Does the Bennett Hypothesis Hold in Professional Education? An Empirical Analysis

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Abstract: Policymakers have been debating the Bennett Hypothesis—whether colleges increase tuition after the federal government increases access to student loans—for decades. Yet most of the prior research has focused on studying small changes to loan limits or Pell Grants for undergraduate students. In this study, I examine whether business schools (the most popular master's program) and medical schools (one of the most-indebted programs) responded to a large increase in federal student loan limits in 2006 following the creation of the Grad PLUS program by raising tuition or living expenses as well as examining whether student debt burdens also increased. Using two quasi-experimental estimation strategies and program-level data from 2001 to 2016, I find little consistent evidence to support the Bennett Hypothesis in either medical or business schools.

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To this point, affordability conversations in higher education have largely focused on undergraduate education. The rising inflation-adjusted price of tuition and fees for a bachelor's degree program (up by 110% at public colleges and 65% at private nonprofit colleges over the last two decades) are certainly a cause for concern (Ma, Baum, Pender, & Welch, 2017). Yet a similar trend is occurring in graduate and professional education, where sticker prices have risen at similar or even faster rates compared to undergraduate programs (Association of American Medical Colleges, 2017c; Baum & Steele, 2017).

The listed price tag of a graduate degree is of relatively little importance to graduate students enrolled full-time in PhD programs, as tuition is generally paid for by a teaching or research assistantship. In the 2011-12 academic year, 58% of PhD students attending full-time had assistantships, with about three-fourths of full-time PhD students at public and private nonprofit colleges receiving some amount of financial assistance from their institution. But students enrolling in master's and professional doctoral programs rarely received assistantships, with just eight percent of master's and three percent of professional doctoral students having assistantships in the 2011-12 academic year (author's calculations using data from the National Postsecondary Student Aid Study).

The combination of high sticker prices and limited grant aid has resulted in many professional students taking on large amount of debt to finance their education. The median 2017 medical school graduate had $192,000 in debt (Association of American Medical Colleges, 2017b), while law school graduates had over $140,000 in debt and master's graduates had about $50,000 in debt in the 2011-12 academic year (Delisle, 2014). As a comparison, the median bachelor's degree recipient who borrowed for college had about $27,000 in debt (excluding Parent PLUS loans) in 2011-12 (author's calculation using data from the National Postsecondary

Student Aid Study). This has led to graduate and professional students accumulating about 38% of all outstanding federal student loan dollars in spite of only being 17% of all borrowers (Baum & Steele, 2018).

The landscape of federal lending for graduate and professional students has changed significantly over the last fifteen years. Prior to 2006, students in professional doctorate programs in a number of health science fields (such as medicine and dentistry) could take out a maximum of $38,500 per year in federal student loans, subject to a lifetime maximum of $189,125; most other graduate and professional students were limited to $18,500 in annual loans and a lifetime maximum of $138,500 (Bhole, 2017).[1] As of July 1, 2006, graduate students could take out federal loans up to the full cost of attendance (covering living expenses as well as tuition and fees) for the first time after the Grad PLUS loan program was created in the Higher Education Reconciliation Act of 2005. Given that tuition and fees (particularly at private nonprofit institutions) were often at or above federal loan limits in 2006, the creation of Grad PLUS had the potential to enhance students' ability to borrow for graduate and professional education.

The second major change to the lending landscape occurred with the passage of the College Cost Reduction and Access Act of 2007, which created the Public Service Loan Forgiveness (PSLF) program that allowed students who worked at qualifying nonprofit or government agencies to make income-driven payments for ten years and then to have any remaining balances forgiven. This option is particularly salient for those with large amounts of professional school debt, as even those with annual incomes of over $100,000 per year can qualify for substantial forgiveness (Delisle, 2016). Other borrowers can enroll in one of several income-driven repayment programs created during the late 2000s and early 2010s that can result

in partial loan forgiveness after 20-25 years of payments. Even among medical students, a recent survey indicated that 46% planned to either use PSLF or an income-driven plan to manage their loans (Association of American Medical Colleges, 2017b).

The continued increase in tuition prices that occurred alongside a large increase in federal student lending limits has raised questions of whether federal student loans are driving tuition increases. This idea was popularized by William Bennett, who was President Reagan's Education Secretary, in a 1987 *New York Times* opinion piece (Bennett, 1987) and has been hotly debated in both research and policy circles ever since.[2] Several academic studies have examined the veracity of the so-called Bennett Hypothesis in undergraduate education, with a mix of null and modest positive relationships (e.g., Archibald & Feldman, 2016; Cellini & Goldin, 2014; Heller, 2013; Lau, 2014; Lucca, Nadauld, & Shen, 2015; Rizzo & Ehrenberg, 2004; Singell & Stone, 2007; Stoll, Bradley, & Mahan, 2014; Turner, 2014). However, these studies have exclusively focused on undergraduate education and have relied on small changes to federal grant or loan limits to estimate whether federal student aid drives tuition increases. Only one prior study has looked at graduate and professional education, with Kelchen (2017) finding limited evidence to support the Bennett Hypothesis among law schools.

In this study, I extend the literature on the Bennett Hypothesis in post-baccalaureate education by examining the master's degree program with the most degrees awarded (business administration) and one of the highest-debt professional doctorates (medicine). In both cases, students pay the vast majority of overall tuition and fees, making both the expansion of federal loan access through Grad PLUS and the growth of income-driven repayment programs particularly salient for these two programs.

My research questions are the following:

(1) Did tuition/fees or living expenses for medical and business school students increase at a faster rate following the creation of the Grad PLUS program in 2006 and the expansion of income-driven repayment beginning in 2007?

(2) Did the student debt burden of medical and business school graduates increase at a faster rate following the creation of the Grad PLUS program in 2006 and the expansion of income-driven repayment beginning in 2007?

About Graduate and Professional School Borrowing

Graduate and professional students were first eligible to receive federal loans following the creation of what is now called the Perkins Loan program in 1958 (Kelchen, 2014). Students with financial need attending participating colleges can receive up to $8,000 per year through this program, which altogether provided almost $200 million in funding for graduate and professional students in the 2014-15 academic year (U.S. Department of Education, 2016). However, this program's authorization expired in September 2017 and loans will be phased out as a result (Kreighbaum, 2017). Federal student loan access for professional students was significantly expanded through the creation of the subsidized Stafford loan program in the Higher Education Act of 1965 and the unsubsidized Stafford program in the 1992 Higher Education Act reauthorization.

Prior to the creation of the Grad PLUS program in 2006, most graduate and professional students could borrow up to $18,500 in federal loans in a given year (with a maximum of $8,500 per year in subsidized loans) and $138,500 in loans during their lifetimes (with a maximum of

$65,500 in subsidized loans) (FinAid.org, 2017). Since 2006, there have been two other changes to federal student loan limits. In 2007, the unsubsidized loan limit increased by $2,000 per year and subsidized loans for graduate and professional students were eliminated in 2012. Today, students are subject to annual unsubsidized loan limits of $20,500 and lifetime loan limits of $138,500, with medical students having higher limits as noted in the previous section.

The federal borrowing limits for non-PLUS loans are well below the average cost of attendance for most graduate and professional programs, leading many students who are not enrolled in research doctoral programs to take out the maximum in these loans. In the 2003-04 academic year, 73% of law and medical students and 39% of MBA students with federal loans borrowed the maximum amount; these numbers have increased somewhat for law and medical students in recent years while slightly declining for MBA students (Woo & Shaw, 2015). Prior to 2006, the only option to finance the remainder of the cost of attendance was by using private loans; in 2003-04, 36% of law students, 18% of medical students, and 7% of MBA students who borrowed for graduate school had private loans.

Grad PLUS loans differ from other federal loans in that a potential borrower must not have an ‘adverse credit history,’ which is defined as having at least $2,085 in debt at least 90 days delinquent in the last two years or having a foreclosure, default, or wage garnishment in the last five years (Federal Student Aid, 2015). But since this is a more lenient standard than most private lenders (who focus on creditworthiness), the growth in Grad PLUS borrowing generally outstripped the decline in private loans. In the 2016-17 academic year, nearly $10 billion in Grad PLUS loans were distributed (Baum, Ma, Pender, & Welch, 2017). Although fewer than five percent of professional students took out private loans in 2011-12, 34% of medical and 59% of

law students used Grad PLUS loans. However, only about five percent of business students took out Grad PLUS loans (Woo & Shaw, 2015).

