The Rising Tide of Graduate Student Debt: Evidence of Change 2008 to 2012

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Abstract

The price of a graduate training in the US continues to rise, and in 2012, graduate students borrowed more than 35 billion dollars in federal and private loans to finance their education. Using data from the National Study of Postsecondary Student Aid (NPSAS) this study examined changes in graduate student education debt from 2008 to 2012. While the greatest percentage increase in debt from 2008 to 2012 was for students in some Master's level programs, findings revealed increases in many graduate level programs, including Medicine with a 2012 cumulative debt of over $143,000 and Law students at almost $124,000. Increasing education debt may discourage students from even considering enrollment and may motivate degree completers to seek more lucrative jobs after graduation simply to pay off loans. Additional implications are discussed.

Introduction

Loans for graduate and professional education are at a record high and show no signs of slowing. Over the past 25 years, the average price of graduate education has increased by about 126% (National Center for Educational Statistics, 2015), with law school tuition rising 317% (Segal, 2011). Overall, graduate students in 2012 borrowed more than 35 billion dollars in federal and private loans to finance their education—more than double what was borrowed just one decade ago, after accounting for inflation (The College Board Advocacy and Policy Center, 2012). Since they receive only about four percent of federal and state grants (Clark, 2008), many graduate students have become increasingly dependent on private loans at the master's, professional, and doctoral levels (National Center for Education Statistics, 2011; National Science Foundation, 2012). Furthermore, the percentage of private loans guaranteed by the government decreased in part due to the number of private student lenders who no longer offered loans after the College Cost Reduction and Access Act of 2007 was instituted (Thies, 2010).

Disparities in graduate debt by field of study also exist; for example Zeiser, Kirshstein, and Tannenbaum (2013) reported that while 58% of the social, behavioral, and economic science Ph.D. recipients accrued graduate level debt, only 28% of Ph.D. recipients in STEM fields accrued similar debt. Additional concern mounts for applied professional students who, on average, receive few graduate assistantships and have the largest amount of educational debt across all graduate student groups. For example, with average educational debts at about $145,000 (higher for private medical schools), few medical students receive grants or scholarships. Of the $2.5 billion in financial assistance given to medical students in 2005-06, 80% was in the form of loans (Steinbrook, 2008). Despite the differences, students in nearly all disciplines face increased educational costs. The rising tide in graduate student debt may

discourage many from pursuing an advanced degree, possibly restricting their human capital and contributions to the economy and knowledge production.

Despite record debt levels and the growing importance of a postbaccalaureate degree, graduate students have not been the focus of debt-reducing legislation or policy (Wendler, Bridgeman, Markle, Cline, Bell, McAllister, & Kent, 2012). For example, in summer 2012, the Budget Control Act of 2011 eliminated subsidized loans for students pursuing graduate degrees—a measure that will increase graduate student debt load because of higher interest rates. Given that about 70% of all students graduating from four-year colleges have student loan debt (TICAS, 2014 and confirmed in our data from 2012 NPSAS), an increasing number of students may choose to not pursue graduate or professional education or could be facing excessively high or insurmountable debt loads in the years to come. And since federal loans comprise approximately 67% of all graduate student aid (The College Board Advocacy and Policy Center, 2012 and confirmed in our 2012 NPSAS data), a better understanding of graduate student needs can inform possible legislative action and institutional policy changes.

Compared to that for undergraduate students, relatively few studies have focused on factors that contribute to graduate student debt. This study extends previous work by Belasco, Trivette, and Webber (2014) and uses national level data from the National Postsecondary Student Aid Study (NPSAS) to examine contributing factors to graduate and professional student debt in 2008 and 2012. As an understudied topic, a better understanding of graduate student debt is of national importance because knowledge production and economic gains are deeply affected by graduate student education. Projections of a shortage in PhDs have been noted (e.g., Ehrenberg & Mavros, 1992), but if students cannot afford graduate level education, they may choose to not enroll and our nation's knowledge and economic strength may be jeopardized.

Purpose of the Study

We know that there is an increasing number of graduate degrees completed in the US (National Center for Education Statistics, 2011), but a deeper understanding of the role of financial need in graduate program enrollment is necessary. In particular, underserved students may be especially averse to taking on graduate school debt, or may be unaware of other financing available for graduate level education. Further, while graduate level education and degree production are of great importance in STEM fields, graduate education in the humanities, arts, and professional programs are equally important to national economic and cultural strength. Guided by theories of human capital and rational choice, the research questions for this study are:

1. Has the level of graduate student borrowing at US institutions changed from 2008 to 2012?
2. Has the level of borrowing changed by degree level or graduate program?
3. Does graduate student debt differ by gender, race, and sector?
4. Does past educational debt influence graduate borrowing? and
5. Do institutional characteristics (i.e., tuition and fees, institution reliance on tuition, education expenditures, institution funds allocated for financial aid) influence graduate borrowing?

Relevant Literature

To date, relatively few studies have specifically examined graduate student debt, but a few guide our understanding of the current status. Using 2000 and 2008 data from the *National Postsecondary Study of Student Aid* (NPSAS), Belasco, Trivette, and Webber (2014) found that borrowing among graduate students increased in 2008 compared to similar levels in 2000. In

addition, and similar to Kim and Otts (2010), Belasco et al. (2014) found that debt incurred varied by degree program. In particular, those individuals pursuing a law degree (JD), medical degree (MD), or other professional doctorate (EdD, PsyD, DMin) incurred more graduate debt than students pursuing a Master's or PhD degree. Belasco et al. (2014) and Kim and Otts (2010) point out that borrowing levels have serious consequences for students' choice of major or professional program specialty area.

Using data from the *Survey of Earned Doctorates*, Rapoport (1999) found that doctoral recipients of underrepresented minority status incurred more graduate debt than their white counterparts. In a previous study, and perhaps somewhat surprisingly, Rapoport (1998) found that doctoral recipients in science and engineering (S&E) fields incurred more debt, from 1993 to 1996, than students in other graduate fields. It is important to note that this study did not control for other predictors of graduate borrowing and included psychology and social sciences among S&E disciplines.

