For-Profit Higher Education Responsiveness to Price Shocks: An Investigation of Changes in Post 9-11 GI Bill Allowed Maximum Tuitions *

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March 31, 2018

Abstract

One hypothesis regarding financial aid is that increased generosity in aid programs gives incentives for universities, particularly for-profit colleges, to increase tuition rates. However, this causal effect is difficult to estimate because identification requires exogenous shocks to a program's generosity. The Post 9/11 GI Bill represented one of the largest expansions of college benefits for veterans and their dependents. In the first version of the bill, the Department of Veterans Affairs offered full funding for public colleges and set the maximum tuition reimbursement for private institutions on a state level. However, in 2010, the VA set the maximum tuition benefit for private schools to one nationwide amount, while continuing to fully fund attendance at public colleges. In this study we use a difference in differences estimator and find that in states where the benefit increased, for-profit universities increased their sticker price tuition by $461. We also find that for-profit institutions in states where the VA cut benefits lowered tuition significantly, exhibiting symmetric behavior with pass through rates of around 5.6 percent. However, for-profit institutions did not increase admissions or enrollments because of the policy change.

*The authors would like to thank Meredith Anderson, John V. Winters, Robert Toutkoushian, Richard Patterson, and conference participants at the Association for Public Policy and Management, the Association for Education Finance and Policy, the Society of Labor Economists, the Northeastern Economics of Education Workshop, and the Southern Economic Association for helpful comments and suggestions. The views expressed herein are those of the authors and do not reflect the position of the United States Military Academy, the Department of the Army, the Department of Defense, the RAND Corporation, or the American Institutes for Research.

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1 Introduction

The rapidly increasing cost of college and the pricing behavior of colleges (and in particular, for-profit institutions) is of concern to policymakers, college administrators, and the public. Many factors are cited as potential cost-drivers; examples include decreases in state-level aid (Webber, 2017), an increase in the focus on obtaining outside funds, an increase in the number and proportion of administrators employed (Griffith and Rask, 2016), and potential push-back about faculty salaries and teaching loads (Ehrenberg, Rizzo and Jakubson, 2007).

Policymakers have suggested ways of alleviating the effects of increasing college costs including increasing the level and availability of financial aid. However, financial aid has the potential to increase the "sticker price" or published tuition before financial aid.[1] William J. Bennett, former United States Secretary of Education, suggested that when governments increase the amount of publicly funded financial aid, universities have an incentive to increase their tuition to capture this new aid as a form of price discrimination (Bennett, 1987). While this behavior would increase tuition revenues for the university, it would not be optimal for the student and would at least partly defeat the goals of providing additional financial aid.

One public entity that distributes financial aid is the Veterans Administration (VA), via the various iterations of the GI Bill. The Post 9/11 GI Bill (PGIB) is the most recent iteration of this policy.[2] In this study, we leverage an unanticipated change in the state maximum tuition reimbursement for private colleges under the PGIB in 2011 to a national standard maximum to measure the effect of changes in financial aid on sticker price tuition at private colleges. Before this policy change, PGIB funds used at private universities (non-profit and for-profit) were allocated based on the maximum tuition and fee cost of

[1] Many students, especially at schools with higher sticker prices, do not pay full price due to a combination of merit-based and need-based financial aid.

[2] The PGIB, passed in 2008 and enacted in 2009, is the latest in a series of educational benefits designed to ease service members transitions into civilian life. The PGIB is, on average, considerably more generous than the previous bill (the Montgomery GI Bill). The PGIB also includes a unique feature; those who serve for a sufficient amount of time may transfer some or all of their benefits to a spouse or child.

attendance for public post-secondary schools within a particular state. Tuition for students who attended private schools was covered up to the most expensive public program in the state. However, in 2011, Congress instituted a uniform maximum tuition rate that applied across all private institutions nationally,[3] but public institutions remained fully funded for in-state residents. This tuition maximum has increased by a modest percentage each year since a single maximum was established.[4]

This policy change creates unique exogenous variation among the states because benefits for some recipients in some states increased while benefits in others decreased. In states where the maximum tuition benefit increased, this policy change created an incentive for private colleges to increase the price of their tuition; in other states, private colleges faced different incentives as the maximum reimbursement decreased. We anticipate effects to be stronger at for-profit colleges because, in general, they have great flexibility and incentive to change tuition in response to such policy changes (Deming, Goldin and Katz, 2012; Gilpin, Saunders and Stoddard, 2015). We anticipate that the sticker price of for-profit institutions should increase in states where the maximum tuition allowed under the PGIB increased relative to states where the maximum allowable tuition decreased. We also expect the effect to be stronger for schools that enroll a large number of PGIB recipients.

For-profit colleges are of great concern to the Departments of Defense and Veteran Affairs. In the first year of the PGIB, nearly 36.5 percent of all benefits were claimed by students at for-profit universities, although such universities enrolled 23.3 percent of PGIB beneficiaries (Health, Education, Labor and Pensions Committee, 2010; Deming, Goldin and Katz, 2012). For-profit schools must follow the "90-10 rule" requiring that no more than 90 percent of their revenue come from Title IV (Department of Education) sources. However,

[3]The PGIB also includes funds for other educational expenses, including a generous stipend that varies depending on local costs of living. However, we focus on the payments to private schools for tuition and fees as the relevant policy change impacted only this portion of the PGIB

[4]See `http://www.benefits.va.gov/GIBILL/resources/benefits_resources/rate_tables.asp`

PGIB funds (as well as DoD Tuition Assistance programs) are exempted from this rule and thus do not count against the 90 percent limit(Hefling, 2016).[5] In 2014, 70 percent of for-profit schools' revenues came from Title IV sources; non-profit schools derived 30 percent of their revenues from Title IV sources. Approximately twenty percent of for-profit schools receive between 85 and 90 percent of their revenue from Title IV sources, demonstrating their reliance and thus likely responsiveness to financial aid changes (Cellini and Koedel, 2017).