Prior to 2007, the only income-driven repayment option was an Income-Contingent Repayment plan that was only available for Direct Loan borrowers (excluding FFEL loans). This program required students to pay 20% of their discretionary income (above 150% of the federal poverty line) for up to 25 years, which was less attractive than the standard repayment plan for many students. In 2007, the College Cost Reduction and Access Act created a new Income-Based Repayment program that allowed all students with federal loans to access income-driven repayment and pay 15% of their discretionary income for up to 25 years before any remaining balance would be forgiven. After not being included in the initial bill, Grad PLUS loans were included when the program was fully implemented in 2008 in what some insiders have considered to be a drafting error at the Department of Education (Shireman, 2017). Three other income-driven student loan programs have been created since then (a revised Income-Based Repayment Plan, Pay as You Earn, and Revised Pay as You Earn), which can reduce monthly payments to as low as 10% of discretionary income for 20 years (Federal Student Aid, n.d.).

The College Cost Reduction and Access Act also created a Public Service Loan Forgiveness (PSLF) program that allows borrowers working for government or other nonprofit agencies to pay 10% of their discretionary income for as little as ten years while having any remaining balances forgiven tax-free (which is not the case for other income-driven programs). As of September 2017, nearly 740,000 borrowers have submitted employment certification forms that indicate their interest in applying for PSLF after making 120 qualifying monthly payments (Federal Student Aid, 2017). The Association of American Medical Colleges has been among the groups lobbying to keep PSLF for future borrowers after both the Trump

Administration and House Republicans have proposed to end the program over cost concerns (Association of American Medical Colleges, 2017a). Although it is unclear how many professional students are relying on income-driven repayment or PSLF, the fact that 53% of the federal Direct Loan dollars belonging to students with at least $100,000 in debt are enrolled in income-driven programs suggests that these programs are heavily utilized by graduate and professional students (author's calculation using data from the Federal Student Aid Data Center).

Theoretical Framework

The key premise of the Bennett Hypothesis is the assumption that colleges are revenue-maximizing agents that are attempting to take advantage of increases in federal aid availability to garner additional institutional resources. This at least partially aligns with two important theories in the nonprofit management arena. The first is resource dependency theory (e.g., Aldrich & Pfeffer, 1976), which explains how organizations that rely on the external environment to provide resources can be shaped by the preferences of these outside forces. As such, colleges are constantly attempting to diversify their revenue sources in an effort to gain some independence from external pressures. This has always been important for the vast majority of tuition-driven private colleges, but is becoming increasingly important for public colleges as state appropriations have failed to keep up with enrollment growth (State Higher Education Executive Officers Association, 2017). Tuition revenue from professional students is also becoming more important as a growing number of states place limits on in-state tuition and fee prices for undergraduate students in an effort to maintain affordability while not regulating graduate and professional prices (Armstrong, Carlson, & Laderman, 2017).

The second theory that explains why professional programs may raise their prices if additional financial aid becomes available is the revenue theory of costs (Bowen, 1980). Bowen's theory posits that colleges will seek to raise—and spend—as much money as possible in an effort to improve the quality of education and to enhance their prestige. At many institutions, this pressure is enhanced by private-sector rankings organizations such as *U.S. News & World Report* that direct reward many professional programs (such as medical schools) that have the resources to keep class sizes low regardless of student learning outcomes (Morse & Hines, 2017). Colleges often counter Bowen's theory with Baumol's (1967) cost disease theory, which states that the rising price tag of higher education is largely due to the skilled labor-intensive nature of the industry. Although there is empirical support for Baumol's cost disease (e.g., Archibald & Feldman, 2008), the steady increase in the cost of providing a college education suggests that it may work separately from changes to financial aid availability.

Only three rigorous empirical studies have examined the key premise of the Bennett Hypothesis as originally stated—whether increases in federal student loan availability are associated with increases in tuition and fee prices. At the undergraduate level, Lucca et al. (2015) concluded that increases in subsidized loans were associated with sizable increases in tuition at for-profit and expensive private nonprofit colleges (between $.45 and $.60 for each $1 increase in loan limits), while increases in unsubsidized loans were generally not associated with tuition increases. Lau (2014) found a relationship between increased loan limits and tuition prices, with the relationship varying between $.25 at community colleges and $.51 at for-profit colleges. Finally, Kelchen (2017) examined whether law schools increased tuition or living allowances following the implementation of Grad PLUS as well as whether student debt burdens increased and found no or modest evidence to support the Bennett Hypothesis across a range of

specifications. Other high-quality studies at the undergraduate level have examined the relationship between maximum Pell Grant awards and tuition prices (e.g., Rizzo & Ehrenberg, 2004; Singell & Stone, 2007; Turner, 2014) and the relationship between participation in federal financial aid programs and tuition prices (Cellini & Goldin, 2014) and found a mix of null and modest positive relationships.

Data, Samples, and Methods

I constructed a panel dataset ranging from the 2001-02 to the 2016-17 academic years from a number of sources to examine whether business and medical schools raised tuition prices or living allowances following the creation of the Grad PLUS program in 2006 and if the debt burdens of graduates were also affected. The following section contains details on the data sources, analytic methods, and samples for the business and medical school analyses.

Data

My primary data source for both the business and medical school analyses is *U.S. News & World Report*'s annual "Best Graduate Schools" guidebooks that include rankings and data for a range of graduate and professional programs. I did not use the numerical program rankings in this analysis, instead using data that programs reported about themselves in the program directory portion of the guidebook. My two research assistants and I hand-entered data from the 2003 through 2018 guidebooks (representing data from the 2001-02 through 2016- 17 academic years) to compile this dataset. Approximately 85% of business schools and 82% of medical

schools invited to submit information to *U.S. News* did so in the typical year, with participation rates being highest in 2010-11 and lowest in earlier and later years of the panel.

Three outcomes of interest came from the *U.S. News* guidebooks. The first outcome was tuition and fees, which is the classic test of the Bennett Hypothesis. I examined both in-state and out-of-state tuition and fees for full-time students attending public institutions and the single tuition and fees charge for full-time students at private nonprofit institutions. A small number of business schools reported tuition prices for the entire degree program (which was generally two years in length), so I divided the reported price by two to get an annual price. The second outcome was the living allowance, which covers non-tuition components of the cost of attendance such as room, board, and transportation expenses. The third outcome was the mean debt burden of graduates who took on debt, which included over 80% of medical students and 40% of business students (Woo & Shaw, 2015).[3]

The *U.S. News* guidebooks also provided information on a number of program-level characteristics that I used as control variables in my regressions. For both business and medical schools, I used overall program enrollment, the percentage of female and racial/ethnic minority students, the percentage of students admitted, and the median standardized test scores (GMAT/MCAT) and GPAs of newly-enrolled students. For business schools, I also used the percentage of part-time and international students, while I used the percentage of underrepresented (non-Asian) minority students in addition to the above variables for medical students. All variables are for full-time students only, which represents all medical school students and between 35% and 40% of the business school students attending colleges in the *U.S. News* dataset.

When *U.S. News* tuition and fee data were unavailable for medical schools (about 15% of observations), I substituted in data first from the U.S. Department of Education's Integrated Postsecondary Education Data System (IPEDS) and then from the Association of American Medical Colleges (AAMC). Although IPEDS generally does not include program-level data, the dataset does contain tuition and fee prices for in-state and out-of-state students in medicine as well as law and a number of other health-related fields. IPEDS data were missing for the 2009-10 academic year and incomplete for the 2008-09 academic year, while the AAMC data were available for all years. In-state tuition and private tuition values were very strongly correlated among the data sources (over 0.9 in nearly every year), while out-of-state tuition correlations across the sources ranged between 0.7 and 0.9. Unfortunately, no additional sources were available over time for business school tuition and fee prices. I used IPEDS data on three other covariates that could potentially affect graduate programs' prices: graduate and professional students as a percentage of overall enrollment, the share of overall revenue coming from tuition dollars, and per-student endowment resources. In the small number of cases where financial data were combined with other institutions in a system of higher education (e.g., Jaquette & Parra, 2014), I assigned the same per-FTE values to each IPEDS UnitID nested within a Federal Student Aid OPEID.