While literature exploring the predictors of graduate student debt is limited, research examining the consequences of graduate borrowing is more robust. Numerous studies have identified financial resources as an important predictor of graduate degree-related outcomes. Although Weiler (1995) found that graduate school enrollment was unrelated to undergraduate education debt, Bair and Haworth (2004) and Ehrenberg and Mavros (1995) reported that graduate students who relied on their own financial resources spent more time in graduate school and were less likely to complete their degree, while several other studies revealed that students without sufficient departmental funds in the form of fellowships or research assistantships were less likely to complete doctoral degrees in particular (Abedi & Benkin, 1987; Bowen & Rudenstein, 1992; Delise, 2014; Dolph, 1983; Seigfried & Stock, 2001).

Students in professional programs also take on high educational debt, and this is particularly true for law students. According to Campos (2006), private law school tuition increased four-fold in real, inflation-adjusted terms between 1971 and 2011, while resident tuition at public law schools has nearly quadrupled over the past two decades. Regardless of the reasons for the increase (e.g., small student to faculty ratios, large salaries for professors, expansion of administrative staffs, law school fund allocations to central university budget), students are expected to pay the rising tuition, aware that full or nearly full graduate assistantships are rare. Some authors address the current status of and consequences resulting from high educational costs as a 'crisis' (Campos, 2012).

Theoretical Framework

This study is guided by economic theories of human capital and rational choice, since both provide insight into the precursors of graduate school enrollment and borrowing. Generally, human capital models posit that students invest in education to maximize their utility, and that decisions to pursue further schooling are based on expected costs and benefits (Elwood & Kane, 2000). Becker (1993) and others argue that the cost-benefit analyses related to educational pursuits are influenced by both monetary and non-monetary elements. Costs, like benefits, also assume a financial and non-financial form. In addition to direct monetary costs and foregone earnings, prospective graduate students must account for the potential psychic costs associated with their enrollment (Cunha, Heckman, & Navarro, 2005). These costs may include stress associated with "juggling" family and graduate school (Rice, Sorcinelli, & Austin, 2000) or anxiety generated by the prospect of an onerous or insurmountable loan burden (Field, 2009). Individuals with a spouse and/or children, for instance, may decide against graduate education and the family-related sacrifices their attendance would likely entail, regardless of academic

ability or wealth (Brus, 2006; Weiler, 1994). As such, and although individuals are anticipated to make rational decisions about education-related investments (Manski; 1993; Manski & Wise, 1983), their decisions will vary considerably, and will be dependent upon their preferences and circumstances (Perna, 2004).

In constructing rational decisions, DesJardins and Toutkoushian (2005), argue that rationality is not exclusive to those who make investments in schooling that most observers would deem appropriate or as yielding the most benefit. Individuals can still act rationally and make choices that ultimately, and foreseeably (at least to others), produce undesirable outcomes. DesJardins and Toutkoushian (2005), as well as other economic theorists (e.g., Becker, 1993; Elwood & Kane, 2000; Paulsen, 2001), purport that such behavior is consistent with the human capital model and can be attributed to personal preferences that derive from the attributes and experiences that shape how individuals perceive postsecondary education—such as tolerance for risk or the amount and quality of education-related information to which a prospective student has access—and which can vary considerably across both race (De La Rosa & Hernandez-Gravelle, 2007; Rabin & Thaler, 2001) and gender (Alexitch, 2006; Roszkowski & Grable, 2010). Previous literature suggests, for example, that African Americans and Latinos are less likely to have adequate information about college costs and financial aid (Freeman, 1997; González, Stoner, & Jovel, 2003; Perna, 2000), and as a consequence, may incur more educational debt than non-minority students (Malcom & Dowd, 2012; Price, 2004). This can be a double blow that could contribute to the gap in graduate degrees earned between majority and minority students.

In addition to personal preferences and finances, other forces are likely to mediate graduate borrowing. For example, the financial condition of graduate schools and programs will

have a substantial impact on enrollees' borrowing levels. Institutions that are better endowed and that have variety of revenue sources other than tuition are more likely and more able to provide graduate scholarships and grants (Slaughter & Rhoades, 2004), while students pursuing graduate degrees at less profitable institutions and/or in more professionalized fields (e.g., law and medicine) are more likely to finance their graduate education via loans (Hoffer et al., 2006). Furthermore, the extent to which institution officials are able to subsidize graduate education may also be influenced by broader economic trends and institutional budget models. Some budget models such as performance-based budgets require each unit or division within an institution to generate funds to cover all its expenses. For these reasons, select institutional characteristics are included in this study.

Method

Data

Data for this study was captured from the 2008 and 2012 National Postsecondary Study of Student Aid (NPSAS), the Integrated Postsecondary Data Education System (IPEDS), and the Delta Cost Project (DCP). NPSAS respondents who completed their graduate or professional degree in the year of the sample (2008 or 2012) were selected. As a comprehensive source of data on how students finance their postsecondary education, the NPSAS surveys contain nationally representative samples of undergraduate and graduate students, and as such, provided data suitable to a national analysis. Respondents in postbaccalaureate certificate programs and those enrolled in institutions that contained the DCP's parent-child flag that could not be confirmed as independent in reporting financial data were omitted from analyses herein. All values for 2008 were adjusted for inflation to reflect 2012 dollars. Sampling weights were used and analyses included adjustments for design effects to improve the precision and efficiency of

the estimates (Hahs-Vaughn, 2006; Thomas & Heck, 2001). The 2008 analytic sample of 2,270 respondents (rounded) represents just over 595,000 graduate students; the 2012 sample of 3,060 respondents (rounded) represents over 775,000 graduate students. All results reported below are preliminary and reflect weighted values to ensure greater generalizability.