Despite concerns from various federal agencies, very little is known about how for-profit (or traditional non-profit) universities respond to plausibly exogenous shocks in veterans' benefits. If these institutions enroll more veterans (even despite some tuition increases), then the Departments of Defense and Veteran Affairs will be fulfilling their goals in helping to re-train military members transitioning to civilian life and labor markets. If for-profit colleges respond to an increase in the maximum benefit by simply increasing sticker price tuition without an accompanying increase in enrollment, then the increase in tuition costs are not accompanied by any social gain[6] (assuming quality at the schools remains unchanged); the schools are simply capturing additional revenue through price discrimination.

In this study, we use this plausibly exogenous variation in changes to the PGIB benefit to examine how private colleges adjust their sticker price tuition, and whether these changes can be explained by shifts in demand (enrollments) or price discrimination. We find that in states where the maximum tuition payment from the PGIB increased, sticker price tuition

[5]This requirement stems from a VA requirement established after World War II; for-profit schools have been included in the rule explicitly since the 1992 Higher Education Act although at that point the rule was 85-15. The 90-10 ratio was established in the 1998 reauthorization of the Higher Education Act.

[6]This study focuses on the cost side of attending a for-profit college. However, the previous literature shows that the returns to for-profit education is quite low. For example, Deming et al. (2016) and Darolia et al. (2015) conduct audit studies of fictitious resumes and find that applicants with a for-profit degree do no better than those at community colleges and could actually be harmed by receiving fewer callbacks. Cellini and Turner (Forthcoming) use treasury data to find that graduates of for-profit colleges earn less than similar community college students and have no statistically significant wage premium over students that attend no college.

rates at for-profit colleges increased by $460 with a pass through rate, or the amount of aid that a college captures via price increases, of 1.03 percent compared to four profits in other states. However, we find no such effect at public or non-profit institutions. We also estimate a triple difference model using public institutions as our control group (since they were unaffected by the policy) and find that in states where the benefits increased, for-profit colleges increased their sticker prices by $437, but in states where benefits decreased, for-profit colleges lowered their tuition by $1,260. This symmetry is evidence of a Bennett Hypothesis with respect to the PGIB. Our results are more pronounced in institutions whose sticker price tuition was less than the previous state maximum amounts and in counties with a larger veteran population. We also estimate the effect that changes in the PGIB had on fall headcount enrollment and find no significant effects. This evidence suggests that for-profit colleges may have used price discrimination to retain additional PGIB tuition funds without increasing enrollment of recipients.

For traditional colleges, the evidence of manipulating prices given a change in financial aid is mixed. Long (2004) examines changes in Georgia college and universities given the introduction of the HOPE scholarship and finds that four-year institutions did increase tuition pricing after the introduction of the HOPE;[7] however Cornwell, Mustard and Sridhar (2006) find that HOPE scholarship also increased the number of students attending Georgia colleges and universities. Singell and Stone (2007) use panel data to examine variations in financial aid policies and find that public universities (whose tuition prices are generally regulated by a state board) do not respond to increases in aid; however private universities and non-resident tuition pricing do respond to these changes. Turner (2012) shows that universities decrease merit aid when students report using tax breaks for college education. Turner (2017) uses a regression kink identification and finds that colleges respond to increases

[7]Authorized in 1993, HOPE scholarship is a lottery funded scholarship in Georgia that provides students with a significant portion of in-state tuition at a state college or university. Students need to graduate with at least a 3.00 GPA from a Georgia high school to be eligible.

in Pell Grants by lowering institutional merit aid and thus capturing Pell Grant dollars. The author finds a pass through rate of 11-20 percent.

For-profit universities are a relatively new area of research in this domain. Cellini and Goldin (2014) compare for-profit colleges that are eligible for federal financial aid to those institutions that are just below the eligibility cutoff. The authors find that for-profit universities that are eligible for federal funds have higher sticker price tuition as compared to those colleges not eligible for programs like subsidized student loans or Pell Grants. Cellini (2010) finds that the number of for-profit institutions that entered in a given county increased when certain aid programs such as Pell Grants, Cal Grants, and GI Bill were also increased in California.

Despite the large numbers of beneficiaries and resources spent on the program, there is surprisingly little research done on the effects of changes in the PGIB on student behavior; this is likely due to the new and evolving nature of this benefit. However, Barr (2015) finds that the PGIB increased college enrollment of veterans by fifteen to twenty percent and increased the number of veterans enrolled at (relatively expensive) four-year institutions. On a related note, Barr (2016) shows that increased state, merit aid programs reduce military enlistments, thus showing an interesting trade-off between college enrollment and military enlistments.

This study contributes to all of these strands of the literature by being among the first papers to examine the relationship between expanded veterans' education benefits and the pricing behavior of for-profit colleges, and by investigating symmetric responses to shifts in financial aid maximums. The structure of the paper is as follows: Section 2 introduces background information regarding the PGIB. Section 3 discusses the data. Section 4 describes the empirical strategy and models. Section 5 presents results, Section 6 conducts various robustness checks, and Section 7 concludes.