Finally, I also used comparable data for undergraduate students in one set of analyses. Data on two outcomes of interest (tuition/fees and living allowances) came from IPEDS, and the third outcome (median debt of bachelor's degree recipients) came from the College Scorecard. Although data on selectivity and standardized test scores were not used due to a high rate of missing data and the difficulty equating undergraduate and graduate admissions test scores, I did use the percentage of female and racial/ethnic minority students as covariates.

Samples

The business school sample consisted of 410 programs that were accredited by the Association to Advance Collegiate Schools of Business (AACSB), enrolled full-time master's students, and participated in the *U.S. News* guidebook at any point during the length of the panel. AACSB-accredited business schools are typically found at more-selective and research-oriented colleges, as AACSB accreditation standards require faculty members to meet peer-reviewed research standards (AACSB International, 2017). AACSB-accredited programs in my dataset awarded approximately 59% of the over 160,000 master's degrees in business in the 2015-16 academic year (author's calculations using IPEDS data). Summary statistics of the 277 public and 133 private nonprofit business schools in the 2015-16 and 2016-17 academic years are presented in the left side of Table 1.

[Insert Table 1 here]

The medical school sample consisted of 150 MD-granting programs that were accredited by the Liaison Committee on Medical Education, the only organization that accredits such programs.[4] Because I was able to supplement tuition and fee data from other sources beyond *U.S. News*, all medical schools are included in the dataset for analyses without additional covariates. Summary statistics for the 91 public and 51 private nonprofit medical schools that were in operation in the 2015-16 and 2016-17 academic years are presented in the right side of Table 2.

For certain analyses, I used a comparison sample of public and private nonprofit colleges that were did not have a business or medical program that was included in the *U.S. News* guidebook. (These colleges could have had a business school that was either not accredited by AACSB or did not respond to the survey in any year, but this represents very few full-time

students who could have been affected by the increase in federal student loan limits.) All of these institutions in the comparison samples were public or private nonprofit colleges that had data on at least one of the three outcomes of interest, granted more baccalaureate degrees than associate degrees, and was not classified as a primarily religious institution in the 2010 Carnegie classifications. This resulted in comparison groups of 303 public and 1,038 private nonprofit institutions for the business school analyses and 491 public and 1,125 private nonprofit institutions for the medical school analyses.

Methods

I used two different analytic strategies to examine whether there is evidence to support the Bennett Hypothesis among business or medical schools. My preferred strategy is to use interrupted time series (ITS) models (run separately for public and private nonprofit business and medical schools) to examine whether tuition and fees, living allowances, or student debt burdens increased more quickly following the implementation of the Grad PLUS program in 2006. The regression equation for college *i* is the following:

$$Y_i = \beta_0 + \beta_1 Time_t + \beta_2 Post_t + \beta_3 (Time * Post)_t + \beta_4 X_{it} + \epsilon_{it} + \mu_i \quad (1)$$

Y represents the outcome of interest, which is logged to interpret as a percentage point change. *Time* reflects the number of years following the beginning of the panel dataset in the 2001-02 academic year, *Post* is a dummy variable equal to 0 before the 2006-07 academic year and 1 otherwise, and (*Time*Post*) represents the number of academic years since July 1, 2006. In interpreting the ITS results, *Post* reflects the immediate treatment effect (the change in level immediately following 2006) and (*Time*Post*) reflects the treatment effect over time (the change in slope following 2006).

The *X* vector includes three sets of control variables that were previously described in the data section and presented in Table 1: program-level demographics from *U.S. News* data, program-level selectivity measures from *U.S. News* data, and institution-level control variables from IPEDS. For the tuition and living allowance analyses, covariates are used from the prior year to reflect the college's characteristics when it set prices for the following academic year. The debt analyses are matched with covariates from two years prior in order to allow students to experience one full year of the new pricing strategy before graduation. This means that tuition prices and living allowances for the 2006-07 academic year and debt burdens for the graduating class of 2007 are all matched with 2005-06 covariates. ϵ represents an idiosyncratic error term and μ is an institution-specific error term. Finally, all financial variables were logged and adjusted for inflation into 2016 dollars using the Consumer Price Index.

One factor that could have influenced whether programs were able to increase their prices (if desired) following the creation of Grad PLUS is the selectivity of the program, with more-selective programs potentially having the ability to raise their prices and still meet enrollment targets. All medical schools in the dataset were already highly selective prior to 2006, with the median program admitting just eight percent of applicants. However, there was much more variation in business schools, with some programs admitting all students and others with admit rates more similar to the typical medical school. I divided business schools into less selective and more selective groups based on GMAT scores in the 2004-05 and 2005-06 academic years to obtain a pre-treatment measure of selectivity and because GMAT scores were a more stable measure of selectivity over time than were admit rates (which were highly variable across years for all but the most elite programs). Programs with median GMAT scores over 575 in either year (roughly the median score among business programs in my sample) were placed in the more

selective category, while programs with lower GMAT scores and those that did not report GMAT scores being placed into the less selective category.

The second analytic strategy in this study was to use difference-in-differences (DD) models to examine whether tuition prices, living expenses, or student debt burdens increased at a faster rate for business and medical schools than for undergraduate students at four-year colleges that did not have a business or medical school that was in the analytic sample. For college *i*, the regression equation is the following:

$$Y_i = \theta_{0i} + \theta_{1i}Prof_i + \theta_{2i}YrsPost_t + \theta_{3i}(Prof * YrsPost)_{it} + \theta_{4i}X_{it} + \epsilon_{it} + \mu_i, \quad (2)$$

where *Y* represents the same outcome variables as in the ITS regression, *Prof* is a dummy variable equal to 1 for business or medical schools and 0 for undergraduate institutions, and *YrsPost* represents the number of academic years since July 1, 2006 (with the 2006-07 academic year being coded as 1). The key variable in this model is (*Prof***YrsPost*), which represents the difference in slope (if any) between professional programs and undergraduate institutions. A positive value for this coefficient would provide support for the Bennett Hypothesis in professional education. The *X* vector of control variables contained two demographic measures (percent female and percent minority) that were present in both the business and medical school data and the three institutional financial characteristics that were also included in the ITS regression.

One potential threat to validity in both the ITS and DD models is that professional programs could have already been increasing tuition at higher rates prior to the 2006 implementation of Grad PLUS loans, either because programs expected changes to federal student lending limits or due to some other factors that could possibly confound the relationship

between Grad PLUS and prices charged. To examine this possibility, I ran falsification tests that used 2005 as the beginning of the Grad PLUS program instead of 2006; ITS results are presented in Appendix 1 and DD results are presented in Appendix 2.

For the ITS models, the post-2005 dummy (the key variable in the falsification test) is positive and significant at $p<.10$ for in-state tuition at medical schools and positive and significant at $p<.01$ for debt burdens of public medical school graduates. This potentially suggests a positive pre-treatment trend in the data. The years*post-2005 dummy variable (examining the change in slope over time) is negative and significant at $p<.01$ for tuition prices at public business and medical schools. The professional school*post-2005 variable in the DD models shows a number of statistically significant results, but this should be expected as post-treatment years are included. However, it is worth comparing these coefficients to the post-2006 coefficients to see if they differ in a meaningful way from each other.

Limitations

There are three main limitations of this study. The first limitation is that it is possible that other outcomes, such as student demographics or enrollment levels, could potentially also have been affected by the increased availability of loans. This is a particularly salient concern at business schools, which can more easily expand capacity at a lower cost than can medical schools. I addressed this potential concern in two ways, first controlling for demographic characteristics from the prior year in the regressions and then running separate models with enrollment as the outcome of interest. For business schools, the interaction between the number of years since the beginning of the panel and the post-2006 indicator was statistically significant

at p<.10 for private nonprofit programs and was not significant for public programs. However, the post-2006 dummy variable was significant at p<.05 for both public and private nonprofit programs as enrollment increased during the beginning of the Great Recession. This could allow total program revenue to increase even if per-student revenue did not, potentially biasing my results toward zero.

