

# Disparities in American Graduate Students' Tendency to Borrow: *Race, Family Background, and Major*

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## Abstract

This study uses National Postsecondary Student Aid Study of 2012 data to examine disparities in graduate students' borrowing tendency. Results show Black and Hispanic students, students in education, humanities, and social sciences, and students of parents with lower education level are more likely to borrow for graduate education, even after controlling for financial factors and enrollment pattern. Institution's size and student body racial distribution are associated with borrowing likelihood, while no gender difference is detected.

**Keywords:** Graduate student, Student loan, Race, Family background, Field of study

## 1. Introduction

Graduate education is increasingly crucial for the job market and individual income. Between 2010 and 2020, jobs that require a master's degree for entry are expected to grow by 21.7%, faster than the growth rate of any other degree category in the United States (Bureau of Labor Statistics, 2012). For individuals, the estimated average lifetime earning of doctoral degree holders is \$193,000 more than master's degree holders, whose estimated average lifetime earning is \$457,000 more than that of bachelor's degree holders (Carnevale, Smith, & Strohl, 2010). The benefits of graduate education for both the economy and individuals are apparent.

Graduate education faces challenges, such as enrollment and student success. One of the challenges is the cost of attendance, which is reflected in increasing graduate student borrowing. The issue of college affordability has been the focus of national policy discussion and scholarly research over the past years in the United States (Dannenberg & Voight, 2013; Delaney, 2014; Hossler, 2004). The ever increasing cost of college education, especially as a proportion of family income for middle- and low-income students, has posed challenges for policy makers and college administrators in terms of helping students find ways to pay for college (Marcus & Hacker, 2014; National Center for Higher Education Management Systems, 2016). While federal and state student financial aid policies increasingly shift towards non-need based aid, borrowing has become more common among students and the total debt amount has increased over years (Baum, Elliott, & Ma, 2014).

Situated in the national trend of rising college cost and decreasing public funding appropriation, graduate students are becoming more reliant on borrowing in general. This trend is not limited to professional students. The percentage of borrowing graduate students is 45% in the 2011-12 academic year with an average debt of \$21,400, compared to 26% in the 1995-96 academic year with an average debt of \$11,100 (National Center for Education Statistics, 2015). As of 2012, around 40% of the outstanding student loans were taken by graduate students (Delisle, 2014).

The significant impacts of college debt on education outcomes have been well documented in the research literature. It has been shown that college debt influences time to degree and probability of graduating, career decisions, pursuit of higher degrees, and professional performance in the workforce (Dwyer, Hodson, & McCloud, 2013; Kim & Eyermann, 2006; Millett, 2003; Minicozzi, 2005; Rothstein & Rouse, 2011; West, Shanafelt, & Kolars, 2011). This combined with the rising level of graduate student borrowing leads to the necessity for college administrators and policy makers to understand the pattern of borrowing among graduate students. Such understanding is crucial for institutions to better meet students' financial needs, promote graduate student success, and make informed institutional decisions. Abundant research and policy discussion has been conducted regarding borrowing among undergraduate students, who tend to be dependent and to lack income sources to cover the entire college cost (Jackson & Reynolds, 2013), and regarding the influence of student debt on career choices of professional students

(e.g., Phillips, Weismantel, Gold, & Schwenk, 2010). Less attention has been paid to graduate students' borrowing. In fact, the rapid rise in college student debt amount is more attributable to graduate than to undergraduate students (Delisle, 2014).

Research on undergraduate student borrowing has shown that low- and moderate-income students rely more heavily on borrowing than middle- and high-income students (Choy & Berker, 2003). Moderate-income students and underrepresented minority students, namely Black and Hispanic students, have higher burden to pay for college themselves (Elliott & Friedline, 2013). These students also are more likely to be financially at-risk after graduation due to the college debt incurred (Archuleta, Dale, & Spann, 2013). Family socioeconomic status (SES) has been shown to have long lasting effects on students' higher education decision making, oftentimes beyond the choice of college (Hearn, 1984). Little is known about whether the stronger reliance on borrowing for lower SES students and underrepresented minority students continues into graduate school.