2 Background

Figure 1 presents a time line of events regarding passage of PGIB and its amendments. In January 2007, Senator Jim Webb introduced the PGIBthat was signed into law by President George W. Bush in June 2008. The PGIB went into effect in August 2009 and is one of the largest expansions of financial aid benefits within the last few decades. The PGIB automatically enrolled all service members that meet enlistment standards, including a modest amount of service.[8] Under PGIB, tuition is paid directly to the institutions; in the first few years the maximum amount covered differed depending on the maximum in-state tuition and fees at any public university in the state. This policy change introduced wide variation in the direction and magnitude of the change in the maximum tuition benefit. For example, before the policy change, the maximum payment in Delaware was as low as $665, while in Colorado the maximum allowable tuition was set at $43,035.[9] Then in 2010, Congress revised the PGIB (effective August 2011) which changed the state level maximum tuition for private colleges to a national maximum tuition rate of $17,500 while leaving aid for public institutions unchanged.[10]

Figure 2 displays whether a given state saw an increase or decrease in maximum tuition for private colleges under PGIB given the policy change. Thirteen states saw a decrease in the the maximum, while the Department of Veterans Affairs increased the maximum reimbursement rates in 37 other states. Also, there is no distinguishable pattern of whether a state's benefits were increased given the state's geography, political leaning, or culture. Figure 3 presents the by-state trends in the maximum. Before the 2011 policy change, we

[8]The amount of tuition reimbursement is determined by the length of service. For example, if an individual served more than 90 days and less than six months, then the she is eligible for 40 percent of the maximum benefit. To be eligible for 100 percent, the service member needs to serve for 36 months.

[9]See `http://www.benefits.va.gov/GIBILL/resources/benefits_resources/rate_tables.asp` for a list of maximum tuition rates by year.

[10]There were a few states that had grandfathered maximum tuition rates through 2013 for service members already enrolled prior to the change. These states are Arizona, Michigan, New Hampshire, New York, Pennsylvania, South Carolina, and Texas.

might expect that for-profit institutions had an incentive to locate, increase enrollment, and/or increase tuition costs in high-maximum tuition states, and alternatively to move out of, decrease enrollment, and/or decrease tuition costs in low-maximum tuition states.

The underlying theory of behavior of the for-profit institutions is relatively straightforward: in an attempt to maximize profits, institutions will attempt to capture increases in subsidization via financial aid changes through increases in tuition prices. This pricing behavior is possible because veterans are unable to retain any unspent portions of the benefit, and have no financial incentive to seek a school that has lower sticker prices as long as those sticker prices are covered by PGIB. Also, for-profit schools must recruit new students to succeed as a business.[11]

The incentives surrounding enrollment and the net effect on enrollment are less clear theoretically. Schools may face capacity constraints or may be able to garner higher overall profit through constraining enrollment before any capacity constraints. For example, Gilpin, Saunders and Stoddard (2015) and Gilpin and Stoddard (2017) argue that for-profit colleges tend to serve underrepresented populations, are more responsive to market needs, and are more flexible to working adults' schedules. Even if there is a desire to increase enrollment in the face of increased benefits, a program such as PGIB may instead change the distribution of veteran and non-veteran students.

3 Data

Our primary source of data is the Integrated Postsecondary Education Data System (IPEDS). IPEDS contains data collected from the universe of higher education institutions that partic-

[11] Steinerman, Volshteyn and McGarrett (2011) in a 2009 survey of for-profit schools found that on average 11 percent of revenue was spent on advertising, and the average student costs around $4,000 to recruit, which can be quickly recaptured in tuition. Veterans may be systematically pursued because of their financial aid availabilities and there has been at least some success: veterans are about 5 times as likely to be enrolled in for-profit schools than non-profit schools (Steele, Buryk and McGovern, 2018).

ipate in federally funded assistance programs (Title IV), e.g. Pell Grants, subsidized loans, and, relevant to this paper, PGIB. Institutions must report several statistics annually as part of their qualification for federal funds. We combine these data with the Area Health Resource Files to get county-level demographic and socioeconomic data, as well as data from the American Community Survey to estimate county-level fractions of students that are veterans, as discussed below.

We use IPEDS data from 2003 to 2013. We have adjusted all variables for inflation to 2014 dollars. These data span before and after the 2011 changes in PGIB benefits. Table 1 displays summary statistics of dependent variables and exogenous controls. The columns of Table 1 compare non-profit less than four-year institutions, non-profit four-year institutions, for-profit less than four-year institutions, and for-profit four-year institutions. These summary statistics show that there is a significant degree of heterogeneity within both the non-profit and for-profit sectors. For-profit institutions tend to be more expensive, enroll fewer students, and be located in more urban counties.

Figure 4 shows total enrollment across all institutions within a category. For readability, given how large the four-year non-profit sector is, and given it is not the focus of the paper, we omit it from Figure 4.[12] Enrollment in for-profit four-year schools peaked in 2009, and decreased between 2009 and 2013. Two-year and less than two-year for-profit schools saw similar declines since 2009, as has non-profit two-year schools. Meanwhile, non-profit less than two-year schools has seen relatively stable total enrollment from 2003 to 2013, while non-profit four-year schools (not shown) has had steadily increasing total enrollment across this period.

[12]Calculations from Table 1's report of number of institutions and average enrollment shows that non-profit four-year degrees account for approximately half of all the students in the overall data. In certain years, our data included enrollment ranges rather than counts. We imputed the enrollment counts for these years. In the years for which we have the counts of enrollees, we also have the ranges. We use these data to estimate the average number of students within each range, and assign this mid-point to a school in any year in which we have the range but not the exact counts.

Figure 5 shows the average tuition, by school-type. Average tuition rates at non-profit schools trend upwards across all years covered by our data, while average tuition rates at for-profit schools increased slightly leading up to 2009, and then trended downwards somewhat thereafter, largely mirroring the trends in total enrollment shown in Figure 4.