The second limitation is that because of the increased generosity of income-driven repayment programs following the creation of Grad PLUS in 2006, the results from my analyses should be interpreted as the effect of both Grad PLUS and income-driven repayment instead of a pure test of the Bennett Hypothesis. If colleges took advantage of income-driven repayment plans to increase their tuition, the true effect of the Grad PLUS program would be smaller than the observed coefficients. Finally, the difference-in-differences models are potentially understating the actual effect of changes to federal student loan policies for professional students because undergraduate students also saw a small increase in their federal student loan limits (Wei & Skomsvold, 2012). But since undergraduate students generally saw the same changes to income-driven repayment plans as professional students, the DD analyses do help to isolate the effect of the Grad PLUS program from the effect of income-driven repayment plans.

Trends in Professional Program Pricing and Debt

Before presenting the ITS and DD results, I present graphics summarizing trends in business and medical school tuition and fees, living allowances, and debt burdens. The business school graphics (the three panels of Figure 1) show steady increases in tuition prices over the panel, with in-state, out-of-state, and private tuition prices all increasing by between $8,000 and

$10,000 above the rate of inflation over the sixteen-year period By 2016-17, in-state annual tuition prices were $16,916, out-of-state prices were $27,377, and private program prices were $37,238. Room and board allowances increased by about $3,000 in business schools, while debt burdens rose from $25,484 to $36,663 at public programs and from $46,234 to $56,694 in private programs. However, debt burdens at private business schools primarily rose between 2001-02 and 2004-05 (to $54,335 in 2016 dollars) before remaining generally steady during the following decade.

Although much larger in magnitude, medical school tuition prices (Figure 2) generally followed the same pattern of steady increases as business schools. In-state tuition reached $33,632 in 2016-17, while out-of-state tuition was $56,616 and private tuition was $54,813. Out-of-state tuition at public medical schools started out lower than private tuition, but surpassed their private counterparts by the 2004-05 academic year. Living allowances remained fairly stagnant for both public and private medical schools, with very small annual increases above the rate of inflation. Student debt rose substantially for graduates of public programs (from $109,895 to $158,994 in inflation-adjusted dollars), with private program graduates seeing an increase from $137,449 to $158,019. Private medical schools, like private business schools, saw most of their increases in debt during the early years of the panel; peak inflation-adjusted medical school debt ($161,622) occurred in the 2009-10 academic year.

The graphics in Figures 1 and 2 also contain vertical lines representing the first year in which Grad PLUS loans were available (the 2006-07 academic year or the graduating class of 2007). There do not appear to be large changes in the slope of the trendlines upon implementation, which suggests that substantial responses by colleges are unlikely. But this

could be different when using quasi-experimental methods with control variables, which is the focus of the next section.

Interrupted Time Series Results

I first tested for whether business and medical schools increased their tuition at faster rates following the creation of the Grad PLUS program. The results of this most direct test of the Bennett Hypothesis using ITS regressions can be found in Table 2. Across both public and private nonprofit programs at business and medical schools, I found no evidence to support the Bennett Hypothesis through either changes in level (the immediate treatment effect) or changes in slope (the treatment effect over time). The change in level coefficient was insignificant or weakly negative across all models, while the change in slope coefficient ranged from negative two to negative four percentage points and was significant at $p<.05$ for public business and medical schools. However, the negative coefficients are somewhat smaller (closer to zero) for in-state and out-of-state tuition at business schools than in the falsification tests from Appendix 1 that used 2005 as the placebo treatment date.

[Insert Table 2 here]

Turning to living allowances and debt burdens (Table 3), there are no statistically significant coefficients for either the changes in levels or changes in slopes among business schools in models with control variables. Medical schools had two main sets of statistically significant results. Private nonprofit medical schools had positive changes in both levels (3.8 percentage points, $p<.10$) and slopes (2.5 percentage points, $p<.05$), indicating a potential

relationship between the implementation of Grad PLUS and living allowances. The level variable was not significant in falsification tests (Appendix 1), suggesting that the modest effect can be attributed to Grad PLUS. Second, the level of debt burdens increased by about 7.0 percentage points at public medical schools and 5.6 percentage points at private medical schools immediately following 2006 (both $p<.01$). The change in level was comparable for public medical schools in the falsification test, while not significant for private medical schools. This provides evidence that the increase in debt burdens for private medical school graduates may be attributable to the Grad PLUS program.

[Insert Table 3 here]

Because business schools varied so much in their selectivity (and thus potentially affecting their ability to respond to increased federal student loan limits), I ran the analyses separately for more-selective and less-selective programs. As Table 4 shows, there were few meaningful differences by the level of selectivity. The only notable difference was that less-selective public business schools saw a large and statistically significant increase after the first year of the Grad PLUS program, while more-selective programs had a negative but insignificant (and noisy) coefficient.

[Insert Table 4 here]

Difference-in-Differences Results

The next set of analyses compared outcomes for business and medical schools with undergraduate students using a DD framework. The results from regressions with tuition and fees

as the outcome of interest can be found in Table 5, with the key coefficient of interest being the business school*number of years post-2006 variable. Public business schools raised their tuition prices approximately 1.1-1.2 percentage points faster than undergraduate institutions following Grad PLUS in the model with all control variables, while private business schools raised their tuition about 0.3 percentage points slower (all $p<.01$). These are very similar to the falsification test using 2005 as the enactment of Grad PLUS (Appendix 2), suggesting that at least some of the observed effects may be due to pre-treatment trends.

[Insert Table 5 here]

The tuition and fee results for medical schools are somewhat different than the business school results. Public medical schools increased in-state tuition about 0.3 percentage points per year faster than for undergraduate students, while increasing out-of-state tuition about 0.4 percentage points slower ($p<.01$). Private medical schools increased tuition 1.1 percentage points more slowly for their students than what undergraduates students faced. Again, the coefficients for private nonprofit tuition and out-of-state medical school tuition are similar to in the falsification test, but the coefficient for in-state tuition is larger in the DD model with the actual starting date for Grad PLUS.

Finally, I examined living allowances and debt burdens for business and medical students in the DD framework (Table 6). Living allowances for public business schools increased faster than for undergraduate students (0.3 percentage points per year, $p<.05$), while there was no significant difference for private nonprofit business schools. Graduates of public business schools saw their debt burdens increase by 0.5 percentage points per year faster than undergraduates ($p<.10$), while private graduates saw their debt rise by 1.6 percentage points

more slowly than undergraduates ($p<.01$). These results are generally similar to models using 2005 as the beginning date for Grad PLUS (Appendix 2).

[Insert Table 6 here]

Among medical schools, increases in living allowances and debt burdens are consistently estimated to be slower than for undergraduate students. Living allowances increased about one percentage point per year slower across both public and private medical schools, while debt burdens increased 1.2 percentage points per year more slowly than for undergraduates at public colleges and 2.2 percentage points more slowly at nonprofit colleges (all $p<.01$). These values are slightly larger (more negative) than the falsification results in Appendix 2. They also run counter to the positive coefficients for debt burdens in the ITS results, showing disagreements between the two models.

Discussion

Whether the availability of federal student aid increases tuition prices and student debt has been the subject of numerous policy debates ever since the Bennett Hypothesis was first stated more than three decades ago. Rigorous empirical studies have found a mix of null and modest positive relationships between increases in federal grant and loan limits and tuition prices at the undergraduate level, yet these studies have generally estimated effects based on small increases in federal financial aid awards. There has been little attention paid to graduate and professional schools' potential responses to changes in financial aid availability, even as the creation of the Grad PLUS program in 2006 sharply increased federal loan limits and subsequent

income-driven repayment policies reduced the amount that some students would be expected to repay on their loans.

In this study, I provide quasi-experimental examinations of the Bennett Hypothesis for the most popular master's degree program in the United States (business) and for one of the most expensive professional programs (medicine). I did not find consistent evidence that either business or medical schools systemically increased tuition and fees or living allowances following 2006, and this generally resulted in student debt burdens remaining on their prior trajectory. There were some differences between the two estimation strategies (ITS and DD), but even the largest coefficients in either of the two models were still relatively modest in size.

