the completion of a degree (Chen & Bahr, 2020; Perna, 2004). Additionally, students that attended undergraduate institutions within these regions, most likely attended major universities with focuses on STEM fields, such as Brown University, Harvard University, Quinnipiac University and University of Connecticut in New England; Princeton University, Columbia University and University of Pennsylvania in the Mideast; and Texas Tech University, Rice University and Texas A&M University in the Southwest regions.

Finally, selectivity of an undergraduate institution provided a statistically significant relationship towards enrollment to a graduate degree program focused on STEM. Undergraduate institutions that identified as very selective and minimally selective had the most influence on enrollment in STEM graduate degree programs. These findings provide a deeper look into the characteristics of an undergraduate institution and their influential ability to further a student's education.

### **Conclusion**

The results of the multinomial logistic regression provided findings within student characteristics and college opportunity, financial, and institutional characteristics. The focus of the findings was on loans, age, race, regional location, and selectivity. There was little evidence of undergraduate loans remaining a major influence on graduate school enrollment. This aligns with the findings provided by previous studies (Chen & Bahr, 2020; Choy, 2000; English & Umbach, 2016; Perna, 2004; Rothstein & Rose, 2011). Additionally, findings indicated student characteristics remain an influence on graduate school enrollment following the studies within

the current literature (Baker, 2016; English & Umbach, 2016; Perna, 2006; Scott-Clayton, 2018). Regarding undergraduate institutional characteristics, all findings provided unique relationships towards each dependent variable. These findings continue the trend provided by current studies (Chen & Bahr, 2020; English & Umbach, 2016; Perna, 2006). The results from this dissertation brought relevance to continue using the Undergraduate College Choice Theory with Iloh's model as student characteristics and college opportunity, financial, and institutional characteristics all remain influential variables in studying graduate school enrollment.

## **Chapter V**

### **CONCLUSION AND POLICY RECOMMENATIONS**

This dissertation's purpose was to fill the gaps in literature by using the B&B:16-17 dataset to provide results relevant from the Great Recession of 2008. The results from this dissertation filled major gaps in the literature focused on STEM and business fields.

Additionally, the results from this dissertation provided evidence on enrollment metrics and other factors that relate to enrollment. Finally, this dissertation determined if undergraduate student debt, institutional context and student characteristics remained an influence when enrolling into graduate school for STEM and business-related fields.

Enrollment remains a major influence towards a college's financial success. It is extremely important to understand what factors influence one to pursue a master's degree program as it can assist enrollment departments and target specific individuals. Factors such as graduate school attainment factors and college financial factors remain as factors measured in previous studies and is important to continue to measure through economic declines. This dissertation explored the impact undergraduate student debt, institutional context and student characteristics had on an individual's decision to pursue a graduate degree program in STEM or business-related fields. It also explored influences undergraduate institutional context had towards graduate school enrollment.

The research questions answered include the following:

1. To what extent does student characteristics and undergraduate student loan debt influence graduate school enrollment in STEM and Business-related fields?
2. To what extent does an individual's undergraduate institutional context influence graduate school enrollment in STEM and Business-related fields?

Literature presented on this topic provided historical patterns on factors that influence enrollment to graduate school. The findings in previous studies provided mixed results on the influence specific factors have on one's decision to enroll into graduate school. The results found a strong relationship between undergraduate GPA, institutional classifications, indebtedness, and undergraduate academic major toward the graduate school decision process. The major gap in the literature was B&B datasets used and incorporation of regional and residential variables for undergraduate institutions. This dissertation filled the gap presented in the literature by using the most recent B&B dataset and incorporating institutional location variables into the research model. Additionally, this dissertation was the only study that focused on STEM and business programs towards graduate school enrollment.

The sample used in this dissertation was focused on students that completed their baccalaureate requirements between 2015 and 2016. Additionally, the sample was focused on students that enrolled in a graduate degree program within STEM, business, or other majors. The sample comprehensively examined data drawn from the NCES B&B survey of 2016-2017 and measured all variables 12 months after completion of their bachelor's degree.