Figure 6 shows the average tuition, by school-type. The first vertical dotted line is the introduction of PGIB. The second is the change from state-level variation in maximum benefits to national. Non-profit institutions show steady increases in sticker price tuition across these periods, regardless if they are in a decreasing or increasing tuition benefit state. On the other hand, for-profits have been experiencing decreases since the Great Recession. However, for-profits in states that saw negative changes to max tuition kept on decreasing, while for-profits in states that saw positive changes leveled out somewhat. Overall, the trends between the two types of schools were steady for both non-profits and for-profits prior to the policy change.

Figure 7 shows the average tuition charged by for-profits schools. The schools are grouped both by the direction of change due to the 2011 policy and by the fraction of the students in the county of the institution that are veterans.[13] For the institutions in counties with few veteran students, the pattern is generally similar to that found in Figure 5. For the counties with more veterans of student age, tuition rates were similar and increases were substantial prior to the PGIB. At these institutions, tuition dropped sharply after the Great Recession. But after tracking closely prior to the passage of the PGIB, the patterns diverged, with the schools in high-benefit states ("negative change") charging higher tuition than those in the low-benefit states ("positive change"), and then with the revision and collapse to national level, the two types of counties reconverge as there is no longer any advantage to being in a low or high public tuition states. These results are interesting because if we

[13] We estimated the fraction of students who are veterans using the ACS for the three year span of 2009-2011, before the reform of interest. We calculate the fraction of college students in a county that are veterans from the ACS, and divide counties into above-median counties versus below-median counties.

believe that institutions are responding to changes in the PGIB, then institutions located in counties with large number of veterans of student age might be expected to see response to the policy change. Indeed, by 2013, tuition charges appear somewhat higher in states that saw an increase in the maximum tuition allowed.

4 Econometric Models

We base our identification on the plausibly exogenous changes in maximum reimbursement rates, from the maximum state-level to the single federal level. This policy change allows for a difference-in-difference estimator, where the first difference is across time (before and after the maximum reimbursement changes) and the second difference is across states that have either a positive or negative change in the maximum reimbursement rate as all states had to conform to the initial $17,500 cap. Thus we estimate the following equation:

$$Y_{jst} = \beta_0 + \beta_1 Positive_{st} \times Post2011_t + \gamma_t + \alpha_j + X_{jst} + \epsilon_{jst} \tag{1}$$

where Y_{jst} is the outcome ("sticker price" tuition rate in both levels and logs, as well as enrollment rates) for institution j in state s in year t. $Positive_{st}$ is an indicator for the institution being in a state s that experienced a positive increase in the PGIB maximum tuition benefit in going from the state level to the collapsed federal level. $Post2011_t$ is an indicator for whether the rate was set after the policy change took effect in 2011. We include year fixed effects (γ_t), institution fixed effects (α_j), and X_{jst}; a vector that includes various exogenous controls such as whether the institution is degree granting and several county-level demographic time-varying variables, such as the population, the demographic make-up, the unemployment rate, and income levels. β_1 is the coefficient of interest, since it represents the change in tuition rates in states with an increase in benefit after the policy change. In the difference in differences model, we compare schools to their peers within their respective

sectors (i.e. public, for-profit, or private non-profit). We cluster our standard errors at the institution level since the policy change affects private and for-profit institutions within a state while not changing any incentives for public institutions. Clustering at the institutional level also allows us to control for autocorrelation between observations over multiple years.

The 2010 re-authorization of the PGIB is unique because it not only created exogenous variation in the direction of the maximum benefits, but also in the magnitudes of the change. Since the VA set the maximum benefit at $17,500, some veterans living in a particular state saw drastic changes to their benefits, while veterans in other states experienced only modest changes. To calculate the magnitude in the PGIB change, we use both the initial state maximum in 2008, which we argue is unanticipated by for-profit colleges (as it is a policy parameter of the new PGIB) as well as the change in maximum reimbursement rates from 2010 to after (the collapse to the national level shown in Figure 2). This additional variation allows us to estimate a difference in differences dosage style estimator:

$$Y_{jst} = \beta_0 + \beta_1 \Delta Aid_s \times Post2011_t + \gamma_t + \alpha_j + X_{jst} + \epsilon_{jst} \tag{2}$$

where ΔAid is the change in the generosity in the PGIB in a given state, s. The notation for the fixed effects and the exogenous controls are the same as Equation 1. Equation 2 also allows us to estimate the "pass-through" rate for the policy change since it represents the fraction of the benefit change that is captured by the university.

We further extend our analysis by estimating a triple difference model with public institutions as our control group. Since veterans using the PGIB benefits at a public institution were not affected by the policy change, we can assume that public institutions did not change their sticker price tuition rates in response to the policy. A true "Bennett Hypothesis" effect would imply that sticker price tuition follows the direction of financial aid. To test whether for-profit institutions responded in a symmetric fashion to fluctuations in veteran

benefits, we estimate a triple difference model with public institutions as our control group. This triple difference regression essentially estimates the treatment effect that is present in Figure 6 where for-profit institutions and public institutions in states where benefits are cut or boosted are on parallel trends before the policy change. However, after the policy change, there appears to be divergence in the for-profit sector depending on the direction of the PGIB cut. To isolate this change in tuition pricing in the for-profit sector compared to the public sector, we estimate the following econometric model:

$$Y_{jst} = \beta_0 + \beta_1(\textit{Post 2011} \times \textit{For-Profit}) + \beta_2(\textit{Pos} \times \textit{Post 2011} \times \textit{For-Profit}) + \beta_3(\textit{Pos} \times \textit{Post}2011)\gamma_t + \alpha_j + X_{jst} + \epsilon_{jst} \tag{3}$$

where β_1 estimates the effect of being a for-profit university in a state where the amendments to the PGIB cut tuition benefits and β_2 represents the effect of the policy change on for-profit universities in states where benefits increased. These results are helpful for interpretation because the coefficient estimates show changes in the sticker price tuition rates relative to non-profit institutions.