Why did both business and medical schools generally fail to increase tuition prices at higher rates following a large increase in federal student loan limits? I offer two potential explanations. The first explanation is that programs were either unwilling or unable to increase tuition following the creation of Grad PLUS. The optics of sharply increasing tuition after more federal financial aid would not be favorable for higher education, and as such colleges may have been hesitant to do so. There is also a game theoretic explanation: since programs compete for students, the first college to raise prices may have lost market share even though all programs would benefit from a coordinated price increase. Less-selective programs may have been particularly unwilling to raise tuition given the lack of a waitlist, but I also did not find differences in tuition practices between more-selective and less-selective business schools.

The second possibility is that a relatively small percentage of enrolled students faced credit constraints that would have been eliminated by Grad PLUS. The Grad PLUS program still could have had the effect of increasing access to credit, but that effect may have operated

through changing the applicant pool for professional programs. Medical schools have the highest borrowing rates, but nearly every medical school rejects more than three-fourths of its applicants. It is possible that Grad PLUS made medical school possible for a more diverse group of students, with the applicant pool including students who would have been unable to access private loans; this is a question that deserves further study. Meanwhile, other students switched from private loans to Grad PLUS, especially following the creation of income-driven repayment programs (Bhole, 2017).

Although the Grad PLUS program is profitable for the federal government under official accounting standards (Congressional Budget Office, 2017), there are growing concerns among policymakers (particularly conservatives) about the implications of unlimited lending to graduate students combined with income-driven repayment plans (e.g., Delisle, 2016).[5] House Republicans' 2017 legislation to reauthorize the Higher Education Act would cap graduate loans at below the full cost of attendance for most programs and end or curtail income-driven repayment programs (Douglas-Gabriel, 2017). It is important to emphasize that my study cannot speak to the implications of reverting back to pre-2006 student loan policies for graduate and professional students, as the same trends for pricing and debt may not hold in reverse.

As the topic of federal student loans for graduate and professional students gets an increasing amount of attention, further research is needed in two main areas. First, as mentioned above, an examination of whether additional access to federal financial aid changed the types of students enrolling in graduate and professional education is much needed. Second, the outcomes and career pathways of students following Grad PLUS and PSLF should be examined, with a particular focus on whether these policies induced students to enroll in socially valuable but low-paid fields. Unfortunately, this question is difficult to examine at this point for most professional

programs due to a lack of available program-level data on student outcomes and PSLF takeup. Federal Student Aid could spur important research by working to make these data elements available to the public.

[1] Professional students enrolled in fields such as public health, pharmacy, or clinical psychology were subject to annual loan limits of $31,000 prior to 2006 (Bhole, 2017). For the sake of brevity (and because they are not the focus of my analyses), I do not discuss them in more detail in this paper.

[2] The origins of the idea date back to at least 1976 (Gladieux & Wolanin, 1976), but it was popularized by Secretary Bennett. Thank you to Beth Popp Berman for bringing this piece to my attention.

[3] The estimate for business students includes both full-time and part-time students. Since my analysis focuses on full-time students only, the borrowing rate is likely higher.

[4] *U.S. News* also surveys osteopathic programs under the medicine section of the guidebook, but I omitted those programs (approximately 30) to ensure a more comparable sample.

[5] Under an alternative set fair-value accounting estimates (which base projections on market risk instead of Treasury yields), Grad PLUS loans are already viewed as being unprofitable for the federal government.

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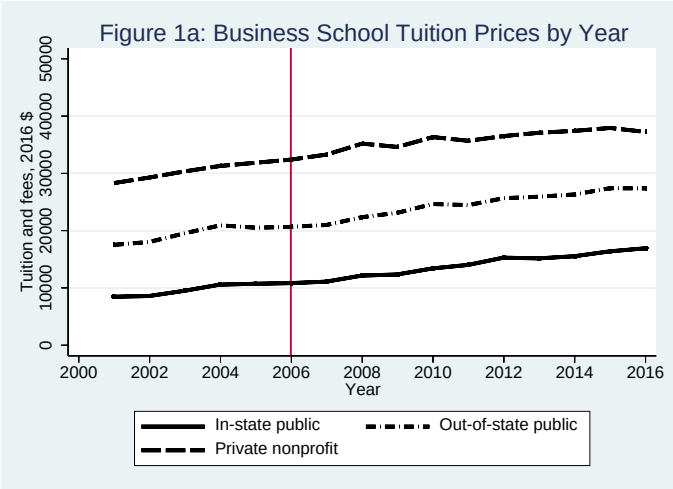
Figure 1a: Business School Tuition Prices by Year
Tuition and fees, 2016 $
0
10000
20000
30000
40000
50000
2000
2002
2004
2006
2008
2010
2012
2014
2016
Year
In-state public
Out-of-state public
Private nonprofit

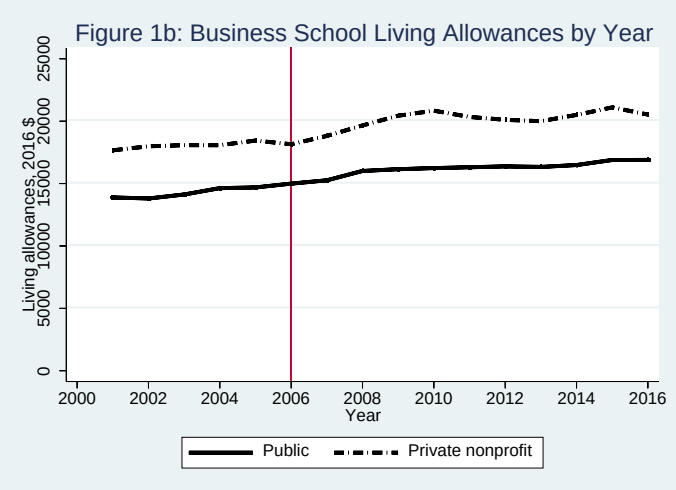
Figure 1b: Business School Living Allowances by Year
Living allowances, 2016 $
0
5000
10000
15000
20000
25000
2000
2002
2004
2006
2008
2010
2012
2014
2016
Year
Public
Private nonprofit

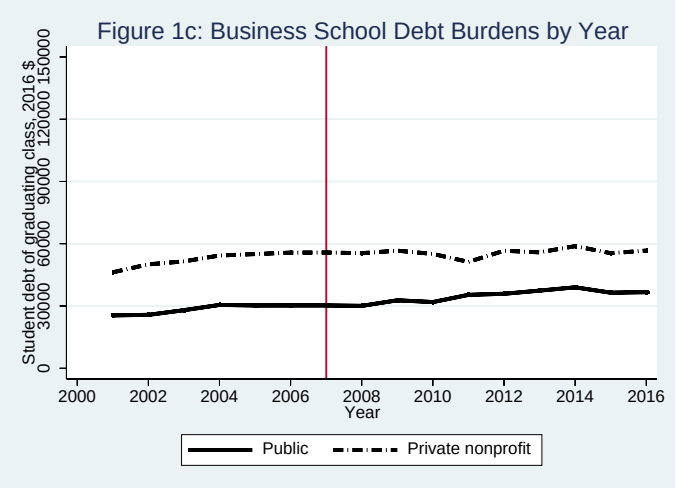
Figure 1c: Business School Debt Burdens by Year
Student debt of graduating class, 2016 $
0
30000
60000
90000
120000
150000
2000
2002
2004
2006
2008
2010
2012
2014
2016
Year
Public
Private nonprofit