Previous research suggests that different study fields in higher education are associated with varying power and prestige, much of which stems from the perspective economic return of majors, and students' family SES background tends to be related to their choice of study field (Braxton & Hargens, 1996; Davies & Guppy, 1997; Rumberger & Thomas, 1993; Sianou-Kyrgiou, 2010; Thomas, 1985). Different study fields also differ in terms of external funding (Sides, 2015; Tworek, 2013), which is an important source of graduate student financial aid. Examining whether graduate students' borrowing pattern differs by study field could help college administrators and policy makers understand which student subgroup has the most unmet financial needs and is the most inclined to incur student debt.

The purpose of this study was to examine the pattern of American graduate student borrowing on the national level with focus on students' family SES background, race, and graduate field of study. The central research question guiding this study is: Does graduate students' likelihood of borrowing for school differ by race, family SES background, and study field?

## **2. Review of Literature**

### *2.1 Racial Disparities in Student Borrowing*

The increasing student loan amount has been attributed to factors such as rising cost of college education, decrease in public funding for higher education, and the shift from need-based to merit-based student financial aid (Bergeron, Baylor, & Flores, 2014; The Sillerman Center, 2015; Williams, Benson, Bain, & Dicks, 2016). While college students on all levels seem to be increasingly reliant on borrowing, disparities in taking student loans among student subgroups do exist. Students of different race/ethnicity backgrounds tend to differ in borrowing behaviors. On the undergraduate level, research findings show general aversion of borrowing for Asian students and the opposite as well as higher risk of default and difficulty in repaying student debt for Black students (Addo, Houle, & Simon, 2016; Baum & Steele, 2010; Huelsman, 2015; Jackson & Reynolds, 2013; Malcom & Dowd, 2012; Price, 2004). Hispanic students are more likely to have excessive student debt a few years after graduation than White students (Price, 2004), suggesting difficulty in repaying student debt. It is not entirely clear whether Hispanic students are more or less likely than White students to borrow for college since findings have been inconsistent (Cunningham & Santiago, 2008; Heller, 2001).

Descriptive data show that Ph.D. students' accumulated graduate student debt differs by race/ethnicity within study fields. Specifically, Black students have the highest percentage of borrowing and the highest debt amount, followed by Hispanic students and non-underrepresented minority students (Asian and multi-racial) (Zeiser, Kirshstein, & Tanenbaum, 2013). On the professional education level, it has been shown that both Black and White medical students have significantly higher anticipated debt than Asian students (Dugger et al., 2013). Given the apparent racial differences in borrowing behaviors on the undergraduate and professional level, it can be hypothesized that racial disparities also exist on the graduate level. Whether the borrowing patterns of racial subgroups on the undergraduate level continue on the graduate level remains to be examined.

### *2.2 Family SES and Student Borrowing*

Research shows that lower-income students are at higher risk to incur student debt and to make financial decisions that could negatively impact academic experience and educational outcomes (Houle, 2014; Soria, Weiner, & Lu, 2014). Since borrowing is directly related to students' available financial means, it is intuitive to focus on family income when relating family SES to student borrowing (DiGangi, 2015). Indeed, students from different SES backgrounds differ substantially in financial support received (or not) from their families, which directly influences their higher education outcomes (Swartz, 2008). SES is a composition of education level, occupation, and income

(Baker, 2014), and research has shown that family social capital, which is closely related to parents' education and occupation, influences students' access to college (González, Stoner, & Jovel, 2003). It is necessary to ask whether parents' education level influences student borrowing beyond the impact of family income. This is especially relevant for graduate students, who are more likely to be independent of their parents. Graduate students' own income is likely more relevant than that of their parents in terms of financial means for graduate school. Focusing on the impact of parents' education level could better reveal the influence of family SES on graduate students' borrowing behaviors.