The method used within this dissertation was a multinomial logistic regression that identified if a student enrolled in STEM, business, or other majors measured against did not enroll into a graduate degree program. This was tested against three major sections of variables: undergraduate student loan debt, student characteristics and college opportunity, and undergraduate institutional context.

### **Implications**

There were a lot of findings that identify the need to continue research on this field of study and give enrollment focused program opportunities. The results from this study identified

the inequalities within STEM and business graduate degree enrollment based on race, continued focus on undergraduate student loans and undergraduate institutional characteristics. These results provided the opportunity for major implications.

The inequalities within enrollment for STEM and business graduate degree programs provide an opportunity to create programs targeted towards underrepresented races/ethnicities. These programs could provide major opportunity in filling the gap for both STEM and business through recruiting strategies. This could involve financial implications to help remove any financial burden and the removal of required third party testing or other applicational testing requirements. This was shown in the removal of the SAT/ACT for undergraduate institutions and larger increase in applicants from underrepresented races/ethnicities (Preston, 2017). More focus should be involved in aligning programs and opportunities given to undergraduates, to graduate school candidates. These programs will provide opportunities and removal of major barriers towards enrollment to a graduate degree program.

Undergraduate student loans are still a major issue in financial decisions. Future studies need to continue to examine the influence loans and other financial factors have on a student's postbaccalaureate decisions. Additionally, more financial programs need to be provided to graduate students. There are not enough financial support programs provided to graduate students. Additionally, there is a lack of financial support to be provided to students that work while receiving their graduate degree. Currently most students in graduate degree programs rely on tuition remission from their employer, graduate assistantships, and private loans to fund their graduate education (Webber & Burns, 2020). There is a major need to provide more opportunities for graduate students such as in scholarships and grants.

Undergraduate institutions need to educate and provide programs that are directed towards graduate school. Career focused programs such as internships and mentorships could encourage students to focus on making career-driven postbaccalaureate decisions. These decisions could provide potential increases in graduate school enrollment as well. There are several studies that proved major benefits from these type of programs towards a student's success (Hamilton et al., 2019; McKinsey, 2016). All studies provide evidence on the importance mentorship programs and success focused programs have towards a student in their academic and career success. Currently, there are limited studies that focus on graduate student mentorship programs within STEM and business fields. There is an opportunity to use these programs within these fields as they have proven success in other areas such as medical and nursing (Lombardo et al., 2017; Skjevik et al., 2020).

This dissertation found that the amount of student loans accumulated was influential towards enrollment into graduate degree programs in STEM and other majors. These findings align with other recent studies that found total loans as a factor in graduate school enrollment (Baker, 2016; Malcom & Dowd, 2012; Zhang, 2013). The results of this dissertation suggest that enrollment into STEM and other major graduate degree programs were influenced on the amount of student loans accumulated. Undergraduate institutional context was a major influence on enrollment for STEM and business graduate degree programs. Understanding the influences on graduate school enrollment provides guidance for future graduate enrollment studies and college enrollment departments.

Measuring graduate school enrollment factors are key in improving enrollment in any graduate degree program. This dissertation focused enrollment in STEM and business graduate degree programs. These programs continue to be one of the most continuously growing and in-

demand fields in graduate degree programs. For enrollment management departments, it is important to understand influences students have towards graduate enrollment. The results of this dissertation provide guidance for enrollment management in targeting students based on undergraduate institutional context. A major advantage for enrollment management is to target students from specific undergraduate institutions while they are currently pursuing their bachelor's degree.

### **Future Research**

This dissertation revealed that studying factors relative to graduate school enrollment is important to continue to study. Results indicated that student characteristics, accumulated undergraduate student loans and undergraduate institutional context were influences in enrollment to a graduate degree program. These results follow the previous studies conducted on graduate school enrollment (Baker, 2016; Chen & Bahr, 2020; English & Umbach, 2016; Heller, 2001; Iloh, 2019; Mullen, 2003; Zhang, 2013). For future research, it is vital to continue to measure variables such as total undergraduate loans, student characteristics and undergraduate institutional context.