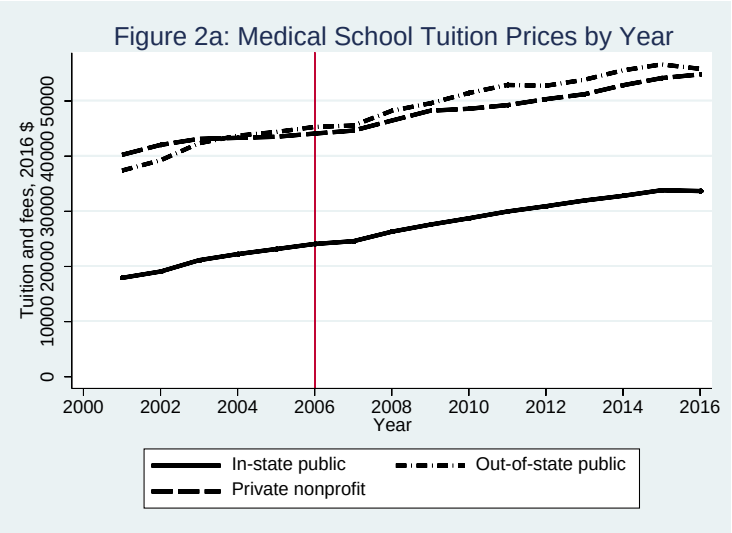
Figure 2a: Medical School Tuition Prices by Year
Tuition and fees, 2016 $
0
10000
20000
30000
40000
50000
2000
2002
2004
2006
2008
2010
2012
2014
2016
Year
In-state public
Out-of-state public
Private nonprofit

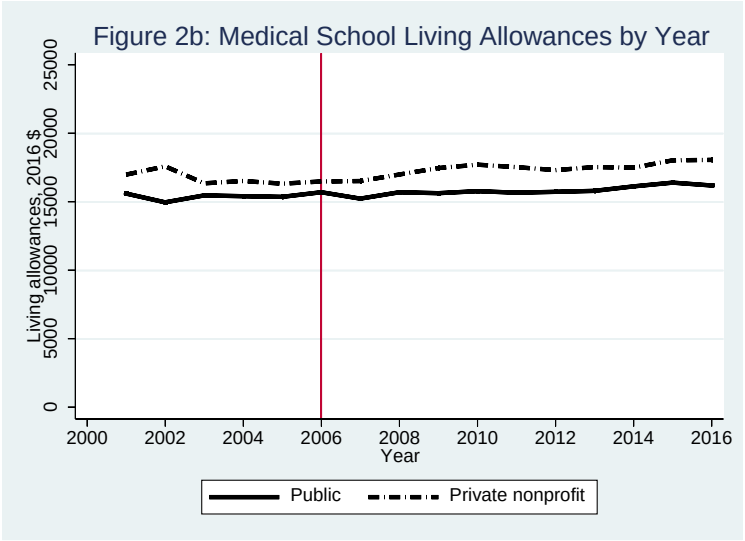
Figure 2b: Medical School Living Allowances by Year
Living allowances, 2016 $
0
5000
10000
15000
20000
25000
2000
2002
2004
2006
2008
2010
2012
2014
2016
Year
Public
Private nonprofit

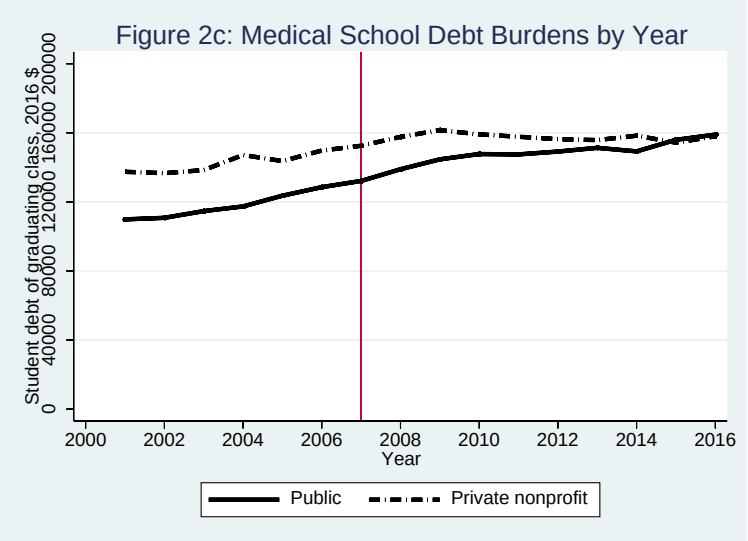
Figure 2c: Medical School Debt Burdens by Year
Student debt of graduating class, 2016 $
0
40000
80000
120000
160000
200000
2000
2002
2004
2006
2008
2010
2012
2014
2016
Year
Public
Private nonprofit

Table 1: Summary statistics of the datasets.

	Business schools				Medical schools			
	Public		Private nonprofit		Public		Private nonprofit	
Characteristic	Mean	(SD)	Mean	(SD)	Mean	(SD)	Mean	(SD)
Outcomes of interest (2016-17 academic year, 2016$)								
In-state tuition and fees	16,916	(11,386)	37,238	(16,807)	33,632	(8,292)	54,826	(6,957)
Out-of-state tuition and fees	27,377	(12,552)	--	--	55,814	(13,946)	--	--
Living allowance	16,875	(5,817)	20,530	(6,519)	16,194	(4,515)	18,056	(4,424)
Debt of 2016 graduates	36,663	(20,544)	56,694	(27,754)	158,994	(30,003)	158,018	(42,986)
Demographic controls (2015-16 academic year)								
Total enrollment	306	(303)	429	(476)	652	(240)	620	(202)
Pct part-time students	63.3	(22.7)	56.5	(22.1)	--	--	--	--
Pct female students	39.5	(11.2)	41.1	(9.6)	46.7	(4.6)	49.2	(3.1)
Pct minority students	20.2	(16.2)	21.2	(14.3)	34.2	(13.9)	42.3	(9.4)
Pct underrep minority students	--	--	--	--	17.5	(13.2)	16.5	(4.5)
Pct international students	27.9	(18.7)	31.0	(17.9)	--	--	--	--
Selectivity controls (2015-16 academic year)								
Pct of students admitted	60.3	(24.3)	53.2	(23.2)	7.6	(3.8)	5.1	(1.9)
Median GMAT/MCAT	568	(77)	589	(94)	31.2	(2.0)	34.1	(2.3)
Median GPA	3.34	(0.14)	3.34	(0.15)	3.72	(0.07)	3.77	(0.10)
Institutional control variables (2015-16 academic year)								
Pct of revenue from tuition	30.8	(9.6)	57.7	(21.4)	20.5	(12.8)	31.7	(22.8)
Pct of enrollment as grad students	18.8	(10.7)	34.6	(18.1)	38.8	(27.0)	62.2	(25.7)
Per-student endowment (2016$)	15,026	(27,073)	141,146	(284,811)	49,642	(74,128)	313,759	(411,876)
Maximum number of schools	277		133		92		51	

Sources: *U.S. News* (outcomes and demographic/selectivity control variables), Integrated Postsecondary Education Data System (tuition/fees and institutional control variables), Association of American Medical Colleges (tuition/fees).

Notes:

(1) For business schools, demographic and selectivity control variables are only for full-time students.

(2) Underrepresented minority students exclude Asian students, but include all other racial/ethnic minority students.

Table 2: Interrupted time series results for professional schools' tuition and fee prices.

Business schools	Public				Private nonprofit	
	In-state		Out-of-state		Tuition/fees	
Variable	(1)	(2)	(1)	(2)	(1)	(2)
Years since start of panel	0.073***	0.084***	0.042***	0.053***	0.032***	0.027***
(pre-treatment trajectory)	(0.006)	(0.013)	(0.005)	(0.010)	(0.004)	(0.008)
Post-2006 dummy	-0.004	-0.045*	0.003	-0.028	0.016	0.008
(change in level--immediate treatment effect)	(0.019)	(0.027)	(0.016)	(0.022)	(0.013)	(0.017)
Years*post-2006 dummy	-0.030***	-0.044***	-0.011**	-0.022**	-0.008*	0.000
(change in slope--treatment effect over time)	(0.007)	(0.013)	(0.006)	(0.011)	(0.004)	(0.008)
Includes control variables?		X		X		X
Number of programs	273	204	272	203	133	93
Adjusted R-squared (overall)	0.106	0.072	0.076	0.013	0.032	0.010
Medical schools	Public				Private nonprofit	
	In-state		Out-of-state		Tuition/fees	
Variable	(1)	(2)	(1)	(2)	(1)	(2)
Years since start of panel	0.071***	0.072***	0.050***	0.042***	0.022***	0.017***
(pre-treatment trajectory)	(0.004)	(0.007)	(0.005)	(0.008)	(0.004)	(0.004)
Post-2006 dummy	0.000	0.003	-0.016	-0.019	-0.006	0.006
(change in level--immediate treatment effect)	(0.014)	(0.015)	(0.017)	(0.016)	(0.012)	(0.009)
Years*post-2006 dummy	-0.035***	-0.039***	-0.025***	-0.021***	-0.001	0.003
(change in slope--treatment effect over time)	(0.004)	(0.007)	(0.006)	(0.008)	(0.004)	(0.004)
Includes control variables?		X		X		X
Number of programs	99	71	99	71	52	44
Adjusted R-squared (overall)	0.291	0.114	0.156	0.189	0.169	0.094

Sources: See Table 1.