### 2.3 Differences among Study Fields

While research has shown that undergraduate student loan amounts vary by study fields, a plausible explanation of such difference is not available (Harrast, 2004). This is partly due to the lack of variability of college cost for different study fields on the undergraduate level, and more research on this topic has been called for (Harrast, 2004). Students' debt burden after graduation also varies by major (Hershbein, Harris, & Kearney, 2014). Previous research on graduate student borrowing has mainly focused on the impact of professional student debt and are mostly major-specific (Greysen, Chen, & Mullan, 2011; Olivas, 1999; Rosenblatt & Andrilla, 2005; Williams et al., 2016). In terms of non-professional graduate programs, descriptive data show that Ph.D. students in social, behavioral, and economic (SBE) sciences accrue more graduate student debt than their counterparts in science, technology, engineering, and mathematics (STEM), although the two groups are very similar in terms of undergraduate student debt (Zeiser et al., 2013), suggesting differential borrowing by study field that is independent of students' personal characteristics and family SES. Little is known about whether inferential statistics also suggest effects of study fields on graduate student borrowing.

## 3. Methods

### 3.1 Sample

The population of interest is all graduate students, including all degree levels and types, in the U.S. This study uses data of the nationally representative sample of graduate students from the National Postsecondary Student Aid Study (NPSAS) of 2012. This dataset collects data from college students regarding their personal and institutional characteristics, with a focus on the means they use to finance their postsecondary education. NPSAS collects data separately from undergraduate and graduate students, making its graduate student component suitable for the purpose of this study. This study uses the 2012 wave of data collection, which surveyed students who were enrolled during the 2011-12 academic year. The NPSAS data are collected from various resources, including institutional record, government databases, and student self-managed or computer-assisted telephone interviews. The data components include students' demographics, family structure, income sources, degree type, enrollment pattern, financial aid, and characteristics of institutions.

### 3.2 Variables

The outcome variable of interest is whether one has borrowed for graduate education. This is a dichotomous variable constructed from the cumulative amount borrowed for graduate education. Those with a value of zero for cumulative amount are non-borrowers and are assigned a value of zero for the dichotomous variable.

Racial groups are White, Black, Hispanic, Asian, and other domestic. The reference group is *White*. The adoption of this grouping is partly based on borrowing patterns revealed by previous research on undergraduate and professional student borrowing, and partly due to the small percentage of the racial groups other than the four major ones. Parents' education level is measured by the highest level of education achieved by either parent of the student. Responses are grouped into six levels, namely no college, some college but no Bachelor's degree, Bachelor's degree, Master's degree, non-professional doctoral degree, and professional doctoral degree. The reference group is *no college*. Based on literature on disparities in student borrowing across majors (Hershbein et al., 2014; Zeiser et al., 2013), study fields are categorized into six groups, namely STEM, humanities and social/behavioral sciences, education, business/management, professional, and other disciplines.

The graduate student body is very diverse in terms of age, family structure, income sources, and enrollment pattern. I controlled for several personal and institutional characteristics that might be confounding the association between race, parents' education level, field of study, and graduate borrowing. Specifically, I included years between Bachelor's degree and graduate school, the number of jobs held during the survey academic year (2011-12) excluding work-study and assistantship, the cost of attendance at one's institution as a percentage of total income in the previous year, and the net price after all financial aid except work-study as a percentage of total income, to control for available financial means and financial needs. The 2010 Carnegie basic institution classification, total enrollment of institution, and the percent of the institution's student body which is White are included to control for

institution's characteristics. Finally, I also controlled for students' demographic characteristics, including age, gender, number of generations the student's family has been in the U.S., and number of dependents.

### 3.3 Statistical Analysis

This study does not aim to investigate the causal relationship regarding graduate students' borrowing decisions. This means that the question of "what factors have led students to decide to borrow or not to borrow" is beyond the scope of this study. Instead, this investigation aims to provide an overview of different student groups' tendency to borrow for graduate education with focus on students' race, family background, and field of study. Methods that reveal correlational relationship among factors are suitable. Logistic regression is used to accommodate the dichotomous nature of the dependent variable. Independent variables are added to the model simultaneously. Observations are independent to each other, which satisfies the assumption of logistic regression.

### 3.4 Limitations

One limitation is that part of the data are self-reported, such as students' work experience. Self-reported data are subject to errors, leading to potential bias in analysis results. Since student interview is the only source of student experience data in NPSAS, it is not possible to double check the accuracy of such data.