We also extend our analysis by conducting three robustness checks. First, we may be concerned about our results if they are driven by shifting demand for education. This shift would drive up both prices and enrollment. Thus we test for a corresponding enrollment effect with our models. The next robustness checks are useful since one limitation in our data is that we cannot observe how many veterans are attending a given institution in a given year. IPEDS started to collect these data in 2014, but these data are after the policy change and we would worry about general equilibrium effects. To address this concern, we consider institutions whose sticker price tuition was already lower than the pre-policy tuition maximum versus those above to examine how the responses differ according to the incentive to respond to the policy. Institutions whose tuitions are already above what would be the

new maximum benefit would not have the same incentive to increase their tuition rates. Next, we compare institutions located in counties with higher than median populations of student aged veterans to those in counties below the median. These robustness checks help to validate our primary findings.

5 Results

5.1 The Effects of Changes of PGIB on Tuition Pricing

We begin by examining the results for for-profit schools. Table 2 shows the results for the difference-in-difference model with logged tuition as the outcome variable, for for-profit schools. Controlling for institutional fixed effects (columns 2-4) decreases the estimated responsiveness. However, after controlling for institutional fixed effects, adding year fixed effects and institutional control variables increases precision, the estimates remain similar. In Column 4, we limit the sample to the years 2009 and later. Given that our estimation strategy is a within-institution difference-in-difference, there is little additional benefit from including information from earlier years farther from the intervention; in fact, estimates including more pre-change information are less precise, perhaps due to additional noise and less relevant tuition prices. For the rest of the analysis, we limit the sample to 2009-2013.

Focusing on column (4), the preferred specification, our point estimate of 0.029 suggests that for-profit institutions in states where the maximum benefit increased raised tuition by 2.9 percentage points more than institutions in states where the maximum benefit decreased.[14] We further note that, with 2009 as the baseline year, there was a slight increase in overall tuition sticker prices in 2010 at for-profit institutions, with no meaningful difference in later years. For ease of reading, we do not report the coefficients on any of the control

[14]This uses Kennedy's (1981) transformation for a dummy variable in a log-linear model, where the percentage increase equal to $100 * (\exp(\beta - .5se(\beta)^2) - 1)$

variables.

We next estimate the same model in column 4 for non-profits and for-profits separately, both pooling all degree-granting types and then separating between four-year degree granting institutions and less than four-year (with two-year and less than two-year pooled). These results are presented in Table 3. We first notice that there is no effect among the non-profit schools. This result is expected, as these schools generally were not influenced by the policy change. For the less than four-year schools, there is a reasonably-sized estimate at 0.02, but it is not statistically significant. The overall effect for non-profits of 0.009 is both statistically insignificant and practically small. On the other hand, for the for-profit schools, we now see that the overall result of 0.029 (reproduced in column 4) is being driven by four-year institutions. Separated out, the effect for these schools is a highly-significant and large estimate of 0.045, equivalent to a 4.6 percent relative increase in sticker prices.

Table 4 presents an alternative specification with level–as opposed to logged–tuition as the outcome. Consistent with the results in Table 3, there are no statistically significant results for non-profit institutions, while for-profit institutions in states in which the maximum tuition increased raised their tuition by a positive and significant amount, relative to institutions that saw a decrease in benefits. Because of this result, the remainder of this paper focuses primarily on for-profit institutions, with the understanding that there were no effects for the non-profit counterpart institutions.[15] The overall effect is estimated at $461 for being in a positive-change state versus a negative-change state. The result is larger for four-year, for-profit institutions, at approximately $656.

Next, we estimate our second dosage style model for for-profit schools. This model represents a difference-in-differences estimation that uses the difference between the maxi-

[15]The overlap between non-profit institutions and public institutions is considerable, if imperfect. By excluding non-profit institutions, we are excluding all public institutions. Recall that we would expect public institutions to be unaffected by the policy changes because tuition pricing is controlled by a public entity.

mum tuition rates and the post-2011 national fixed rate as the dependent variable. Table 5 reports these results for for-profit institutions, both for the log-model and the level-tuition model.The level-model allows us to calculate a pass through estimate; we find that for each additional $100,000 (scaled this large for ease of presentation for the log model), there is an increase of just over $1,000 in the sticker price. This result is equivalent to a pass-through rate of just over one percent. While small, this change represents the "sticker price" charged to all students regardless of veteran status, and the majority students in these institutions on average are not veterans. While 24 percent of veterans attend for-profit colleges, veterans make up only about five percent of for-profit enrollments.

To summarize, we find that for-profit colleges located in states that experienced an increase in maximum PGIB tuition rates permitted did increase their sticker prices by an average of $460, and these results were driven by four-year for-profit institutions. Using the log of the "sticker price" tuition, we find that for-profit colleges increased their tuition by 2.9 percent. Non-profit institutions had no such response to the policy change. The pass-through rate was estimated at just over one percent; that is, on average institutions pass on one percent of the increased benefits as higher tuition. Given the increased tuition is spread out across veteran and non-veteran students, and veterans on average only represent a small fraction of the student bodies, this represents a sizable response to the increased benefits.

