

Undergraduate Debt Causes ‘Pipeline Leakage’ from Undergraduate School to Graduate and Professional School

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EXECUTIVE SUMMARY

The educational pathway from kindergarten to elementary, middle and high school, and from high school to undergraduate school and possibly graduate and professional school, can be thought of as a multi-stage pipeline. Each stage in this pipeline has leaks, where students fail to continue on to the next stage. This paper discusses the causes of pipeline leakage in the transition from undergraduate school to graduate and professional school.

This paper demonstrates that Bachelor’s degree recipients who graduate with no undergraduate student loan debt are 70% more likely to enroll in graduate and professional school than students who graduate with some debt. There is also no “zero effect level” other than graduating with no debt, meaning that any amount of debt at graduation will affect the likelihood of enrolling in graduate and professional school. Thus, when a scholarship program seeks to completely eliminate the debt and work burden of undergraduate students, the program does not just maximize access, choice, persistence and completion, but also increases the number of students who continue on to graduate and professional degree programs.

METHODOLOGY

The analysis was performed using the data analysis system for the 2003-04 and 2007-08 National Postsecondary Student Aid Study (NPSAS). The NPSAS is a large survey conducted every four years by the National Center for Education Statistics (NCES) at the US Department of Education. The 2003-04 NPSAS surveyed 80,000 undergraduate students and 11,000 graduate and professional students. The 2007-08 NPSAS surveyed 114,000 undergraduate students and 14,000 graduate and professional students.

The analysis involved developing synthetic estimates of the impact of various demographic variables on progression from Bachelor’s degree attainment to enrollment as a first-year graduate or professional student. The estimates are called synthetic because they do not follow a single cohort of students from Bachelor’s degree attainment to enrollment in graduate and professional school, but rather compare the characteristics of two cohorts in the same academic year, one cohort involving undergraduate students who received a Bachelor’s degree and the other cohort involving first-year graduate and professional students. The prevalence of the demographic characteristics within the two cohorts is compared to identify the impact of the demographic variables on enrollment in graduate and professional school. In effect, this determines the extent to which a particular demographic set of students is under- or over-represented among graduate and professional students as compared with Bachelor’s degree recipients.

This approach is effective only for demographic variables that are static, such as gender, race or the amount of undergraduate debt at graduation. It is not effective for variables that may change from

undergraduate school to graduate and professional school, such as field of study, student marital status or characteristics of the educational institution.¹

Since these estimates are synthetic, it is possible that other factors may be responsible for the trends. For example, the onset of the credit crisis and the recession may have stimulated increases in college enrollment, especially among nontraditional students. The gap between Bachelor's degree attainment and enrollment in graduate and professional school may also have increased as a result. For this reason many of the analyses presented in this report do not rely on absolute statistics, but rather compare two variables to produce statistical analyses of the relative differences in trends. For example, rather than report graduate school enrollment rates for borrowers who graduated with no undergraduate student loan debt and with some undergraduate student loan debt separately, this paper reports the ratio of graduate school enrollment rates for borrowers who graduated with and without undergraduate student loan debt.

Ideally one would rely on a longitudinal study that tracked a single cohort from Bachelor's degree attainment through enrollment in graduate and professional school. The Baccalaureate and Beyond (B&B) survey is just such a longitudinal study. Additional non-synthetic analyses were conducted using the data analysis systems for the 2003 follow-up to the 1992-93 Baccalaureate and Beyond longitudinal study (B&B:93/03) and the 2001 follow-up to the 1999-2000 Baccalaureate and Beyond longitudinal study (B&B:00/01). The 1992-93 B&B study surveyed 9,000 Bachelor's degree recipients and the 1999-2000 B&B study surveyed 10,000 Bachelor's degree recipients.²