Along with respondent demographic characteristics and degree achievement of respondents, NPSAS also includes data on the type and amount of debt students incurred during the course of their graduate education. Independent variables drawn from NPSAS and included at the student level are those that have previously been associated with student debt, namely gender, race, marital status, age, number of dependents, enrollment intensity (full-time, part-time, or mixed), the total amount of grant, fellowship and assistantship dollars received during the 2007-2008 academic year, and graduate degree program (e.g., Dowd, 2008; Harrast, 2004; Price, 2004).

Analytic Plan

Analysis of the data began with descriptive analyses. As shown in Table 1, about the same percent of females were enrolled in a graduate program (61% in 2008 compared to 60% in 2012), somewhat more minority students (31% in 2008, 36% in 2012), and about the same percentage enrolled in each of the institution levels (doctoral/research, Master's bachelor's, special focus). The mean age at graduation was 32. From 2008 to 2012, the average graduate assistantship decreased and the average amount borrowed for undergraduate education (across all respondents) increased by almost 40%.

(Insert Table 1 about here)

Table 1 also includes information on important finance variables for institutions. Although key finance variables may differ by private versus public institutions as well as by

institution mission (Toutkoushian, 2001), total current funds revenues and education and general expenditures can be general signals for an institution's overall financial health, and the reliance on tuition can give insight into the level of an institution's use of other internal funds for student financial aid assistance versus the degree to which it relies on tuition and fees to fill the gap in institutional funds. Data provided in IPEDS and the Delta Cost Project (deltacostproject.org) include independent, institution-level variables that reveal how colleges generate revenue or variables that influence the costs and/or debt that students incur, specifically graduate tuition, graduate fees, institutional expenditures per student and tuition reliance (Gladieux & Perna, 2005; Gross, Osman, Hossler, & Hillman, 2009; Volkwein & Szelest, 1995). Tuition reliance, a Delta derived variable, identifies the degree to which an institution relies on student tuition and fees to meet budgeted needs. As shown in the lower portion of Table 1, institutional education and general expenditures remained relatively constant from 2008 to 2012, total funds revenues per FTE decreased slightly, and institution reliance on tuition increased from 56.8% to 60.1%.

The dependent variable used in our analyses was the cumulative amount borrowed for graduate education only, specifically among students who completed a graduate degree in 2008 or 2012, and includes all federal and private institutional loans graduate degree completers ever borrowed for their graduate education.

The Wald test was used to analyze differences in mean cumulative borrowing between 2008 and 2012, and values were adjusted for inflation. This analysis showed a statistically significant difference in mean cumulative debt from 2008 to 2012 ($t=49.82$, $p <.001$). In addition to analyzing the difference in borrowing for the total group, we also analyzed differences in borrowing by subpopulations, for example, by degree level, field of study, gender, and race. These results are shown in Table 2 and discussed below.

Following thorough descriptive analyses, we examined factors that contribute to debt via regression analysis. Since about 45% of degree completers did not take on educational loans, a tobit hurdle analysis in Stata was used to account for the number of students who have a zero for the dependent variable (debt) and to adjust for the nonnormal distribution. The two-level tobit model is formally expressed in the following set of equations, where the observable variable, $\underline{Y_{ij}}$, is equal to the latent variable whenever positive, and is zero otherwise:

$$Y_{ij} = \begin{cases} Y_{ij}^{*} \ if \ Y_{ij} > 0 \\ 0 \ \ if \ Y_{ij} \leq 0 \end{cases}$$

where $Y_{ij}^{*} Y_{ij}^{*}$ is a latent variable:

$$Y_{ij} = \mu_j + \beta \mathbf{X}_{ij}$$

$$\mu_j = \mu + \Gamma \mathbf{X}_j + \varepsilon_j \mu_j = \mu + \Gamma \mathbf{X}_j + \varepsilon_j$$

and where Y_{ij} indicates the cumulative graduate debt of students who earned their graduate degree in the 2008 (or 2012) calendar year; μ_j indicates the random intercepts that vary over cluster (i.e., institution); and $\mathbf{X}_{ij}$ and $\mathbf{X}_j$ represent vectors of individual- and institution-level variables, respectively.

Results

Table 2 shows the percentage of students who borrowed for graduate education in 2008 and 2012 and mean cumulative debt calculated based on the number of students who borrowed, and then based on all graduate students (including those who did not borrow). As shown, 58.2% of all graduate students who completed their degree in 2008 reported borrowing for their education, compared to 63.9% in 2012. The mean debt based on borrowers only increased more than $17,000 in the four years, from $48,777 to $53,894. When graduate student educational debt was calculated based on the total number of students completing their degree that year, the mean debt rose from $28,379 to $34,413. These figures indicate that not only did the average

debt rise significantly in the four-year period, but a higher percentage of graduate students also borrowed for education.

(Insert Table 2 about here)

Table 2 also shows the percentage of students with education debt and mean debt values by degree type and degree program. Compared to 2008, more 2012 Master's degree students borrowed for educational pursuits (up 7%), and slightly more doctoral students (up 1%). The overall percentage of professional students who borrowed in 2012 was down nearly 4%, but it is noted that 85% of all professional students in 2012 took out loans for their education.

Variation is also seen by degree program. Overall, increases in borrowing occurred most often for Master's level students compared to doctoral and professional students. The percentage of students in 'Other' Master's degree programs (e.g. Master's of Public Administration, Master's of Fine Arts, Master's of Social Work who borrowed increased the most (9.7%), followed by MBA students (7.96%) and students in the Master's of Education program (7.14%). The percentage of students in Law programs and Medicine who borrowed decreased about one percent.

Although the percentage of professional students who borrow decreased by 4% since 2008, these students incur the highest cumulative debt. Shown in Table 2, and based on values that included only students who borrow, Doctor of Medicine students who were completing their degree in 2012 reported a mean cumulative debt of just over $143,600, and Law students at almost $124,000.

The lower portion of Table 2 examines differences in borrowing by race, gender, and sector. Compared to 2008, 15% more Hispanic students borrowed for their graduate education, as did nearly 11% more men. In 2012, just under 80% of all Black and Hispanic graduate

students took educational loans. In comparing borrowing by gender, results show that in 2012 63% (men) and 64% (women) borrowed and their mean debt among all borrowers was much closer than it was in 2008. Borrowing for graduate education increased across all sectors, but most precipitously for students in for-profit graduate programs. Students completing their degree in 2012 who took loans increased by three percent in public institutions, six percent in private institutions, and over eight percent in for-profit institutions. It is also noteworthy that 81% of the 2012 degree completers in for-profit schools borrowed for their graduate degree.