Total undergraduate student loans provided evidence of an influential factor in enrollment to graduate school. Future research should continue to measure undergraduate student loans. Student loans continue to be a controversy topic and is important to continue to understand financial factors that influence enrollment. This dissertation only covers effects on enrollment 12 months after graduation from a bachelor's degree, future studies should explore longer timelines after bachelor's degree graduation and other financial factors. Other financial factors should include major expenses such as car payments, housing, and family support expenses. These expenses become more relevant in students that hold off their enrollment into graduate school

(English & Umbach, 2016). These metrics provide future information on the financial influences connected to graduate school enrollment.

Student characteristics continue to show common results in the differences between race/ethnicity. This dissertation found differences in STEM and business enrollment among different races/ethnicities. Due to these findings, further research should focus on the inequalities among different degree majors by race/ethnicity. This research could provide different programs for underrepresented races/ethnicities within each field of study. There is an opportunity to study interaction of race by gender. This would provide more detail directed on student characteristics and barriers for specific identified individuals. Additionally, this research can help provide different enrollment and recruitment strategies.

Undergraduate institutional context was a major factor in this dissertation that proved to remain influential within each variable measured for graduate school enrollment. These findings provided alignment with other previous study findings. Future studies need to continue to measure these items with additional measurements that focus on programs offered within an undergraduate degree major, such as mentorships, internships, career focused programs and any courses or offered sessions focused on postbaccalaureate decisions. These measurements will provide further detailed information on the type of education and opportunities offered within each undergraduate degree's program and the influence towards graduate degree enrollment.

Finally, there are major limitations in using metrics from one dataset. This dissertation used all results from the B&B:16/17 and identified variables from this dataset to measure graduate degree enrollment. This is a major limitation on fully understanding the story behind why metrics are valued at their collected measurements. A qualitative study is highly suggested

to review the influences of total undergraduate loan accumulation and undergraduate institutional context have on one's decision to enroll in a graduate degree program.

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## Appendix

**Table 1: Descriptive Statistics for Categorical Variables**

Variables	Weighted Percentage	Std. Dev
<u>B&amp;B:16/17 (n = 9,699)</u>		
<b>Graduate Enrollment</b>		
Enrollment into Graduate School		
No Enrollment	76.7 %	0.736
STEM	3.9 %	0.736
Business	4.1 %	0.736
Other Major	15.3 %	0.736
<b>Student Characteristics and College Opportunity</b>		
Gender		
Male	39.7 %	0.489
Female	60.3 %	0.489
Marital Status		
Single, never married	79.9 %	0.719
Married	19.0 %	0.719
Other	1.10 %	0.719
Attended Undergraduate Institution within residential state		
Yes	71.0 %	0.500
No	26.1 %	0.500
Foreign/International	2.0 %	0.500
Race/Ethnicity		
White	62.0 %	1.407
Black/African American	12.8 %	1.407
Hispanic/Latino	6.5 %	1.407
Asian	0.5 %	1.407
American Indian	0.3 %	1.407
Alaska Native	0.1 %	1.407
Native Hawaiian/other Pacific Islander	0.4 %	1.407
More than one race	3.5 %	1.407
Parental Highest Education Level Achieved		
Bachelor's	25.9 %	0.226
Did not complete high school	4.9 %	0.226
High school diploma or equivalent	15.8 %	0.226
Vocational/technical training	5.3 %	0.226
Associate degree	8.0 %	0.226
Some college but no degree	14.9 %	0.226
Do not know either parent's education level	0.3 %	0.226
Master's degree or equivalent	16.7 %	0.226
Doctoral degree-professional practice	4.4 %	0.226
Doctoral degree-research/scholarship	4.0 %	0.226
Highest Education Level Expected		
Bachelor's degree	32.4 %	0.802
Master's degree	44.2 %	0.802