Notes:

(1) * represents p<.10, ** represents p<.05, and *** represents p<.01.

(2) All financial variables are logged and inflation-adjusted into 2016 dollars using the Consumer Price Index.

(3) Regressions have a one-year lag between control variables and outcomes metrics and also include institutional fixed effects.

Table 3: Interrupted time series results for professional schools' living allowances and debt burdens.

Business schools	Living allowances				Debt burdens			
	Public		Private nonprofit		Public		Private nonprofit	
Variable	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Years since start of panel	0.020***	0.022**	0.003	0.004	0.022	0.065	0.036***	0.048
(pre-treatment trajectory)	(0.006)	(0.010)	(0.007)	(0.010)	(0.016)	(0.041)	(0.013)	(0.037)
Post-2006 dummy	0.037**	0.006	0.012	0.015	0.029	0.023	-0.033	-0.037
(change in level--immediate treatment effect)	(0.017)	(0.021)	(0.022)	(0.023)	(0.047)	(0.057)	(0.041)	(0.054)
Years*post-2006 dummy	-0.008	-0.012	0.014*	0.008	0.018	-0.033	-0.013	-0.021
(change in slope--treatment effect over time)	(0.006)	(0.010)	(0.007)	(0.011)	(0.017)	(0.041)	(0.014)	(0.038)
Includes control variables?		X		X		X		X
Number of programs	237	181	113	79	188	132	99	66
Adjusted R-squared (overall)	0.034	0.086	0.029	0.119	0.034	0.011	0.001	0.009
Medical schools	Living allowances				Debt burdens			
	Public		Private nonprofit		Public		Private nonprofit	
Variable	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Years since start of panel	0.001	0.011	-0.003	-0.014	0.026***	0.028**	0.012***	0.002
(pre-treatment trajectory)	(0.006)	(0.009)	(0.007)	(0.010)	(0.005)	(0.011)	(0.004)	(0.011)
Post-2006 dummy	0.008	0.005	0.023	0.038*	0.081***	0.070***	0.058***	0.056***
(change in level--immediate treatment effect)	(0.019)	(0.019)	(0.021)	(0.022)	(0.016)	(0.016)	(0.014)	(0.017)
Years*post-2006 dummy	0.001	-0.010	0.010	0.025**	-0.009	-0.016	-0.006	0.001
(change in slope--treatment effect over time)	(0.006)	(0.009)	(0.007)	(0.011)	(0.005)	(0.011)	(0.005)	(0.011)
Includes control variables?		X		X		X		X
Number of programs	73	69	44	43	75	69	44	42
Adjusted R-squared (overall)	0.008	0.036	0.011	0.000	0.247	0.161	0.037	0.047

Sources: See Table 1.

Notes:

(1) * represents p<.10, ** represents p<.05, and *** represents p<.01.

(2) All financial variables have are logged and inflation-adjusted into 2016 dollars using the Consumer Price Index.

(3) Regressions have a one-year lag between control variables and outcomes metrics and also include institutional fixed effects.

(4) Because of how data are reported to *U.S. News*, there is one more pre-treatment year for debt (the same year of data includes debt for 2006 graduates [pre] and tuition prices in 2006-07 [post]).

Table 4: Interrupted time series results by institutional selectivity.

Public business schools	In-state tuition		Out-of-state tuition		Living allowances		Debt of graduates	
Variable	Less selective	More selective	Less selective	More selective	Less selective	More selective	Less selective	More selective
Years since start of panel	0.069***	0.081***	0.036**	0.059***	0.037**	0.016	-0.083	0.072*
(pre-treatment trajectory)	(0.017)	(0.019)	(0.017)	(0.014)	(0.017)	(0.012)	(0.099)	(0.043)
Post-2006 dummy	-0.058*	-0.040	-0.045	-0.018	-0.012	0.020	0.261**	-0.090
(change in level--immediate treatment effect)	(0.035)	(0.040)	(0.035)	(0.029)	(0.036)	(0.024)	(0.123)	(0.062)
Years*post-2006 dummy	-0.040**	-0.035*	-0.013	-0.024*	-0.022	-0.009	0.104	-0.032
(change in slope--treatment effect over time)	(0.017)	(0.020)	(0.017)	(0.014)	(0.017)	(0.012)	(0.098)	(0.043)
Number of programs	139	65	138	65	116	65	79	53
Adjusted R-squared (overall)	0.108	0.030	0.045	0.032	0.067	0.092	0.031	0.026

Private nonprofit business schools	Tuition and fees		Living allowances		Debt of graduates	
Variable	Less selective	More selective	Less selective	More selective	Less selective	More selective
Years since start of panel	0.037***	0.024**	-0.010	0.011	-0.006	0.032
(pre-treatment trajectory)	(0.013)	(0.009)	(0.021)	(0.011)	(0.080)	(0.043)
Post-2006 dummy	0.020	0.000	0.028	0.013	0.022	-0.016
(change in level--immediate treatment effect)	(0.030)	(0.021)	(0.047)	(0.025)	(0.102)	(0.066)
Years*post-2006 dummy	-0.008	0.002	0.029	-0.001	0.023	-0.003
(change in slope--treatment effect over time)	(0.014)	(0.010)	(0.021)	(0.012)	(0.081)	(0.044)
Number of programs	53	40	39	40	33	33
Adjusted R-squared (overall)	0.028	0.105	0.253	0.108	0.001	0.068

Sources: See Table 1.

Notes:

(1) * represents p<.10, ** represents p<.05, and *** represents p<.01.

(2) All financial variables are logged and inflation-adjusted into 2016 dollars using the Consumer Price Index.

(3) More selective programs had a median GMAT above 575 in 2004-05 or 2005-06 (the median value that year). Schools that were not open in 2005 or did not report data that year are classified as less selective.

(4) All models include all three sets of control variables (enrollment/demographics, admissions/selectivity, and institutional financial controls) and institutional fixed effects. Results with fewer sets of controls are available upon request.

Table 5: Difference-in-differences results for tuition prices at professional schools versus undergraduate institutions.

Business schools	Public				Private nonprofit	
	In-state		Out-of-state		Tuition/fees	
Variable	(1)	(2)	(1)	(2)	(1)	(2)
Business school vs. undergraduate institution	0.297***	0.301***	0.235***	0.242***	0.219***	0.354***
	(0.037)	(0.037)	(0.033)	(0.033)	(0.041)	(0.036)
Number of years post-2006	0.053***	0.048***	0.037***	0.032***	0.038***	0.037***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Business school*number of years post-2006	0.013***	0.012***	0.009***	0.011***	-0.002*	-0.003***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.010)	(0.001)
Includes control variables?		X		X		X
Number of institutions	560	521	559	520	1,074	1,026
Adjusted R-squared (overall)	0.277	0.253	0.214	0.191	0.104	0.128
Medical schools	Public				Private nonprofit	
	In-state		Out-of-state		Tuition/fees	
Variable	(1)	(2)	(1)	(2)	(1)	(2)
Medical school vs. undergraduate institution	1.307***	1.438***	1.087***	1.112***	0.714***	0.763***
	(0.035)	(0.036)	(0.035)	(0.038)	(0.060)	(0.054)
Number of years post-2006	0.056***	0.051***	0.039***	0.034***	0.038***	0.037***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Medical school*number of years post-2006	0.003***	0.003***	0.001	-0.004***	-0.008***	-0.011***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Includes control variables?		X		X		X
Number of institutions	576	543	576	543	1,082	1,038
Adjusted R-squared (overall)	0.710	0.674	0.613	0.600	0.161	0.181

Sources: See Table 1.