Following the examination of descriptive statistics and guided by the relevant literature, regression analyses were completed to examine individual and institution characteristics that may contribute to graduate student debt in 2008 and 2012. Tables 3 (for 2008) and 4 (for 2012) show the results from these analyses. Each analysis used a two-stage hurdle model to account for the large number of zeros present in the dataset for students who did not borrow any amount for graduate education. The first step of the analysis is a tobit model that specifies a minimum value of the dependent variable as a hurdle that participants must overcome in order to be included in stage two of the analysis. The value of this hurdle is specified at 0; thus, only students borrowing greater than zero dollars for graduate education are included in stage two. Stage two is the linear hurdle model developed by Cragg (1971) and further delineated by Engel and Moffatt (2014). Individuals who overcome the hurdle of zero in the first stage of the model are included in the second stage, which models the association between hypothesized indicators of borrowing and the continuous amount students borrow.

(Insert Tables 3 and 4 about here)

In the first step of each analysis in Tables 3 and 4, results show that a tobit model effectively accounts for the large number of zeros in the dependent variable that could skew the

results of the analysis. In the second step, we present output from the Cragg hurdle model using weights to account for design effects and to normalize the error terms. The model first estimates the likelihood of borrowing greater than zero dollars for graduate education based on student- and institutional-level variables. The second step models the association between the amount of money borrowed for graduate education and the independent variables representing student- and institutional-level characteristics. These steps allow the model to be properly estimated, as are the effects of the predictor variables and the estimates of the standard errors (Engel & Moffat, 2014). This two-stage model also incorporated weights using the balanced repeated replication approach to account for potential design effects.

Furthermore, the models in Tables 3 and 4 allow for separate analysis of the variables that contribute to a student's likelihood to borrow any amount of money for graduate education as well as the variables that influence the specific level of borrowing. Of primary interest is the effect of borrowing, thus the discussion below concentrates on the variables associated with this outcome (second half of each table) rather than the variables that are associated with overcoming the hurdle (first half of each table).

Shown in the second half of Table 3, a number of important variables contribute to borrowing for students in 2008. Older graduate students borrow less (p=0.59) and Asian students borrow less than all others. Compared to White students, Hispanic students borrowed more. As might be expected, those in other doctoral programs (e.g., EdD), Law, and Medicine borrowed more in 2008, compared to Master's of Science students. One specific characteristic of the institution was also important and significant in the 2008 model. Students who attended an institution that relied more strongly on tuition were also more likely to borrow for graduate school.

A similar model for borrowing in 2012 is shown in Table 4. Results show interesting trends; some variables shown to be significant in 2008 remained important, and additional variables become significant in predicting graduate debt in 2012. Compared to White students, Asian students borrowed significantly less and the amount borrowed by Hispanic graduate students approached significance (p=.063). As in 2008, educational debt in 2012 appears to be a cumulative issue; students who borrowed for their undergraduate program were more likely to borrow for their graduate program.

Individuals who completed their degree in 2012 in professional program (Law, Medicine, and other doctorate programs such as EdD) borrowed more than those in Master's of Science programs. As might be expected, part-time students and those with a graduate assistantship take on fewer educational loans.

Similar to 2008, students in 2012 who were enrolled in institutions that rely more heavily on tuition as a source of income reported borrowing more (p=.059). It is noteworthy that the coefficient for tuition reliance in 2012 is larger than in 2008, indicating the institution's reliance on tuition has an even stronger effect on graduate student borrowing than in 2008.

Limitations

Analyses herein did not include postbaccalaureate students or those who earned their graduate degree from an associate's institution or a for-profit institution. Analyses did not include a covariate for "other professional program" because there although this category existed in 2012, it was included as a category in 2008. Data reported in NPSAS and DCP are assumed to be accurate, however it is possible that data errors exist, and if so, may affect our results.

Discussion and Implications

With the economic downturn and higher unemployment that occurred around 2008, it

was not surprising that more individuals pursued graduate education during this period of time. Higher education has historically been an important way for citizens to advance their knowledge, career, and subsequent long-term financial stability. Rising costs for postsecondary education and institutional reliance on tuition due to decreased state subsidies, however, have contributed to students' need for more educational loans. To add to the mix, federal policies that resulted in fewer low-cost loans for graduate education left many individuals with higher loans.

Results herein empirically validate a continued rise in demand for graduate school training in 2012, as evidenced by the increased proportion of students willing to finance their graduate degrees through loans and by the increase in average borrowing levels among students. Results also show continued expansion of graduate education across many program areas, most notably Masters-level and professional education. Institution officials must be cautious of adding programs because they believe these 'cash cows' will achieve a higher profit margin for the institution. Monitoring of degree success, graduate employment rates, and student loan default can continue to better inform policymakers and future policy on the relationship between degree completion, educational loans, and successful transition into the workforce after graduate degree completion.

Consistent with previous findings by Kim and Otts (2010) and Belasco, Trivette, and Webber (2014), results herein show that underrepresented minority students (Black/African American and Hispanic) are more likely to borrow than White peers. This finding contradicts the larger goal to encourage and expand access to a broader diversity of students. In addition, part-time students continue to borrow less similar to previous findings, but still relevant is its effect on time to degree. Part-time enrollment extends the time to degree, which may hinder degree completion, especially for graduate students who may be more likely to have family or other life

events (Rice, et al. 2000). It is noteworthy that in 2012, a higher percentage of women continue to borrow, but there was a larger increase in the percentage of men who borrowed for their graduate education. In 2012, the mean dollar amount of borrowing is much closer for men and women than in the past.