## 4. Findings

Table 1 presents the descriptive statistics of the sample. The average number of years between Bachelor's degree and graduate school is seven, and more than half graduate students (55.4%) held one job other than work-study or graduate assistantship. On average, student budget was 61.7% of students' total income, and net attendance cost after financial aids except for work-study was 46.5% of students' income. More than half of the surveyed graduate students (53.8%) attended research and doctoral institutions, and more than one third (34.1%) attended Master's institutions. The average percentage of White students in institution's student body was 56.6%. The average age was 32, and about 60% were female. The majority of respondents came from families of third generation immigrant or higher (76.8%). The average number of dependents was 2.

Table 1. Descriptive statistics

Variable	Mean or Percentage	Standard Deviation
Years between Bachelor's degree and graduate school	7	7
Graduate field of study		
Education (reference)	21.1%	
Humanities and Social/ behavioral sciences	13.9%	
STEM	14.2%	
Business/management	16.7%	
Professional	22.4%	
Others	11.7%	
Job: Number (excluding work-study /assistantship)		
Zero (reference)	32.2%	
One	55.4%	
More than one	12.4%	
Student budget as percent of income	61.7	37.4
Net price after all aid except work-study as percent of income	46.5	38.8
Carnegie Classification 2010: Basic classification		
Below Master's	3.68	
Master's	34.1	
Research & Doctoral (reference)	53.8	
Special Focus & other	8.4	

Institution 12-month total enrollment		
Below 5,000 (reference)	19.2%	
5,001 - 10,000	13.6%	
10,001 - 30,000	34.8%	
>30,000	32.4%	
Percent enrolled: White	56.6	18.6
Parents' highest education level		
No college (reference)	25.4%	
Some college but no Bachelor's degree	16.2%	
Bachelor's	24%	
Master's	19.8%	
Doctoral degree – research/scholarship	5.8%	
Doctoral degree – professional practice	7.8%	
Age	32	9.3
Gender		
Male (reference)	39.7	
Female	60.3	
Immigrant generational status		
First generation immigrant (reference)	10.9%	
Second generation immigrant	12.3%	
Third generation immigrant or higher	76.8%	
Race/ethnicity		
White (reference)	63.6%	
Black or African American	11.8%	
Hispanic or Latino	8.7%	
Asian	12.9%	
Others	3%	
Dependents: number of dependents	2	1
Attendance intensity		
Full-time (reference)	46.5%	
Part-time	37.9%	
Mixed full-time and part-time	15.6%	

Note. N=13,000.

Professional (22.4%) and education (21.1%) students had the largest shares of the respondents, followed by business/management (16.7%), STEM (14.2%), and humanities and social/behavioral sciences students (13.9%). About a quarter of students (25.4%) came from families where no parent had attended college at all, and about a quarter of students' (24%) parents' highest education level was Bachelor's degree. These are followed by Master's (19.8%) and some college but no Bachelor's degree (16.2%) as parents' highest education level. About 13% of students had parent(s) with doctoral degree. White students (63.6%) made up about two thirds of the surveyed sample, followed by Asian (12.9%) and Black students (11.8%). Hispanic students' share (8.7%) was the smallest among the four major racial groups. The demographic makeup of the sample is representative of the national population (Chen, 2010).

Table 2 presents the results of the logistic regression, which examines the association between factors of interest and the likelihood of borrowing for graduate education. It can be seen that the likelihood of borrowing varies significantly across disciplines. Compared to education students, STEM students are much less likely to borrow (odds ratio=.28,  $p<.001$ ). Professional students, whose tuition costs are much higher than non-professional students, are more likely to borrow than education students (odds ratio=1.51,  $p<.001$ ). Students in humanities and social/behavioral sciences do not differ from those in education in the likelihood of borrowing. It is apparent that

STEM students are the least likely to borrow for graduate education, even after controlling for factors such as net cost and institution type.