However, the B&B studies suffer from a handful of flaws that affect their suitability for the present analyses. The B&B studies are focused on tracking graduation from graduate and professional school, not first-year enrollment rates. There is no GRADLVL variable included in the B&B studies that can be used to identify first-year graduate and professional students. Since the B&B studies are cohort-based, the limited time from undergraduate graduation to the follow-up survey excludes data on students with a longer gap between undergraduate and graduate/professional school. Bachelor's degree recipients who graduate with no debt tend to have a greater gap between graduation and enrollment in graduate and professional school than Bachelor's degree recipients who graduate with some debt. On the other hand, the need for longitudinal follow-up means that the cohorts received their Bachelor's degrees one or two decades ago and may not reflect current trends. In particular, debt at graduation was significantly lower with the older cohorts, perhaps affecting the relevance of the data to current graduates who are more likely to have borrowed excessively. It is unclear whether the B&B studies included some post-baccalaureate certificates within the statistics for graduate enrollment and completion. Finally, the smaller sample size in the B&B studies yields some results that are statistically underpowered when the graduate and professional degree level data is disaggregated by combinations of several demographic variables. This is in contrast with the 2007-08 graduate NPSAS study in which 37.6% (about 5,250) of the students were first-year graduate or professional students and the 2003-04 graduate NPSAS study in which 33.1% (about 3,600) of the students were first-year graduate or professional students.

¹ While characteristics of a single educational institution might not change, most students do not stay at the same institution for their graduate and professional education.

² These cohorts represent the subsets of the 1992-93 and 1999-2000 NPSAS survey samples who had received Bachelor's degrees. Since then the number of undergraduate students surveyed by the NPSAS has more than doubled. However, only 10.5% of the 2007-08 undergraduate NPSAS study received Bachelor's degrees, or about 12,000, and only 8.9% of the 2003-04 undergraduate NPSAS study received Bachelor's degrees, or about 7,100. It is unclear why the more recent cohorts do not include a greater number of Bachelor's degree recipients than the earlier cohorts.

CALCULATING THE IMPACT OF A DEMOGRAPHIC VARIABLE ON PIPELINE LEAKAGE

Suppose that there are u undergraduate students graduating with Bachelor's degrees and g first-year graduate and professional students. Let p be the percentage of Bachelor's degree recipients with a particular characteristic and let $(1 - p)$ be the percentage without this characteristic. Similarly, let q be the percentage of first-year graduate and professional students with this characteristic and let $(1 - q)$ be the percentage without this characteristic. Then the number of Bachelor's degree recipients with and without this characteristic are $p \cdot u$ and $(1 - p) \cdot u$, respectively. Likewise, and the number of first-year graduate and professional students with and without this characteristic are $q \cdot g$ and $(1 - q) \cdot g$, respectively. From this we can calculate a synthetic estimate of the probability that a Bachelor's degree recipient with this characteristic will enroll in graduate or professional school as the ratio of the number of graduate and professional students with this characteristic to the number of Bachelor's degree recipients with this characteristic, namely

$$\frac{q \cdot g}{p \cdot u}$$

Similarly, the synthetic estimate of the probability that a Bachelor's degree recipient without this characteristic will enroll in graduate and professional school is

$$\frac{(1 - q) \cdot g}{(1 - p) \cdot u}$$

The ratio of these two estimated probabilities is

$$\frac{\frac{q \cdot g}{p \cdot u}}{\frac{(1 - q) \cdot g}{(1 - p) \cdot u}} = \frac{q}{p} \cdot \frac{(1 - p)}{(1 - q)}$$

Notice how the ratio of graduate and professional student enrollment to undergraduate student enrollment was filtered out of the calculation, leaving just the ratios of the relative prevalence of students with and without the characteristic in graduate and professional school versus undergraduate school. This calculation is independent of sample size and is dependent just on the proportions within each sample.