Even though public colleges and universities, in general, saw a small increase in state support in 2016, the move for further privatization of American higher education will likely remain. Graduate education will likely become even less affordable, with students contributing a larger share of institutional funds. The combination of rising tuition and shift of the burden to students may mean that some individuals will not consider enrollment, particularly low-income students who may believe the debt load will exceed the payoff of the graduate degree.

Professional students take on the highest amounts of educational debt. Graduates of professional degree programs in 2012 reported a mean cumulative debt of over $109,000, with medical students who took on loans reporting debt of just over $143,000 and Law students at just under $124,000. Such levels of cumulative debt may indeed discourage future students from pursuing certain occupations, and/or may encourage students to choose specialties with higher average salaries primarily because they are concerned about how they will pay off their educational loans. In human capital terms, the monetary losses from tuition as well as forgone wages may be too great.

Increased graduate borrowing for individuals is concerning, but rising debt levels in American graduate education are likely to have important social consequences as well. Several studies have revealed that high debt levels reduce the probability that students pursue public interest jobs (Field, 2009; Rothstein & Rouse, 2011). For example, several studies examined debt and subsequent employment for medical students. While some scholars did not find a

relationship (Kassebaum, Szenas, & Schuchert, 1996; Spar, Pryor, & Simon, 1993;) other scholars (Rosenthal, Marquette, & Diamond, 1996; Colquitt, Zeh, Killian, & Cultice, 1996; Woodworth, Chang, & Helmer, 2000) found that medical students with high debt are less likely to choose specialties that have a long training program or to become general practitioners in poor communities.

Along with vocational choice, student debt may also prevent individuals from civic and social activities that contribute to quality of life (e.g., Baum & O'Malley, 2003; Brint & Rotondi, 2008)—all of which are activities that facilitate the growth of human and social capital and which are essential to the sustained growth and competitiveness of society. In addition, students who accumulate more debt may not be as willing to apply for jobs that pay less (Minicozzi, 2004; Rothstein & Rouse, 2011) or may be at higher risk of default (Hillman, 2014 for undergraduate students). For some, particularly professional students, that may mean fewer graduates who will enter public sector jobs that meet the needs of many underserved citizens in many areas of the country. Institutional leaders and legislators may wish to consider how additional funds can be allocated to support graduate level education so that these students have less or no educational debt at the end of their degree program.

Such choices may affect the graduate's quality of life, including events such as delaying marriage, having children, or buying a home. If monetary costs are high and family needs that require juggling or other psycho-emotional stressors are too great, students may likely decide that there are few rational reasons to invest in graduate training. Increased graduate borrowing for individuals is concerning, but rising debt levels in American graduate education are likely to have important social consequences as well. Along with the hesitancy to pursue public sector jobs (Field, 2009; Rothstein & Rouse, 2011), student debt may also prevent individuals from

civic and social activities that contribute to quality of life (e.g., Baum & O'Malley, 2003; Brint & Rotondi, 2008)—all of which are activities that facilitate the growth of human and social capital and which are essential to the sustained growth and competitiveness of society. At the professional degree level, fewer graduates may enter public sector jobs that meet the needs of underserved citizens in many areas of the country. To ensure continued attention to the public service sector, institutional leaders and legislators may wish to consider how additional funds can be allocated to support graduate level education so that these students have little or no educational debt at the end of their degree program.

Despite more frequent discussion in the past few years (e.g., June, 2014), considerations on whether include graduate students in some lower-cost loans such as Direct Plus Loans (Clark, 2008; Federal Student Aid Newsletter, 2012) were rising some, but now seem to be fading with the current Republican leaders (Delisle, 2017; Kelderman, 2017). It seems unlikely that graduate education will become more affordable in the years ahead, particularly for professional degree programs. As such, we recommend that future policy and research explore interventions that help individuals make prudent and practical decisions about graduate education and borrowing. In 2012, only 700,000 borrowers were enrolled in income-based repayment plans (IBR) provided by the federal government, despite the fact that that over 1.6 million borrowers could have used IBR to reduce their monthly payments and overall debt (The White House, 2011). Happily, student loan default rates have dropped in the past few years (Mayotte, 2014). This has occurred, in part, due to proactive and sustained monitoring of loan default rates and hopeful strategic planning by institutional leaders to apportion more institutional funds to student financial aid. Continued advocacy from leaders at the Council for Graduate Schools and offerings like CGS's financial literacy program are critical.

Institution officials should also work to provide institutional funding through teaching and research assistantships as much as possible. Perhaps professional programs can negotiate for fewer revenues to be transferred to general institution coffers, enabling more funds to be allocated for student tuition assistance. In addition, following the pattern already in place for traditional PhD students, more numerous and larger graduate assistantships for professional students should be considered. They would ease the burden for professional students who have the largest graduate debt and perhaps indirectly encourage them to seek post-degree employment in positions that may pay less (at least initially) but provide tremendous assistance to many individuals who need such services. As mentioned above, more incentives for debt forgiveness may also encourage more graduate degree completers to enter the public or civil service sectors. Finally, institutional analyses to monitor increases in tuition as well as the rise in fees are particularly important for those students who may have an assistantship that covers tuition but not the additional fees.

Organizations that are interested in or advocate for graduate education are poised to provide helpful information to students. For example, The Council on Graduate School provides national level advocacy for graduate education in a number of ways including its GradSense website (www.GradSense.org) and some discipline specific information is available such as that from The American Psychological Association on graduate student funding (http://www.apa.org/apags/issues/funding.aspx). Among those for professional students, The Access Group provides financial educational resources and policy advocacy for affordable legal education (www.accessgroup.org) and the National Medical Fellowships advocates for and offers scholarships and awards for underrepresented minority students in medical programs (https://nmfonline.org/about-us/about-nmf/).