Table 2. Results of logistic regression

Variable	Coefficient	Odds Ratio
Years between Bachelor's degree and graduate school	-0.02**	0.98
Graduate field of study (ref.: Education)		
Humanities and social/ behavioral sciences	-0.21	0.81
STEM	-1.27****	0.28
Business/management	-0.24*	0.78
Professional	0.41****	1.51
Others	0.04	1.04
Number of job (excl. work-study/assistantship) (ref.: Zero)		
One	0.25**	1.29
More than one	0.27*	1.30
Student budget as percent of income	0.03****	1.03
Net price after all aid except work-study as percent of income	-0.02****	0.98
Carnegie Classification 2010: Basic classification (ref.: Research & doctoral)		
Below Master's	-0.49**	0.61
Master's	-0.05	0.95
Special focus & other	0.03	1.03
Percent enrolled: White	-0.01**	0.99
Institution 12-month total enrollment (ref.: Below 5,000)		
5,001 - 10,000	-0.21	0.81
10,001 - 30,000	-0.48****	0.62
>30,000	-0.41***	0.66
Parents' highest education level (ref.: No college)		
Some college but no Bachelor's degree	-0.37***	0.69
Bachelor's	-0.37***	0.69
Master's	-0.45****	0.64
Doctoral degree – research/scholarship	-0.82****	0.44
Doctoral degree – professional practice	-0.91****	0.40
Immigrant generational status (ref.: First generation immigrant)		
Second generation immigrant	-0.05	0.95
Third generation immigrant or higher	0.11	1.12
Race/ethnicity (ref.: White)		
Black or African American	0.90****	2.45
Hispanic or Latino	0.29*	1.33
Asian	-0.21	0.81
Others	0.25	1.29
Dependents: number of dependents	0.18****	1.20
Age	-0.01	0.99
Female	0.08	1.09
Attendance intensity (ref.: Full-time)		
Part-time	-0.68****	0.51
Mixed full-time and part-time	-0.23*	0.80

Note: \* $p < .10$ . \*\* $p < .05$ . \*\*\* $p < .01$ . \*\*\*\* $p < .001$ . N=13,000.

Compared to White students, Black students are much more likely to borrow (odds ratio=2.45,  $p<.001$ ), and so are Hispanic or Latino students (odds ratio=1.33,  $p=.08$ ). Asian students do not differ significantly from White students in terms of borrowing probability ( $p=.20$ ). The racial differences are significant even after controlling for net cost of graduate program as percent of income.

Parents' highest education level is significantly associated with graduate students' probability of borrowing. The likelihood of borrowing decreases with the increase of parents' highest education level. Compared to students whose parents have had no college education, all other students are less likely to borrow for graduate school. The odds of borrowing decrease about 30% for students whose parents have had college education up to Master's degree, and decrease about 60% for students of parents with doctoral degree.

The longer time one takes between Bachelor's degree and graduate school, the less likely one is to borrow for graduate education ( $p=.01$ ). For each additional year one takes before graduate school, the odds of borrowing decrease by 2%. Age, on the other hand, does not play a role in the likelihood of borrowing ( $p=.21$ ). Part-time students' odds of borrowing are about half that of full-time students ( $p<.001$ ).

The ratio of attendance cost to income plays significant role in borrowing behaviors. When student budget (the 'sticker price' without considering financial aid) as percent of students' income increases by 1%, the odds of borrowing increase by 3% ( $p<.001$ ). When financial aids are taken into account, the direction of the association changes. When the net cost after all financial aid except work-study as percent of income increases by 1%, the odds of borrowing decrease by 2% ( $p<.001$ ). For students who held one or more than one job excluding work-study or assistantship, the odds of borrowing is 29% and 30% higher than those who didn't hold jobs excluding work-study or assistantship, respectively ( $p=.01$  and  $p=.07$ ).

Institutional characteristics are also relevant in graduate student borrowing. Students at larger institutions are less likely to borrow. Compared to students at institutions with total enrollment lower than 5,000, the odds of borrowing for those at institutions with total enrollment of 10,001 to 30,000 are lower (odds ratio=.62,  $p<.001$ ), and the odds for those at institutions with total enrollment of 30,000 or more are also lower (odds ratio=.66,  $p=.005$ ). When the percent of White students in the institution's student body increases by 1%, the odds of borrowing decrease by 1% ( $p=.01$ ). Not surprisingly, when the number of dependents increases by 1, the odds of borrowing increase by 20% (odds ratio=1.20,  $p<.001$ ). Students' immigration generational status and institution's Carnegie classification do not seem to be associated with students' likelihood of borrowing. In addition, male and female students do not differ significantly in the probability of borrowing ( $p=.39$ ).