5.2 Triple Difference Model: For-Profit versus Non-Profit Institutions

Table 6 contains results from the triple difference estimator contrasting for-profit and non-profit institutions' responses to the change in benefits. Column (1) shows the results for tuition as the dependent variable. We find evidence of a symmetric effect, meaning that for-profit institutions reduce their tuition rates in the face of benefit cuts as well as increase

tuition when benefits become more generous. We find that for-profit universities decreased their sticker price tuition rates, on average, by $1,260.30 if the institution was located in a state where benefits decreased. In states were benefits increased, for-profit universities increased their sticker price tuition rates by $437.13 relative to public institutions in a given state. Given that the average aid *increase* was $8,601 and the average *decrease* was $19,294, we find similar pass-through rates in both directions of approximately five percent. Column (2) displays our estimates using the logged tuition rates as a dependent variable. We find that, in states were tuition benefits decreased, for-profit universities cut their tuition rates by 14.5 percent. However, in states where benefits increased, we find a small negative effect that is not statistically significant.

These results are evidence that for-profit universities are responsive in either direction to changes in the PGIB. These results are evidence of a Bennett Hypothesis Effect because a cut in benefits does seem to decrease sticker price tuition as well as an increase in benefits. Our results are important for policymakers because it shows that, at least for the PGIB, that for-profit institutions tend to price to extract surplus for veterans students while non-profit institutions do not seem to exhibit this behavior.

5.3 Effect of the 2011 PGIB Policy Change on Enrollment

Next, we estimate the same model but with the number of students enrolled as our dependent variable. These results help to distinguish whether the increase in sticker price tuition is a result of increased demand for education versus price discrimination. If the change in PGIB encouraged veterans to enroll at for-profit colleges because veterans had more resources to pay for college, then we would also expect the tuition result to be driven by a change in demand. However, if for-profit universities are price discriminating to capture the increased benefit, then colleges may not admit more students, but simply charge the current number of students an increased price. Table 7 shows the results for universities using the same

difference in differences strategy used previously. We find no statistically significant effect for non-profit schools. For the for-profit schools, we find a statistically significant decrease in enrollment of about 15 students overall. This result is driven by the four-year for-profit schools, where the decrease is around 50 students. This result is consistent with a movement along the demand curve for education at for-profit colleges.

6 Robustness Checks

6.1 Institutions Previously at PGIB Max Benefits

One limitation with our data is that we cannot see how many veterans attend a specific institution. However, we conduct two robustness tests to show evidence for our main findings. First, we look at institutions that are below or above the maximum tuition reimbursement for the particular state. Our hypothesis is that for-profit institutions that charged below the state maximum benefit before the policy change have an incentive to increase tuition to extract more surplus. In contrast, schools that were charging more than the new federal maximum would have no incentive to increase their sticker price.

We examine these regressions for for-profit institutions. The results, presented in Table 8, confirm our hypothesis. Focusing on column (1) which includes all for-profit schools, we find that institutions that were below the threshold prior to the change increased their tuition by 2.3 percent more than institutions above the state maximum. Column (2) estimates our model for four-year institutions. Similar to our main results, we find a larger increase in price among four-year colleges. We find that four-year institutions whose sticker price was below the state maximum increase their tuition by 3.6 percent.[16] These results add evidence that our findings represent true responses to the change in benefits.

[16]We also estimate the same model using the level tuition, but find no statistically significant results.

6.2 Fraction Veteran

Finally, we estimate a model in which the effect size in response to the policy change differs between counties with higher-than-average levels of veteran students and those with lower-than-average. Using the American Community Survey, we calculate what fraction of post-secondary enrolled students in a county are veterans on average in the years 2009 to 2011. These results serve as a helpful robustness check to see if institutions in higher-veteran student density counties are more likely to be response to the change in benefits. We again do this analysis only for the for-profit institutions. These results, included in Table 9, indicate that in counties with high levels of veteran students, tuition rates fall after the policy change for the four-year colleges. In counties with high veteran populations where the benefit increased, for-profit institutions increased their tuition by 10.5 percent, while counties with high veteran populations where the policy change cut benefits, for-profit schools decreased tuition by ten percent. These results show that institutions located in high veteran areas were more sensitive to changes in the policy and were more likely to have symmetric responses to changes in PGIB.

7 Conclusion

The PGIB is one of the largest sources of publicly provided financial aid. The expansion of the GI Bill benefits in the most recent authorization has the potential to provide opportunities for active duty military members, dependents, and their families. However, one concern could be whether an increased amount of financial aid dollars led institutions to increase their sticker price tuition to capture this new financial resource. If the latter is true, then the social welfare benefits of increasing PGIB benefits would be unclear. More generally, insofar as the Bennett hypothesis is true, changes in aid may represent not only subsidization of student education, but a transfer of wealth from tax-payers to the institutions not captured

by changes in student learning. Evaluating evidence for this hypothesis has important policy implications.

To identify an effect of changing financial aid benefits on a university's sticker price tuition, we use an exogenous policy change to PGIB where various state specific maximum amounts were changed to one nationwide amount. This policy change essentially caused an increase in PGIB benefits in some states while other states saw a decrease. In this study, we estimate a difference-in-difference estimator using the exogenous variation in changes to the PGIB benefit to determine if changes in tuition is price discrimination or a shift in demand for higher education.

We find that in states where the benefit increased relative to states that saw a decrease, the sticker price of tuition at for-profit schools increased $437.13, which translates to a pass through rate of around five percent. We also find that for-profit colleges located in states that experienced a decrease in the PGIB's generosity decreased their tuition rate by $1,260. However since cuts in the program were substantially greater than increases ($8,601 increase versus $19,294 cut), the pass through rate was about the same. These results are evidence that for-profit colleges tend to act with symmetric behavior: increasing tuition when aid goes up, decreasing tuition when aid is cut. We find, however, that tuition increases at these institutions were not accompanied by increases in enrollment. Thus, this paper shows evidence of increased price discrimination instead of a shift in demand.