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Table 1

Descriptive Information for Graduate Degree Completers, 2008 and 2012

	2008 (N=2770; weighted N=595,640)*	2012 (N=3060; weighted N=775,570)*
	Percent	**Percent**
Gender		
Male	39.29	40.13
Female	60.71	59.87
Race		
White	69.15	63.68
Black	8.9	12.43
Hispanic/Latino	7.15	7.04
Asian	12.31	13.28
Other Race	2.48	3.57
Attendance		
Full Time	54.29	53.13
Part Time	34.09	27.65
Marital Status		
Single	56.28	57.04
Married	42.27	41.7
Separated/Widowed	1.45	1.26
Carnegie Group		
Doctoral/Research	49.24	49.47
Master's	38.8	38.49
Bachelor's	3.87	3.63
Specialized	8.09	8.41
Sector		
Public	40.33	46.64
Private Non-Profit	58.28	42.37
Private For-Profit**	1.38	10.99
Graduate Degree		

Master of Science	16.95				25.15			
Master of Arts	9.49				10.25			
Master of Education	14.72				15.97			
Master of Business Administration	12.37				12.76			
Other Master's	14.17				16.75			
PhD	13.93				6.28			
Other Doctorate	7.06				3.28			
Law (JD)	7.07				3.53			
Doctor Medicine	4.24				4.68			
Other Professional**					1.27			
	Mean	**Std. Dev.**	**Min***	**Max***	**Mean**	**Std. Dev.**	**Min***	**Max***
Age	32.08	8.72	20	70	32.25	9.34	20	80
Number Dependents	0.588	1.03	0	10	0.697	1.158	0	10
UG Borrowing	10000	14667.78	0	149000	13948.77	20191.64	0	180000
Grad Assistantship	2180.30	6033.48	0	61512	1582.93	5515.72	0	80000
Tuition Reliance (c1)	0.568	0.28	0.011	1.23	0.601	0.258	0.034	1
Total Current Funds Rev/ FTE (thousands)	50.27	73.11	3.259	1.015	49.45	76.79	5.93	1291.16
Educ & Gen Expend/ FTE (thousands)**	35.196	43.657	2.745	808.412	35.5	37.97	3.95	587.17

* rounded
** not included in subsequent analyses

Table 2

Cumulative Amount Borrowed for Graduate Education (At Time of Graduation) In 2012 Dollars

Graduate Degree Recipients	2007-2008			2011-2012			Change		
Graduate Degree	% Borrowing	Mean Debt (All)	Mean Debt (Borrowers)	% Borrowing	Mean Debt (All)	Mean Debt (Borrowers)	% Borrowing	Mean Debt (All)	Mean Debt (Borrowers)
Total	58.18	28,378.60	48,776.89	63.85	34,412.80	53,894.33	5.67	6,034.20*	5,117.44*
Degree Type									
Master's degree (all)	55.9	17,677.45	31,622.98	62.95	25,075.66	39,837.16	7.05	7,398.21*	8,214.18*
Professional degree (all)	88.53	86,509.21	97,712.34	84.76	109,385.40	129,053.20	-3.77	22,876.19*	31,340.86*
Doctoral degree (all)	48.54	30,685.45	63,221.32	49.72	36,587.93	73,582.36	1.18	5,902.48*	10,361.04*
Degree Program									
Master of Science (MS)	53.22	15,450.10	29,031.90	59.50	24,196.17	40,666.57	6.28	8,746.07*	11,634.67*
Master of Arts (MA)	58.93	17,714.57	30,062.00	62.87	27,522.89	43,777.20	3.94	9,808.32*	13,715.20*
Master of Education (MEd)	61.23	16,854.84	27,526.47	68.37	22,598.22	33,052.46	7.14	5,743.38*	5,525.99*
Master of Business Administration (MBA)	46.39	15,924.88	34,328.74	54.35	21,467.64	39,498.05	7.96	5,542.76*	5,169.31*
Other Master's Degree	59.84	22,695.62	37,925.67	69.54	30,006.87	43,151.07	9.70	7,311.25*	5,225.40*
Law	89.79	78,638.82	87,585.37	88.80	109,993.70	123,866.60	-0.99	31,354.88*	36,281.23*
Doctor of Philosophy (PhD)	39.13	21,525.10	55,007.61	40.09	23,781.35	59,321.02	0.96	2,256.25*	4,313.41*

Medical Doctorate	87.62	104,416.20	119,165.40	86.59	124,388.40	143,659.80	-1.03	19,972.20*	24,494.40*
Other Doctorate	68.35	48,676.36	71,218.99	69.19	59,589.65	86,129.22	0.84	10,913.29*	14,910.23*
Other Professional**				71.70	73,052.10	101,879.70			
Race									
White	58.28	28,660.59	49,181.09	64.13	34,700.28	54,112.28	5.85	6,039.69*	4,931.19*
Black	76.14	38,017.71	49,928.20	79.24	42,897.29	54,136.03	3.10	4,879.58*	4,207.83*
Hispanic	63.95	33,762.30	52,797.80	79.35	40,781.84	51,392.86	15.40	7,019.54*	(1,404.94) *
Asian	40.93	16,622.75	40,614.11	41.39	23,050.44	55,696.62	0.46	6,427.69*	15,082.51*
Other Race	60.09	28,768.03	47,876.50	58.43	29,465.54	50,431.33	-1.66	697.51	2,554.83*
Gender									
Male	52.3	26,725.36	51,096.36	62.97	34,778.65	55,234.19	10.67	8,053.29*	4,137.83*
Female	61.98	29,488.48	47,510.27	64.45	34,167.62	53,017.00	2.47	4,679.14*	5,506.73*
Sector									
Public	54.61	22,288.20	40,811.80	57.66	25,156.32	43,623.97	3.05	2,868.12*	2,812.17*
Private	60.32	32,722.64	54,251.94	66.29	41,825.03	63,090.73	5.97	9,102.39*	8,838.79*
For-Profit	72.24	22,942.23	31,757.91	80.73	45,137.87	55,910.89	8.49	22,195.64*	24,152.98*

*Change in borrowing amount is statistically significant (difference in means t-test)

**Not available for 2008 data

Table 3
Contributors to Debt 2008

Tobit Regression for Borrowing

Number of obs	=	2700 (rounded)
Population size	=	595,640 (rounded)
Replications	=	200
Design df	=	199
F (26, 174)	=	26.81
Prob > F	=	0.0000