IMPACT OF DEMOGRAPHIC VARIABLES ON GRADUATE PIPELINE LEAKAGE

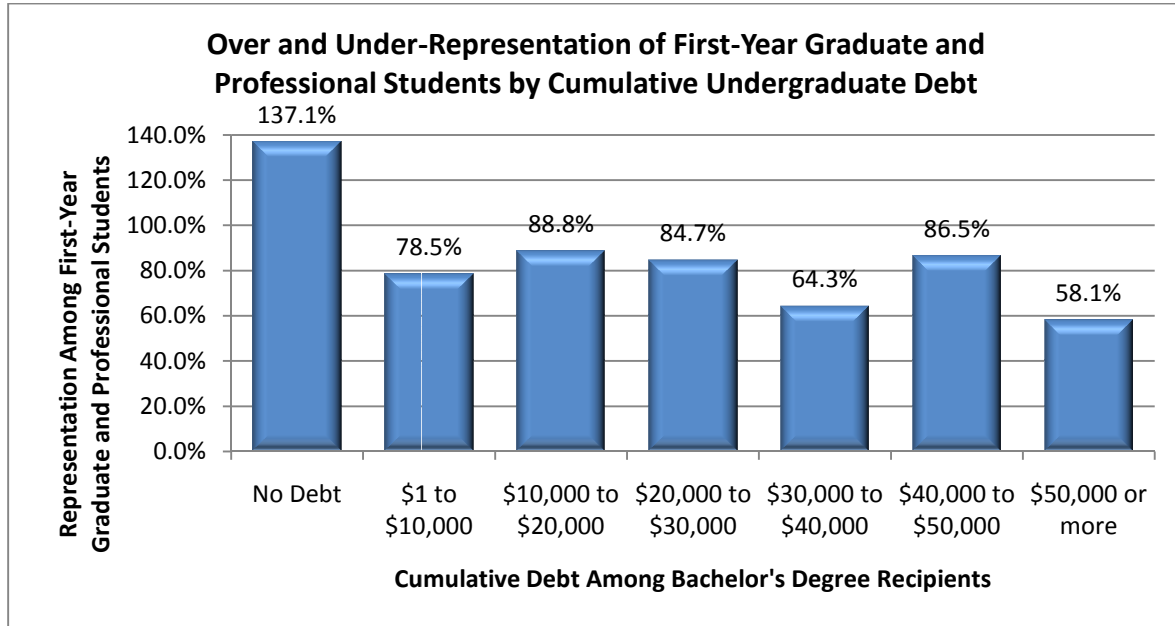
The following table shows the prevalence of students with and without undergraduate debt among Bachelor's degree recipients and first-year graduate and professional school students.

Amount of Debt	Percentage of Bachelor's Degree Recipients	Percentage of First-Year Graduate and Professional Students	Ratio
No Debt	34.8%	47.7%	137.1%
Some Debt	65.1%	52.3%	80.3%

The 137.1% prevalence ratio indicates that Bachelor's degree recipients who graduate with no debt are overrepresented among first-year graduate and professional students. Likewise, the 80.3% prevalence ratio indicates that Bachelor's degree recipients who graduate with some debt are underrepresented among first-year graduate and professional students. From this we can calculate that Bachelor's degree

recipients who graduate with no debt are 70.6% more likely to enroll in graduate and professional school than Bachelor’s degree recipients who graduate with some debt.

The following chart shows the degree of under- and over-representation of Bachelor’s degree recipients among first-year graduate and professional students by the amount of cumulative undergraduate debt.



This chart demonstrates that differences in the amount of debt, so long as it is non-zero, do not have a significant impact on enrollment in graduate and professional school. Rather, it is the presence of debt that has a chilling effect on graduate and professional school enrollment. Further disaggregating the amount of undergraduate debt according to smaller thresholds, such as \$2,500 or \$1,000, demonstrates that there is no “zero effect level” in the impact of the amount of debt on enrollment in graduate and professional school other than having no debt at all. For example, the prevalence ratio for students with \$1 to \$2,500 in cumulative undergraduate debt is 84.6%, demonstrating that they are still underrepresented among the graduate and professional school population. Thus any amount of undergraduate debt is sufficient to affect enrollment in graduate and professional school.

The prevalence ratio for students who received a Pell Grant during their undergraduate education³ is 60%, meaning that Pell Grant recipients are significantly underrepresented among graduate and professional school students. Bachelor’s degree recipients who did not receive a Pell Grant are 66% more likely to enroll in graduate and professional school than Bachelor’s degree recipients who received a Pell Grant. However, Pell Grant recipients who graduate with no undergraduate debt are 20% more likely to enroll in graduate and professional school than Pell Grant recipients who graduate with some undergraduate debt, so eliminating undergraduate debt would increase the number of low-income students enrolling in graduate and professional school.