Graduate level course, no graduate degree or certificate expected	2.0 %	0.802
Post-Baccalaureate certificate	1.1 %	0.802
Post-Master's certificate	1.8 %	0.802
Doctoral degree in professional and research/scholarship	18.5 %	0.802
Undergraduate Major		
STEM	22.7 %	0.343
Business	13.2 %	0.343
Other major	64.1 %	0.343
<b>Undergraduate Institutional Context</b>		
<hr/>		
2010 Carnegie Classification		
Research & Doctoral	31.3 %	0.949
Master's	39.6 %	0.949
Baccalaureate	18.2 %	0.949
Special Focus & Other	10.9 %	0.949
Institutional Selectivity		
Very Selective	18.9 %	0.944
Moderately Selective	43.9 %	0.944
Minimally Selective	13.7 %	0.944
Open Admission	23.6 %	0.944
Regional Location		
New England	5.0 %	0.976
Mideast	16.9 %	0.976
Great Lakes	15.5 %	0.976
Plains	8.0 %	0.976
Southeast and Puerto Rico	24.6 %	0.976
Southwest	11.5 %	0.976
Rocky Mountains	5.4 %	0.976
Far West	13.2 %	0.976

*Note. Weighted Sample. \*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$ . Source: NCES (B&B:16/17)*

**Table 2: Descriptive Statistics for Continuous Variables**

Variables	Min	Max	B&B:16/17 (n = 9,699)	
			Weighted Mean	Std. Dev
<b>Student Characteristics and College Opportunity</b>				
Age	19	79	27.190	8.577
Undergraduate GPA	2.00	4.00	3.340	0.444
<b>Financial</b>				
Undergraduate Student Loans Accumulated (per \$1,000)	0	1.630	1.296	0.119

*Note. Weighted Sample. \*\*\*  $p < 0.001$ ; \*\*  $p < 0.01$ ; \*  $p < 0.05$ . Source: NCES (B&B:16/17)*

**Table 3: Multinomial Regression for STEM Graduate School Enrollment vs No Enrollment**

B&amp;B:16/17 (n = 9,699)

Variables	Odds Ratio	Std. Error	Sig
<b>Student Characteristics and College Opportunity</b>			
Age	0.995	0.009	
Gender			
Female (vs Male)	1.421	0.000	***
Marital Status			
Single, never married (vs Married)	1.322	0.322	***
Other (vs Married)	1.235	0.534	***
Attended Undergraduate Institution within residential state			
Yes (vs Foreign/International Student)	0.901	0.326	
No (vs Foreign/International Student)	0.607	0.339	
Race/Ethnicity			
Black/African American (vs White)	1.324	0.316	
Hispanic/Latino (vs White)	1.162	0.308	
Asian (vs White)	1.290	0.325	
American Indian (vs White)	3.700	0.570	*
Alaska Native (vs White)	0.229	1.252	
Native Hawaiian/other Pacific Islander (vs White)	0.214	0.000	
More than one race (vs White)	0.341	0.000	
Undergraduate GPA	0.887	0.117	
Parental Highest Education Level Achieved			
Did not complete high school (vs Bachelor's)	0.873	0.322	
High school diploma or equivalent (vs Bachelor's)	0.701	0.252	
Vocational/technical training (vs Bachelor's)	0.718	0.315	
Associate degree (vs Bachelor's)	0.634	0.281	
Some college but no degree (vs Bachelor's)	0.699	0.252	
Do not know either parent's education level (vs Bachelor's)	0.648	0.002	
Master's degree or equivalent (vs Bachelor's)	0.763	0.239	
Doctoral degree-professional practice (vs Bachelor's)	0.688	0.308	
Doctoral degree-research/scholarship (vs Bachelor's)	0.651	0.319	
Highest Education Level Expected			
Master's Degree (vs Bachelor's)	0.596	0.125	***
Graduate level course, no graduate degree or certificate expected (vs Bachelor's)	0.270	0.504	*
Post-Baccalaureate certificate (vs Bachelor's)	0.244	0.786	
Post-Master's certificate (vs Bachelor's)	0.575	0.400	
Doctoral degree in professional and research/scholarship (vs Bachelor's)	0.498	0.398	
Undergraduate Major			
STEM (vs Other Major)	8.302	0.129	***
Business (vs Other Major)	0.818	0.243	
<b>Financial</b>			
Undergraduate Student Loans Accumulated (per \$1,000)	3.678	0.039	*
<b>Undergraduate Institutional Context</b>			