This analysis is evidence that for-profit institutions are more likely to increase tuition rates to capture increases in PGIB benefits. Our results give evidence for "Bennett Hypothesis" style behavior at for-profit colleges. Regulatory policies such as the 90-10 rule may have helped students in general, but this policy has created incentives for for-profit universities to target veterans since DoD and VA sponsored benefits are exempt. Our findings show that for-profit universities are sensitive to changes in PGIB reimbursement rates and respond by changing the sticker price to extract surpluses from their students. Our study fits in line

with other previous literature that shows that policymakers should consider the behavior of the for-profit sector when designing financial aid programs.

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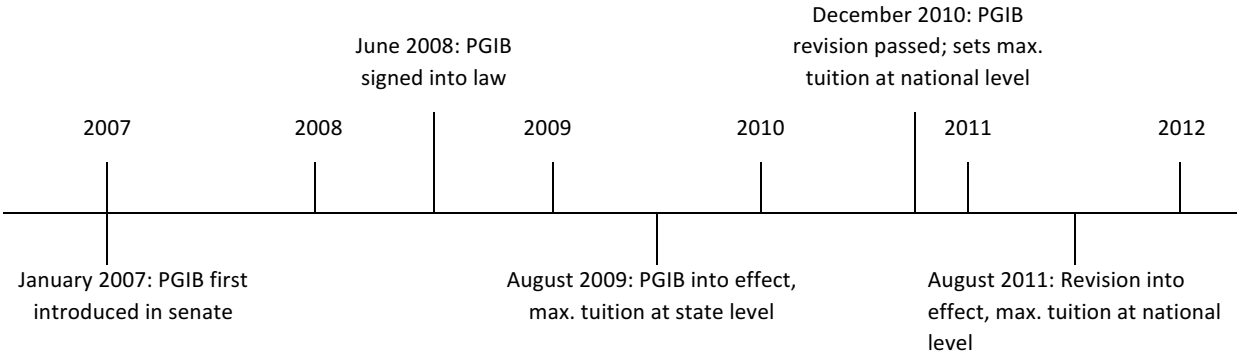
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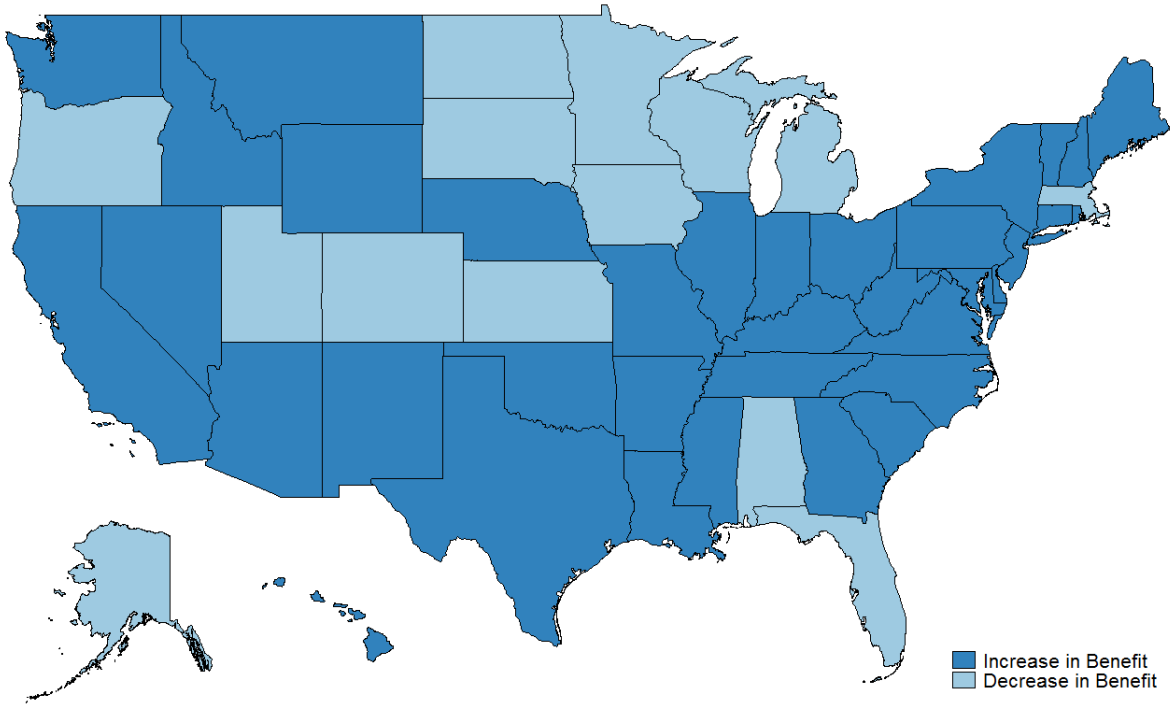
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Figure 1: Timeline of events regarding PGIB