³ This was determined by requiring the cumulative Pell Grant variable, PELLCUM, to be greater than zero.

The following statistics summarize the impact of graduating with a Bachelor's degree and no debt on enrollment in graduate and professional school according to a variety of demographic variables, including race, gender, age and status as a first-generation college student:

Race

- Minority students who graduate with no debt are 1.86 times as likely (86% more likely) to enroll in graduate and professional school than minority students who graduate with some debt.
- African-American students who graduate with no debt are 1.71 times as likely (71% more likely) to enroll in graduate and professional school than African-American students who graduate with some debt.
- Hispanic or Latino students who graduate with no debt are 1.69 times as likely (69% more likely) to enroll in graduate and professional school than Hispanic or Latino students who graduate with some debt.
- Asian students who graduate with no debt are three times as likely (200% more likely) to enroll in graduate and professional school than Asian students who graduate with some debt. 72% of Asian students in graduate or professional school have no undergraduate debt, compared with 46% of Asian Bachelor's degree recipients.
- Caucasian students who graduate with no debt are 1.65 times as likely (65% more likely) to enroll in graduate and professional school than Caucasian students who graduate with some debt.

Gender

- Male students who graduate with no debt are twice as likely (98% more likely) to enroll in graduate and professional school than male students who graduate with some debt.
- Female students who graduate with no debt are 1.56 times as likely (56% more likely) to enroll in graduate and professional school than female students who graduate with some debt.
- Female students are 1.16 times as likely (16% more likely) to enroll in graduate and professional school than male students.

First-Generation College Students

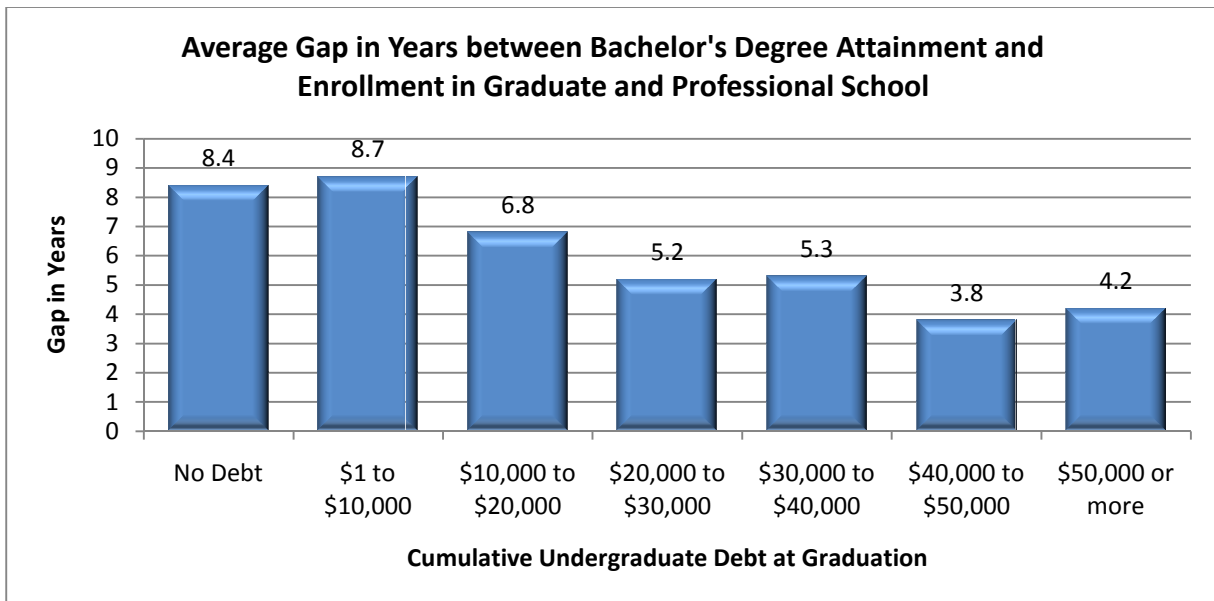
- First-generation college students who graduate with no debt are almost twice as likely (89% more likely) to enroll in graduate and professional school than first-generation college students who graduate with some debt.
- Among students whose parents had some college, those who graduate with no debt are 1.66 times as likely (66% more likely) to enroll in graduate and professional school than students who graduate with some debt.
- Among students whose parents received a graduate or professional degree, those who graduate with no debt are 1.52 times as likely (52% more likely) to enroll in graduate and professional school than students who graduate with some debt.