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2010 Carnegie Classification				
	Research and doctoral (vs Special focus and other)	2.482	0.279	***
	Master's (vs Special focus and other)	3.679	0.262	***
	Baccalaureate (vs Special focus and other)	1.862	0.287	*
Institutional Selectivity				
	Very Selective (vs Open Admission)	0.818	0.214	***
	Moderately Selective (vs Open Admission)	0.579	0.185	
	Minimally Selective (vs Open Admission)	1.711	0.193	**
Regional Location				
	New England (vs Far West)	0.536	0.288	**
	Mideast (vs Far West)	0.669	0.181	**
	Great Lakes (vs Far West)	1.025	0.182	
	Plains (vs Far West)	0.834	0.230	
	Southeast and Puerto Rico (vs Far West)	0.887	0.168	
	Southwest (vs Far West)	0.702	0.207	*
	Rocky Mountains (vs Far West)	1.326	0.262	

**Table 4: Multinomial Regression for Business Graduate School Enrollment vs No Enrollment**

		B&B:16/17 (n = 9,699)		
Variables		Odds Ratio	Std. Error	Sig
<b>Student Characteristics and College Opportunity</b>				
Age		1.018	0.007	*
Gender				
	Female (vs Male)	1.503	0.000	***
Marital Status				
	Single, never married (vs Married)	3.041	0.932	
	Other (vs Married)	2.354	1.016	
Attended Undergraduate Institution within residential state				
	Yes (vs Foreign/International Student)	1.289	0.377	
	No (vs Foreign/International Student)	1.035	0.387	
Race/Ethnicity				
	Black/African American (vs White)	0.764	0.284	**
	Hispanic/Latino (vs White)	2.097	0.298	
	Asian (vs White)	0.726	0.322	
	American Indian (vs White)	1.448	0.699	
	Alaska Native (vs White)	1.044	0.867	
	Native Hawaiian/other Pacific Islander (vs White)	0.832	0.098	
	More than one race (vs White)	0.000	0.006	
Undergraduate GPA		0.835	0.113	
Parental Highest Education Level Achieved				
	Did not complete high school (vs Bachelor's)	0.981	0.313	
	High school diploma or equivalent (vs Bachelor's)	1.033	0.266	
	Vocational/technical training (vs Bachelor's)	0.777	0.320	
	Associate degree (vs Bachelor's)	0.667	0.301	
	Some college but no degree (vs Bachelor's)	0.683	0.273	
	Do not know either parent's education level (vs Bachelor's)	0.707	0.975	
	Master's degree or equivalent (vs Bachelor's)	0.658	0.273	
	Doctoral degree-professional practice (vs Bachelor's)	0.713	0.343	
	Doctoral degree-research/scholarship (vs Bachelor's)	0.705	0.353	
Highest Education Level Expected				
	Master's Degree (vs Bachelor's)	0.767	0.132	*
	Graduate level course, no graduate degree or certificate expected (vs Bachelor's)	0.891	0.355	
	Post-Baccalaureate certificate (vs Bachelor's)	1.021	0.508	
	Post-Master's certificate (vs Bachelor's)	1.013	0.351	
	Doctoral degree in professional and research/scholarship (vs Bachelor's)	0.567	0.244	
Undergraduate Major				
	STEM (vs Other Major)	1.152	0.143	***
	Business (vs Other Major)	6.885	0.130	
<b>Financial</b>				
Undergraduate Student Loans Accumulated (per \$1,000)		3.675	0.053	

## **Undergraduate Institutional Context**

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### 2010 Carnegie Classification

Research and doctoral (vs Special focus and other)	1.606	0.232	
Master's (vs Special focus and other)	2.326	0.206	***
Baccalaureate (vs Special focus and other)	1.228	0.239	