## 5. Discussion

This study examines the association between graduate student borrowing and race, field of study, and parents' highest education level. Logistic regression results provide support for the hypothesized disparities in the likelihood of borrowing for these student subgroups. Consistent with findings of previous research on undergraduate students (e.g., Jackson & Reynolds, 2013), results of this study suggest that on the graduate level, Black students are significantly more likely to borrow than White students. This holds even after controlling for factors such as program net cost as percent of income, field of study, and attendance intensity. Results also suggest that Hispanic students are more likely than White students to borrow for graduate education, although the statistical significance and the magnitude of the gap are weaker than those of Black students. This helps to clarify the inconsistency shown in previous research regarding the tendency of borrowing for Hispanic students (Cunningham & Santiago, 2008; Heller, 2001). It is noteworthy that unlike undergraduate students (e.g., Baum & Steele, 2010), Asian graduate students do not differ significantly from White students in terms of likelihood to borrow.

Combined with prior evidence on the higher probability of borrowing and more difficulty of repaying college debt for Black and Hispanic undergraduate students, findings of this study warrant further attention to the financing of higher education for these two racial groups. While these students could benefit from the credential and higher prospective earnings brought by graduate education, they might also be burdened with student debt beyond a manageable level. This might weaken the benefits of graduate education for these students. The high tendency to borrow could also negatively influence Black and Hispanic students' progress and performance in graduate programs, as research suggests that financial stress related to high debt level lowers students' performance (Ross, Cleland, & Macleod, 2006).

Results of this study show that graduate student borrowing likelihood differs strongly by discipline, even after controlling for cost factors, institutional characteristics, and demographics. The finding that graduate students in STEM majors are the least likely to borrow is consistent with the trend shown by descriptive data (Zeiser et al.,

2013), and with prior research finding that social science and humanities doctoral students are more likely to borrow than engineering, physical science, and biological science majors (Kim & Otts, 2010). The finding that professional students are the most likely to borrow is not surprising. It is noteworthy that the disparity between professional students and education, humanities, and social sciences students is not as big as one might assume. In fact, professional students are the only ones who are more likely to borrow than education students. Business and management students, similar to STEM students, are also less likely to incur debt than education students. Research has shown that not only do education, humanities, and social sciences students earn lower incomes than STEM and business students, they also face larger percentage of earnings needed for student loan repayment in the years following graduation (Hershbein et al., 2014). Results of this study indicate that such burden can at least be partially attributed to the stronger tendency to borrow for these students.

One plausible explanation for the disciplinary disparities in graduate students' borrowing likelihood is difference in financial literacy and sensitivity to financial gains across majors. Given the higher prospective earnings of STEM and business/management majors (Hershbein et al., 2014), it is possible that students in these disciplines are more sensitive to the financial gains of graduate education than those in education, humanities, and social sciences to begin with. Consequently, the former might be more knowledgeable and/or sensitive to the caveats of borrowing and could better analyze the costs and benefits of borrowing, especially in terms of loan repayment. The disparities might also be attributed to cultural differences across disciplines, where borrowing is more regular in certain fields than in others. Regardless of the explanation, these findings are worrisome in that they reveal the financial disadvantage of students in education, humanities, and social sciences in terms of incurring graduate debt, and point to the potential negative effects thereof.

As expected, parents' education level is significantly associated with graduate students' likelihood of borrowing, even after controlling for demographics, net cost of program as percent of income, and field of study. Students of higher-educated parents are less likely to borrow, and the difference in borrowing likelihood considerably widens for students of parents with doctorates. One plausible explanation is that higher-educated parents provide graduate students with better knowledge of borrowing, so that these students are more cautious about incurring student debt. It is also possible that higher-educated parents have more resources to provide financial support (either as gift or as family loan) that is not reflected in students' own income. If this is the case, then the impact of family income on students' borrowing behavior does not only apply to undergraduate students, but extends into graduate school. While detailed information on loans or gifts from parents is not available, this explanation remains plausible. It should be noted that the type of doctoral degree, either professional or research/scholarship, does not seem to matter in terms of lowering graduate students' likelihood of borrowing (the odds ratios are .44 and .40, respectively). This lends more plausibility to the explanation of parental influence in financial literacy than to that in financial support, given the fact that the income gap between professional degree holders and other doctoral degree holders is significant (Burnsed, 2011; Julian, 2012).