Graduate Borrowing	**Coef.**	**BRR Std. Err.**	**t**	**Sig.**
Age	-146.885	146.6308	-1	
Female	4605.301	3466.695	1.33	
Black	372.8335	4051.2	2.03	*
Hispanic	8210.013	7059.863	0.86	
Asian	6087.445	3810.982	-3.16	**
Other Race	-12026.8	7447.759	0.04	
Number Dependents	299.6103	2283.904	0.16	
Part Time	-5785.87	2431.213	-3.09	**
Married	36904.28	5631.607	-1.03	
Separated	-7516.91	27746.3	1.33	
MA	1275.79	3941.396	0.32	
MEd	-1710.95	3817.745	-0.45	
MBA	-3445.68	6895.463	-0.5	
Other Master's	3222.083	5927.452	0.54	
PhD	8026.569	4872.925	1.65	
Other Doctorate	59318.91	6274.335	5.83	***
Law	36548.18	7466.951	7.94	***
Medical Doctorate	86376.93	8287.777	10.42	***
Master's Institution	-9908.64	6924.614	-1.43	
Bachelor's Institution	-10138	6344.742	-1.6	
Special Focus Institution	13365.97	7257.464	1.84	
Private	899.7792	5980.154	0.15	
Total Revenues/FTE	29.8013	29.09055	1.02	
Tuition Reliance	16450.69	14814.92	1.11	
Grad Assistantship (ln)	3911.151	364.3323	-2.05	*
Undergrad Borrow (ln)	-746.17	573.1341	6.82	***
Constant	-20407.3	8295.378	-2.46	**
Sigma	43614	4272.369	10.21	***

Obs. Summary (rounded)	1170	Left-censored observations at boramt2<=0
	1600	Uncensored observations
	0	Right-censored Observations

*p<0.05, **p<0.01, ***p<0.001
Referent Groups: Race = White, Enrollment = Full Time, Marital Status = Single, Degree Program = Master's of Science, Institutional Type = Doctoral/Research, Sector = Public.

Table 3, continued

Cragg Hurdle Regression

Number of obs	=	2700 (rounded)
Population size	=	595,640 (rounded)
Replications	=	200
Design df	=	199
F (26, 174)	=	7.95
Prob > F	=	0.0000

Graduate Borrowing	**Coef.**	**BRR Std. Err.**	**t**	**Sig.**
Age	657.4389	398.6556	1.65	
Female	1273.041	4911.237	0.26	
Black	7432.571	8281.554	0.9	
Hispanic	589.9825	9770.744	0.06	*
Asian	-24961.2	10031.63	-2.49	
Other Race	-4691.32	31488.61	-0.15	
Number Dependents	-4960.08	4699.612	-1.06	
Part Time	-16804.5	8406.983	-2	**
Married	-2207.05	7522.376	-0.29	
Separated	27548.13	39416.05	0.7	
MA	1236.731	9117.914	0.14	
MEd	-2045.19	9795.658	-0.21	
MBA	15111.66	13803.33	1.09	
Other Master's	18769.53	10492.92	1.79	
PhD	64998.61	22637.69	2.87	***
Other Doctorate	85348.63	25721.5	3.32	***
Law	95042.83	17097.4	5.56	***
Medical Doctorate	137003.8	31164.65	4.4	***
Master's Institution	-29095.1	21771.56	-1.34	**
Bachelor's Institution	-29642.3	14542.69	-2.04	*
Specialty Institution	20962.59	10371.3	2.02	*
Private	33072.5	9407.583	3.52	***
Total Revenues/FTE	16.9604	38.34094	0.44	
Tuition Reliance	-24970.4	18570.63	-1.34	
Grad Assistantship (ln)	-1047.85	975.3781	-1.07	
Undergrad Borrow (ln)	2006.098	941.1746	2.13	*
Constant	-63454.7	37093.77	-1.71	
Lower Limit = 0	**Coef.**	**BRR Std. Err.**	**t**	**Sig.**
Age	-0.00899	0.004726	-1.9	
Female	0.184518	0.097622	1.89	
Black	0.057526	0.15919	1.85	
Hispanic	0.294578	0.230111	1.2	
Asian	0.276901	0.088617	-1.94	
Other Race	-0.17182	0.31278	0.06	
Number Dependents	0.018876	0.079962	0.72	
Part Time	-0.21585	0.097692	-1.62	

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Married	1.537331	0.199439	-1.08	
Separated	-0.15808	1.169984	1.31	
MA	0.045615	0.139075	0.33	
MEd	-0.07611	0.166552	-0.46	
MBA	-0.21601	0.277925	-0.78	
Other Master's	0.037746	0.180988	0.21	
PhD	-0.13604	0.181836	-0.75	
Other Doctorate	1.143156	0.212902	2.25	*
Law	0.478966	0.234575	4.87	***
Medical Doctorate	1.096199	0.235824	4.65	***
Master's Institution	-0.18225	0.110317	-1.65	
Bachelor's Institution	-0.16684	0.255436	-0.65	
Special Focus Institution	0.087121	0.192262	0.45	
Private	-0.2184	0.135508	-1.61	
Total Revenues/FTE	0.000595	0.000844	0.7	
Tuition Reliance	0.79027	0.316263	2.5	*
Grad Assistantship (ln)	0.121517	0.014745	-0.94	
Undergrad Borrow (ln)	-0.01389	0.01076	11.29	***
Constant	-0.39782	0.210449	-1.89	
lnsigma				
Constant	10.84527	0.181288	59.82	***

N of observations rounded.
*p<0.05, **p<0.01, ***p<0.001
Referent Groups: Race = White, Enrollment = Full Time, Marital Status = Single, Degree Program = Master's of Science, Institutional Type = Doctoral/Research, and Sector = Public.