### Institutional Selectivity

Very Selective (vs Open Admission)	0.502	0.202	
Moderately Selective (vs Open Admission)	0.552	0.155	**
Minimally Selective (vs Open Admission)	1.259	0.164	***

### Regional Location

New England (vs Far West)	0.812	0.297	
Mideast (vs Far West)	0.849	0.188	
Great Lakes (vs Far West)	1.098	0.190	
Plains (vs Far West)	0.817	0.236	
Southeast and Puerto Rico (vs Far West)	1.032	0.171	
Southwest (vs Far West)	0.940	0.199	
Rocky Mountains (vs Far West)	1.088	0.264	

**Table 5: Multinomial Regression for Other Major Graduate School Enrollment vs No Enrollment**

Variables	B&B:16/17 (n = 9,699)			
	Odds Ratio	Std. Error	Sig	
<b>Student Characteristics and College Opportunity</b>				
Age	0.999	0.006		
Gender				
	Female (vs Male)	0.737	0.012	
Marital Status				
	Single, never married (vs Married)	1.235	0.819	
	Other (vs Married)	1.125	1.038	
Attended Undergraduate Institution within residential state				
	Yes (vs Foreign/International Student)	2.834	0.340	**
	No (vs Foreign/International Student)	2.373	0.346	*
Race/Ethnicity				
	Black/African American (vs White)	0.954	0.208	
	Hispanic/Latino (vs White)	1.504	0.211	
	Asian (vs White)	0.900	0.241	
	American Indian (vs White)	0.915	0.518	
	Alaska Native (vs White)	1.336	0.884	
	Native Hawaiian/other Pacific Islander (vs White)	0.256	0.723	
	More than one race (vs White)	0.000	0.221	
Undergraduate GPA	0.971	0.088		
Parental Highest Education Level Achieved				
	Did not complete high school (vs Bachelor's)	1.106	0.240	
	High school diploma or equivalent (vs Bachelor's)	0.921	0.203	
	Vocational/technical training (vs Bachelor's)	1.027	0.234	
	Associate degree (vs Bachelor's)	0.791	0.225	
	Some college but no degree (vs Bachelor's)	0.882	0.203	
	Do not know either parent's education level (vs Bachelor's)	0.832	0.859	
	Master's degree or equivalent (vs Bachelor's)	0.969	0.199	
	Doctoral degree-professional practice (vs Bachelor's)	1.093	0.250	
	Doctoral degree-research/scholarship (vs Bachelor's)	0.732	0.124	
Highest Education Level Expected				
	Master's Degree (vs Bachelor's)	0.445	0.093	***
	Graduate level course, no graduate degree or certificate expected (vs Bachelor's)	0.574	0.252	*
	Post-Baccalaureate certificate (vs Bachelor's)	0.421	0.370	*
	Post-Master's certificate (vs Bachelor's)	0.580	0.293	
	Doctoral degree in professional and research/scholarship (vs Bachelor's)	0.599	0.187	
Undergraduate Major				
	STEM (vs Other Major)	0.551	0.107	***
	Business (vs Other Major)	0.405	0.138	***
<b>Financial</b>				
Undergraduate Student Loans Accumulated (per \$1,000)	5.036	0.001	***	

## **Undergraduate Institutional Context**

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### 2010 Carnegie Classification

Research and doctoral (vs Special focus and other)	2.245	0.172	***
Master's (vs Special focus and other)	2.666	0.158	***
Baccalaureate (vs Special focus and other)	1.423	0.179	

### Institutional Selectivity

Very Selective (vs Open Admission)	0.588	0.145	***
Moderately Selective (vs Open Admission)	0.680	0.113	***
Minimally Selective (vs Open Admission)	0.606	0.140	***

### Regional Location

New England (vs Far West)	0.537	0.227	**
Mideast (vs Far West)	0.771	0.135	*
Great Lakes (vs Far West)	0.994	0.136	
Plains (vs Far West)	0.792	0.170	
Southeast and Puerto Rico (vs Far West)	0.853	0.124	
Southwest (vs Far West)	0.791	0.144	
Rocky Mountains (vs Far West)	0.938	0.189	