The significant association between time taken before graduate school and likelihood to borrow indicates that besides current income, personal financial means such as savings might play an important role in graduate education financing. When the number of jobs held other than work-study and assistantship increases, the likelihood of borrowing also increases. This suggests that both working and borrowing are crucial ways for graduate students to finance their education, and they tend to mix these two methods. Another plausible explanation is that students hold more jobs because of higher unmet financial need, which also leads to higher tendency to borrow. It is not surprising that program's 'sticker price' is positively associated with graduate students' likelihood of borrowing. It is more difficult to interpret the finding that net price after all aid except work-study as percent of total income is negatively associated with borrowing probability.

While the Carnegie classification institution type does not seem to be related to students' borrowing probability, the size of the institution does. Students at larger institutions are less likely to borrow, controlling for all other factors. This suggests that larger institutions may have more resources in helping students make financial decisions, such as programs in financial literacy and consultation in financial aid options. These institutions may also have a culture in student affairs that aims to minimize students' loan burden. This also applies to the finding that the racial makeup of institution's student body is related to one's likelihood of borrowing, controlling for one's own race. Institutional culture and student affairs resources are plausible explanations. Finally, it is noteworthy that unlike in most aspects of higher education, there seems to be no gender gap in terms of graduate students' likelihood of borrowing.



## 6. Recommendations

### 6.1 Future Research

Qualitative research is needed to further investigate the racial, disciplinary, and family background disparities in borrowing tendency. Perspectives in culture within racial groups and departments, differences in financial literacy across student subgroups, and influence of peers could be promising angles to understand the issue. Involving not only students, but also financial aid administrators, faculty members, and parents could provide information on departmental support, institutional culture, influences of financial aid policy, and family influences. Alternative financial means and their role in graduate education financing, such as personal savings and gifts/loans from parents, should also be examined.

### 6.2 Recommendations for Policy Makers and College Administrators

The results suggest that certain student groups that are generally disadvantaged in higher education are more likely to be under the pressure of borrowing for graduate school. These groups include students with dependents; underrepresented minority students, such as Black or African American students; students whose parents' education level is low; and students enrolling at institutions where minority students constitute a higher percentage of the student body. These trends should raise awareness among college administrators and policy makers in regards to the affordability and outcomes of graduate education for disadvantaged students. Enhanced graduate education financial aid policy that better supports disadvantaged students would not only promote the education outcomes of these students, but also lower their debt repayment burden after graduation and potentially influence their career and personal life choices. While such a task is apparently challenging for policy makers and college administrators given the current trend in college student financial aid, its necessity should not be overlooked.

For student affairs administrators, findings of this study suggest that more attention should be paid to Black and Hispanic graduate students in terms of borrowing and financial aid options. Promoting financial literacy of these students could be effective in helping them make sound financial decisions and manage their student debt. Surveying entering students about their knowledge of and tendency in borrowing could provide crucial information on whether students possess necessary knowledge about student loans, and whether their tendency towards borrowing would bring more benefits than drawbacks. Programs of financial literacy could be developed to target students in need of financial education. Collaborating with minority student organizations, such as Black and Hispanic/Latino student associations, could be an effective way to distribute financial literacy information. It is noteworthy that as suggested by the findings of this study, Asian graduate students are not less likely to borrow than White students. This indicates that Asian graduate students should not be viewed as a student subgroup with minimal need for financial education. This is especially relevant for financial aid administrators at institutions with higher percentage of minority student, where graduate students are more inclined to incur debt regardless of individuals' own race.

Departmental financial aid administrators in education, humanities, and social sciences should be more alert to graduate students' higher tendency to borrow. Collaboration with counterparts on the institution level and in departments with lower tendency of graduate borrowing could be helpful in understanding graduate students' financial decisions. Providing faculty members who supervise graduate students with information on internal and external financial aid could help them better advise their students in terms financial needs. On the institution level, higher priority could be given to these fields when allocating institutional financial aid resources, for example scholarships or fellowships. Conducting case studies or focus groups with graduate students across disciplines could be an effective way to expand students' understanding of borrowing.

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