Other Characteristics

- Among students from single parent households, those who graduate with no debt are 1.40 times as likely (40% more likely) to enroll in graduate and professional school than students who graduate with some debt. However, the small sample size may have affected the accuracy of these results.
- Among students who are veterans, those who graduate with no debt are 1.74 times as likely (74% more likely) to enroll in graduate and professional school than students who graduate with some debt. However, the small sample size may have affected the accuracy of these results.
- Bachelor's degree recipients who are disabled appear to enroll in graduate and professional school in about the same proportion as students who are not disabled. Graduating without undergraduate debt does not appear to affect whether disabled students enroll in graduate and professional school. However, the small sample size may have affected the accuracy of these results.

Among Bachelor's degree recipients who are under age 24, those who graduate with no debt are 2.22 times as likely (122% more likely) to enroll in graduate and professional school while still under age 24 than students who graduate with some debt. Note that many students enroll in graduate and professional school several years after receiving the Bachelor's degree and not immediately after graduation. Among first-year graduate and professional students, only 17.8% enrolled immediately after receiving their Bachelor's degrees, 16.1% after a one-year delay and 11.3% after a two-year delay. 54.7% waited three or more years before enrolling in graduate and professional school.

Curiously, students with more debt tend to have a shorter gap between undergraduate school and enrollment in graduate and professional school, as demonstrated by the following chart. The average gaps for Master's degree programs follow a similar trend, while the gaps for doctoral and professional degree programs are more uniform.⁴



⁴ The gaps for doctoral and professional degree programs are also statistically significant only for undergraduate debt of \$30,000 or less. 60.1% of professional degree students enroll within 1 year of receiving the Bachelor's degree, compared with 28.7% of doctoral degree students and 34.1% of Master's degree students.

Among Bachelor's degree recipients, wealthier students are more likely to graduate with no debt. For example, 51.8% of Bachelor's degree recipients with family AGI over \$100,000 graduate with no debt, compared with 26.9% of Bachelor's degree recipients with family AGI under \$50,000⁵ and 35.6% of Bachelor's degree recipients with family AGI between \$50,000 and \$100,000. Perhaps the likelihood of enrolling in graduate and professional school is dependent on the family financial strength and not on the impact of the cumulative debt at graduation?

To eliminate the impact of family finances as a confounding factor that affects both the likelihood of graduating with no debt and enrolling in graduate and professional school, the analysis was disaggregated by family AGI. Among Bachelor's degree recipients with family AGI under \$50,000, students who graduated with no debt were 2.38 times as likely (138% more likely) to enroll in graduate and professional school as students who graduated with some debt.⁶ For Bachelor's degree recipients with family AGI between \$50,000 and \$100,000, students who graduated with no debt were 1.70 times as likely (70% more likely) to enroll in graduate and professional school as students who graduated with some debt. For Bachelor's degree recipients with family AGI over \$100,000, students who graduated with no debt were 1.08 times as likely (8% more likely) to enroll in graduate and professional school as students who graduated with some debt. Thus, although the advantage in enrollment rates for students who graduate with no debt does not appear to be due to family financial strength, higher family income tends to weaken this advantage. This suggests that eliminating debt at graduation will have a greater impact on enrollment in graduate and professional school by low-income students than for higher-income students. *Please note that these results may be flawed because the CAGI variable in the graduate and professional student NPSAS studies reports only student and spouse income, ignoring parent income, because all graduate and professional students are by definition independent. The graduate and professional student AGI data is not based on undergraduate AGI, and so may represent an apples-to-oranges comparison, with little connection between the two cohorts of students.* However, the B&B studies show a similar effect, albeit with a less dramatic result.