Notes:

(1) * represents p<.10, ** represents p<.05, and *** represents p<.01.

(2) All financial variables are logged and inflation-adjusted into 2016 dollars using the Consumer Price Index.

(3) Regressions have a one-year lag between control variables and outcomes metrics and also include year fixed effects.

Table 6: Difference-in-differences results for living allowances and debt burdens at professional schools versus undergraduate institutions.

Business schools	Living allowances				Debt burdens			
	Public		Private nonprofit		Public		Private nonprofit	
Variable	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Business school vs. undergraduate institution	0.080***	0.103***	0.429***	0.407***	0.161***	0.293***	0.705***	0.848***
	(0.027)	(0.028)	(0.030)	(0.032)	(0.044)	(0.042)	(0.034)	(0.033)
Number of years post-2006	0.020***	0.015***	0.019***	0.014***	0.026***	0.026***	0.033***	0.031***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.003)	(0.002)	(0.002)
Business school*number of years post-2006	0.003**	0.003**	0.002	0.003	0.012***	0.005*	-0.012***	-0.016***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)	(0.002)
Includes control variables?		X		X		X		X
Number of institutions	501	471	1,012	973	479	437	1,039	984
Adjusted R-squared (overall)	0.103	0.131	0.179	0.257	0.205	0.260	0.355	0.443
Medical schools	Living allowances				Debt burdens			
	Public		Private nonprofit		Public		Private nonprofit	
Variable	(1)	(2)	(1)	(2)	(1)	(2)	(1)	(2)
Medical school vs. undergraduate institution	0.247***	0.164***	0.407***	0.222***	2.015***	2.088***	2.058***	2.140***
	(0.024)	(0.027)	(0.044)	(0.044)	(0.031)	(0.029)	(0.040)	(0.037)
Number of years post-2006	0.018***	0.014***	0.020***	0.015***	0.030***	0.030***	0.022***	0.025***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.033)	(0.002)
Medical school*number of years post-2006	-0.011***	-0.010***	-0.008***	-0.007***	-0.007***	-0.012***	-0.017***	-0.022***
	(0.001)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.002)	(0.001)
Includes control variables?		X		X		X		X
Number of institutions	542	535	1,035	1,008	554	541	1,073	1,037
Adjusted R-squared (overall)	0.136	0.172	0.087	0.176	0.874	0.888	0.700	0.752

Sources: See Table 1.

Notes:

(1) * represents p<.10, ** represents p<.05, and *** represents p<.01.

(2) All financial variables are logged and inflation-adjusted into 2016 dollars using the Consumer Price Index.

(3) Regressions have a one-year lag between control variables and outcomes metrics and also include year fixed effects.

Appendix 1: Interrupted time series falsification tests using 2005 as adoption of Grad PLUS (instead of 2006).

Business schools	Public				Private nonprofit		
Variable	In-state tuition	Out-of-state tuition	Living allowance	Debt of graduates	Tuition and fees	Living allowance	Debt of graduates
Years since start of panel	0.109**	0.079***	0.029*	-0.012	0.030***	0.001	-0.023
(pre-treatment trajectory)	(0.020)	(0.016)	(0.015)	(0.078)	(0.012)	(0.016)	(0.069)
Post-2005 dummy	-0.023	-0.037	0.005	0.109	-0.001	0.006	0.056
(change in level--immediate treatment effect)	(0.029)	(0.024)	(0.022)	(0.066)	(0.017)	(0.24)	(0.060)
Years*post-2005 dummy	-0.070***	-0.048***	-0.018	0.043	-0.003	0.011	0.047
(change in slope--treatment effect over time)	(0.020)	(0.016)	(0.015)	(0.078)	(0.012)	(0.016)	(0.069)
Number of programs	204	203	181	132	93	79	66
Adjusted R-squared (overall)	0.067	0.011	0.084	0.011	0.010	0.119	0.012
Medical schools	Public				Private nonprofit		
Variable	In-state tuition	Out-of-state tuition	Living allowance	Debt of graduates	Tuition and fees	Living allowance	Debt of graduates
Years since start of panel	0.079***	0.054***	0.023	0.018	0.025***	-0.021	0.022
(pre-treatment trajectory)	(0.011)	(0.012)	(0.014)	(0.022)	(0.006)	(0.016)	(0.020)
Post-2005 dummy	0.030*	-0.011	-0.005	0.067***	-0.011	0.010	0.017
(change in level--immediate treatment effect)	(0.016)	(0.017)	(0.020)	(0.019)	(0.010)	(0.025)	(0.018)
Years*post-2005 dummy	-0.046***	-0.034***	-0.020	-0.003	-0.004	0.034**	-0.016
(change in slope--treatment effect over time)	(0.011)	(0.012)	(0.014)	(0.022)	(0.006)	(0.016)	(0.020)
Number of programs	71	71	69	69	44	43	42
Adjusted R-squared (overall)	0.116	0.190	0.035	0.160	0.101	0.000	0.052

Sources: See Table 1.

Notes:

(1) * represents p<.10, ** represents p<.05, and *** represents p<.01.

(2) All financial variables are logged and inflation-adjusted into 2016 dollars using the Consumer Price Index.

(3) Because of how data are reported to *U.S. News*, there is one more pre-treatment year for debt (the same year of data includes debt for 2005 graduates [pre] and tuition prices in 2005-06 [post in the falsification test]).

(4) All models include all three sets of control variables (enrollment/demographics, admissions/selectivity, and institutional financial controls) and institutional fixed effects. Results with fewer sets of controls are available upon request.

Appendix 2: Difference-in-differences falsification tests using 2005 as adoption of Grad PLUS (instead of 2006).

Business schools	Public				Private nonprofit		
Variable	In-state tuition	Out-of-state tuition	Living allowance	Debt of graduates	Tuition and fees	Living allowance	Debt of graduates
Business school vs. undergraduate institution	0.301***	0.235***	0.102***	0.288***	0.256***	0.407***	0.850***
	(0.037)	(0.033)	(0.028)	(0.043)	(0.036)	(0.32)	(0.033)
Number of years post-2005	0.044***	0.029***	0.014***	0.024***	0.034***	0.012***	0.027***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.001)	(0.002)
Business school*number of years post-2005	0.012***	0.010***	0.003**	0.005*	-0.003***	0.002	-0.014***
	(0.001)	(0.001)	(0.001)	(0.003)	(0.001)	(0.002)	(0.002)
Number of institutions	521	520	471	437	1,026	973	984
Adjusted R-squared (overall)	0.252	0.191	0.131	0.260	0.128	0.257	0.443
Medical schools	Public				Private nonprofit		
Variable	In-state tuition	Out-of-state tuition	Living allowance	Debt of graduates	Tuition and fees	Living allowance	Debt of graduates
Medical school vs. undergraduate institution	1.437***	1.113***	0.170***	2.090***	0.771***	0.227***	2.147***
	(0.036)	(0.038)	(0.027)	(0.029)	(0.054)	(0.044)	(0.037)
Number of years post-2005	0.047***	0.032***	0.013***	0.026***	0.034***	0.013***	0.021***
	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)	(0.002)
Medical school*number of years post-2005	0.001	-0.003**	-0.009***	-0.010***	-0.010***	-0.007***	-0.019***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)
Number of institutions	543	543	535	541	1,038	1,008	1,037
Adjusted R-squared (overall)	0.673	0.600	0.173	0.888	0.181	0.176	0.752

Sources: See Table 1.

Notes:

(1) * represents p<.10, ** represents p<.05, and *** represents p<.01.

(2) All financial variables are logged and inflation-adjusted into 2016 dollars using the Consumer Price Index.

(3) Because of how data are reported to *U.S. News*, there is one more pre-treatment year for debt (the same year of data includes debt for 2005 graduates [pre] and tuition prices in 2005-06 [post in the falsification test]).

(4) All models include two sets of control variables (enrollment/demographics and institutional financial controls) and institutional fixed effects. Results without controls are available upon request.