Table 4

Contributors to Debt 2012

Tobit Regression for Borrowing

Number of obs	=	3060 (rounded)
Population size	=	775,570 (rounded)
Replications	=	200
Design df	=	199
F (27, 173)	=	41.47
Prob > F	=	0.0000

Graduate Borrowing	**Coef.**	**BRR Std. Err.**	**t**	**Sig.**
Age	-17.0697	182.0459	-0.09	
Female	-943.3	3255.945	-0.29	
Black	6403.838	4494.561	1.42	
Hispanic	8761.92	5145.777	1.7	
Asian	-14373.3	7108.296	-2.02	*
Other Race	-10199.1	9796.66	-1.04	
Number. Dependents	2044.396	1748.069	1.17	
Part Time	-12025.8	3430.151	-3.51	***
Married	-8123.7	3224.409	-2.52	*
Separated	-5305.14	8118.409	-0.65	
MA	-797.362	4979.915	-0.16	
MEd	-6724.12	3850.612	-1.75	
MBA	-5092.8	6413.116	-0.79	
Other Master's	9572.236	4333.997	2.21	*
PhD	11843.58	5102.137	2.32	*
Other Doctorate	40268.06	6022.581	6.69	***
Law	90713.89	6512.131	13.93	***
Medical Doctorate	100991.9	7494.277	13.48	***
Other Professional	48047.79	11175.62	4.3	***
Master's Institution	-5884.74	3089.387	-1.9	
Bachelor's Institution	-5881.92	8913.637	-0.66	
Special Focus Institution	11690.11	6879.281	1.7	
Private	2207.664	3414.482	0.65	
Total Revenues/FTE	76.45177	24.28161	3.15	**
Tuition Reliance	35909.14	8055.45	4.46	***
Grad Assistantship (ln)	-2401.79	463.7014	-5.18	***
Undergrad Borrow (ln)	4144.003	387.523	10.69	***
Constant	-27263.2	8192.252	-3.33	***
Sigma	47663.94	1749.377	27.25	***

Obs. Summary (rounded)	1080	Left-censored observations at boramt2<=0
	1980	Uncensored observations
	0	Right-censored Observations

*p<0.05, **p<0.01, ***p<0.001

Referent Groups:

Race = White, Enrollment = Full Time, Marital Status = Single, Degree Program = Master's of Science, Institutional Type = Doctoral/Research, Sector = Public

Table 4, continued

Cragg Hurdle Regression

Number of obs	=	3060 (rounded)
Population size	=	775,570 (rounded)
Replications	=	200
Design df	=	199
F (27, 173)	=	13.8
Prob > F	=	0.0000

Graduate Borrowing	**Coef.**	**BRR Std. Err.**	**t**	**Sig.**
Age	748.0373	295.2188	2.53	*
Female	4018.999	5028.473	0.8	
Black	2833.458	7383.035	0.38	
Hispanic	-1050.51	8937.36	-0.12	
Asian	-223.959	13444.92	-0.02	
Other Race	-14014.7	11493.93	-1.22	
Number Dependents	40.5595	2961.792	0.01	
Part Time	-11594.9	6512.706	-1.78	
Married	-15332.6	6827.013	-2.25	*
Separated	-14814.9	14680.12	-1.01	
MA	10048.03	11185.54	0.9	
MEd	-20144	9629.373	-2.09	*
MBA	-817.572	11578.32	-0.07	
Other Master's	7834.758	10100.97	0.78	
PhD	56395.65	10523.92	5.36	***
Other Doctorate	74794.72	13127.28	5.7	***
Law	120409.6	12185.57	9.88	***
Medical Doctorate	141388.4	11162.47	12.67	***
Other Professional	96071.88	13718.83	7	***
Master's Institution	-23475.2	6009.988	-3.91	***
Bachelor's Institution	-23665.5	16188.51	-1.46	
Special Focus Institution	3587.498	12838.08	0.28	
Private	18543.26	6684.415	2.77	**
Total Revenue/FTE	114.9174	31.34496	3.67	***
Tuition Reliance	54835.7	13050.37	4.2	***
Grad Assistantship (ln)	-2278.47	946.6083	-2.41	*
Undergrad Borrow (ln)	980.4821	604.2653	1.62	
Constant	-68113.6	16222.76	-4.2	***
Lower Limit = 0	**Coef.**	**BRR Std. Err.**	**t**	**Sig.**
Age	-0.00742	0.005847	-1.27	
Female	-0.09975	0.101072	-0.99	
Black	0.233877	0.172158	1.36	
Hispanic	0.395621	0.211258	1.87	
Asian	-0.35243	0.156736	-2.25	*
Other Race	-0.22863	0.359849	-0.64	
Number Dependents	0.086487	0.04817	1.8	

Graduate Student Debt

Part Time	-0.35978	0.125741	-2.86	**
Married	-0.11893	0.108195	-1.1	
Separated	0.107404	0.291644	0.37	
MA	-0.12739	0.161661	-0.79	
MEd	-0.03772	0.158442	-0.24	
MBA	-0.17926	0.192646	-0.93	
Other Master's	0.303325	0.129478	2.34	*
PhD	-0.04948	0.134156	-0.37	
Other Doctorate	0.389532	0.1369	2.85	**
Law	0.94876	0.350776	2.7	**
Medical Doctorate	0.795015	0.177808	4.47	***
Other Professional	0.17086	0.318406	0.54	
Master's Institution	-0.01845	0.126645	-0.15	
Bachelor's Institution	0.00818	0.256355	0.03	
Special Focus Institution	0.288448	0.192132	1.5	
Private	-0.07515	0.124656	-0.6	
Total Revenue/FTE	0.000538	0.000466	1.16	
Tuition Reliance	0.650032	0.341765	1.9	
Grad Assistantship (ln)	-0.05673	0.014351	-3.95	***
Undergrad Borrow (ln)	0.136225	0.010121	13.46	***
Constant	-0.24439	0.262465	-0.93	
lnsigma				
Constant	10.86789	0.0683	159.12	***

*p<0.05, **p<0.01, ***p<0.001
Referent Groups: Race = White, Enrollment = Full Time Marital Status = Single, Degree Program = Master's of Science, Institutional Type = Doctoral/Research, and Sector = Public.