The advantage of graduating with no debt is similar in the 2007-08 and 2003-04 NPSAS studies, but lower in the 1999-2000 NPSAS study. Bachelor's degree recipients who graduated in 2007-08 with no debt were 1.71 times as likely (71% more likely) to enroll in graduate and professional school than students who graduated with some debt. This compares with 1.79 times as likely (79% more likely) in the 2003-04 cohort and 1.55 times as likely (55% more likely) in the 1999-2000 cohort.

The 1992-93 Baccalaureate and Beyond (B&B:93/2003) longitudinal survey demonstrates a slight advantage in receiving a Master's or professional degree and a significant advantage in receiving a doctorate. This study tracks a single cohort of Bachelor's degree recipients through graduate and professional degree completion and/or employment. Among Bachelor's degree recipients, students who graduated with no debt were 1.04 times as likely (3.7% more likely) to obtain a Master's degree, 1.03 times as likely (2.6% more likely) to obtain a professional degree and 1.29 times as likely (29.4% more likely) to obtain a doctorate than students who graduated with some debt. The advantage improved for Pell Grant recipients pursuing a doctoral degree, where those who graduated with no debt were 1.81 times as likely (81.3% more likely) to receive a doctoral degree than those who graduated with some debt. The advantages for Master's and professional degrees, however, became disadvantages when the data was restricted to Pell Grant recipients.

The 1999-2000 Baccalaureate and Beyond (B&B:2000/2001) longitudinal survey has not yet had sufficient follow-up to determine the impact on graduate and professional degree attainment. However,

⁵ 25.7% of Bachelor's degree recipients with family AGI under \$25,000 graduate with no debt.

⁶ Among Bachelor's degree recipients with family AGI under \$25,000, students who graduated with no debt were 3.08 times as likely (208% more likely) to enroll in graduate and professional school as students who graduated with some debt.

the 2001 follow-up does demonstrate that Bachelor's degree recipients who graduated with no debt are 1.20 times as likely (19.5% more likely) to enroll in graduate and professional school than students who graduated with some debt.

It is unclear the extent to which the statistics reported in this paper are influenced by a degree of moral hazard. Students who are pursuing graduate and professional degrees may be more willing to assume higher levels of undergraduate debt because of the prospect of higher salaries from the more advanced education. They may deliberately enroll in more elite (and expensive) colleges to increase their chances of being admitted to a more prestigious graduate or professional school. However, students who graduate with no undergraduate debt are still more likely to enroll in graduate and professional school than students who graduate with some debt.

CONCLUSION

This paper has demonstrated that Bachelor's degree recipients who graduate with no debt are much more likely to enroll in graduate and professional school than students who graduate with some debt.

This finding has potential policy implications for colleges in their implementation of overaward regulations. Sections 428(a)(2)(C), 428H(c) and (d), 443(b)(4), 471 and 480(j) of the Higher Education Act of 1965 and the federal overaward regulations at 34 CFR 673.5(b), (c) and (d) require reductions in campus-based aid, such as the Perkins Loan, Federal Work-Study and FSEOG, as well as reductions in the Stafford loan, when the combination of need-based and non-need-based aid exceeds financial need. This mandates a reduction in the financial aid package when a student wins an outside scholarship. Colleges, however, have some flexibility in how they reduce the financial aid package. They could, for example, use the scholarship first to fill any unmet need and then reduce loans and work-study before grants. Such an outside scholarship policy minimizes displacement, where the private scholarship replaces institutional grants, yielding no net benefit to the student.

The results reported in this paper demonstrate that outside scholarship policies that allow private scholarships to eliminate a student's debt burden will increase the likelihood that the student will enroll at a graduate or professional school after graduation with a Bachelor's degree.