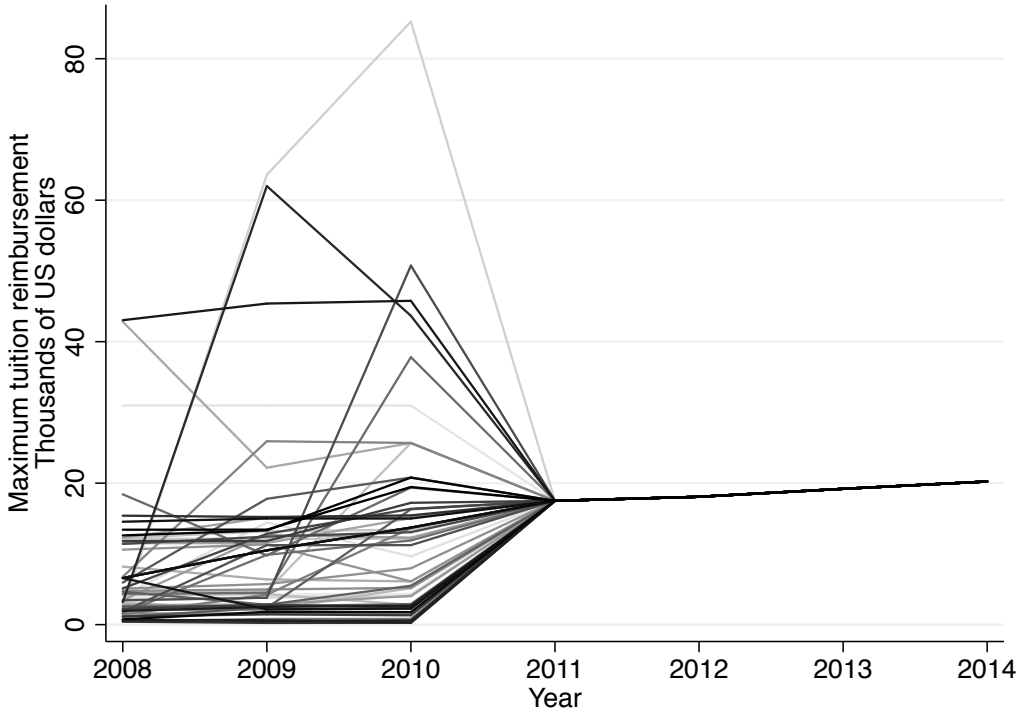
This figure shows the approximate dates of each part of the Post 9/11 GI Bill. The exogenous variation for this paper comes form the 2011 re-authorization that changed the maximum tuition benefit from a state specific amount to one national constant of $17,500.

Figure 2: Differences in benefit by state



This figure shows which states had a positive increase (dark blue) or decrease (light blue) in the maximum tuition reimbursement rate. Note that there exists variation within region and political orientation of state voting patterns.

Figure 3: Maximum PGIB tuition reimbursement rates by state



This figure shows the maximum PGIB for each state over time. The movement to the $17,500 cap shows the exogenous variation created by the 2011 re-authorization.

Figure 4: Number of enrolled students, by school type

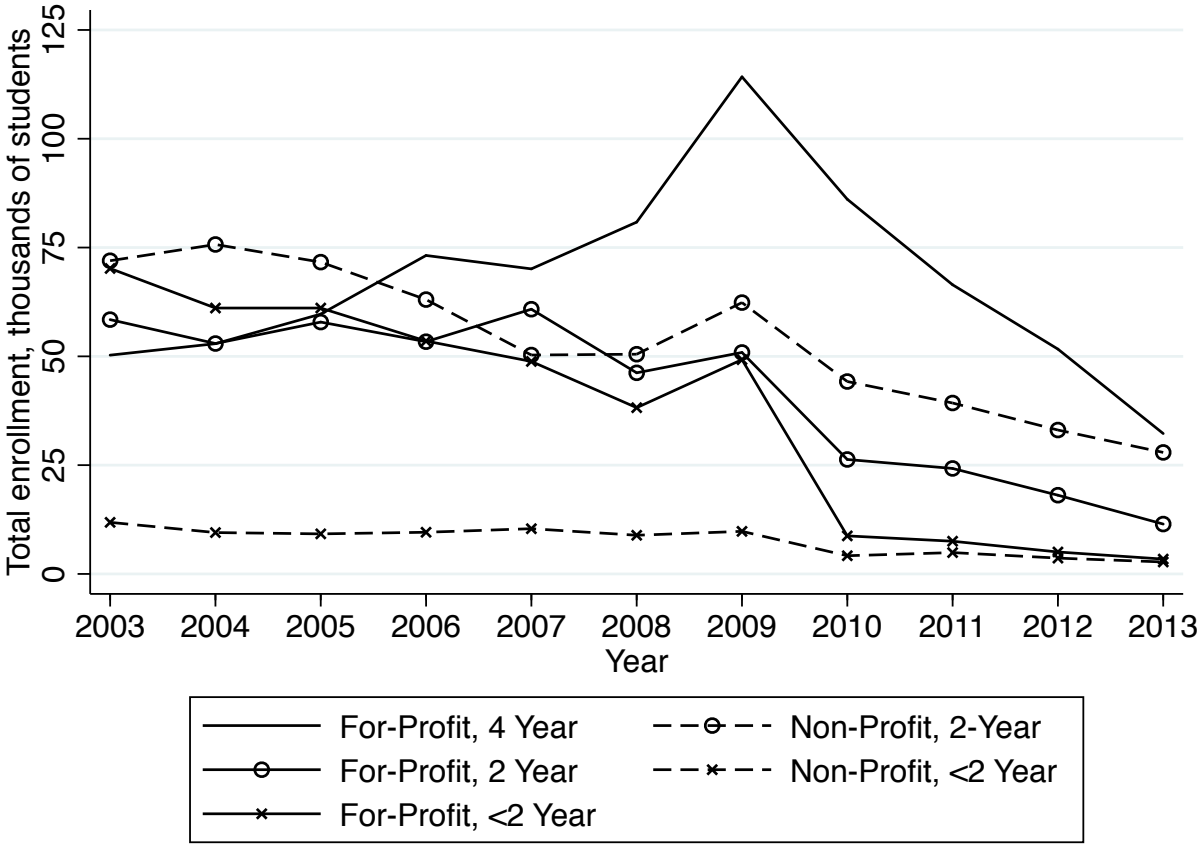


Figure 5: Average tuition, by school type

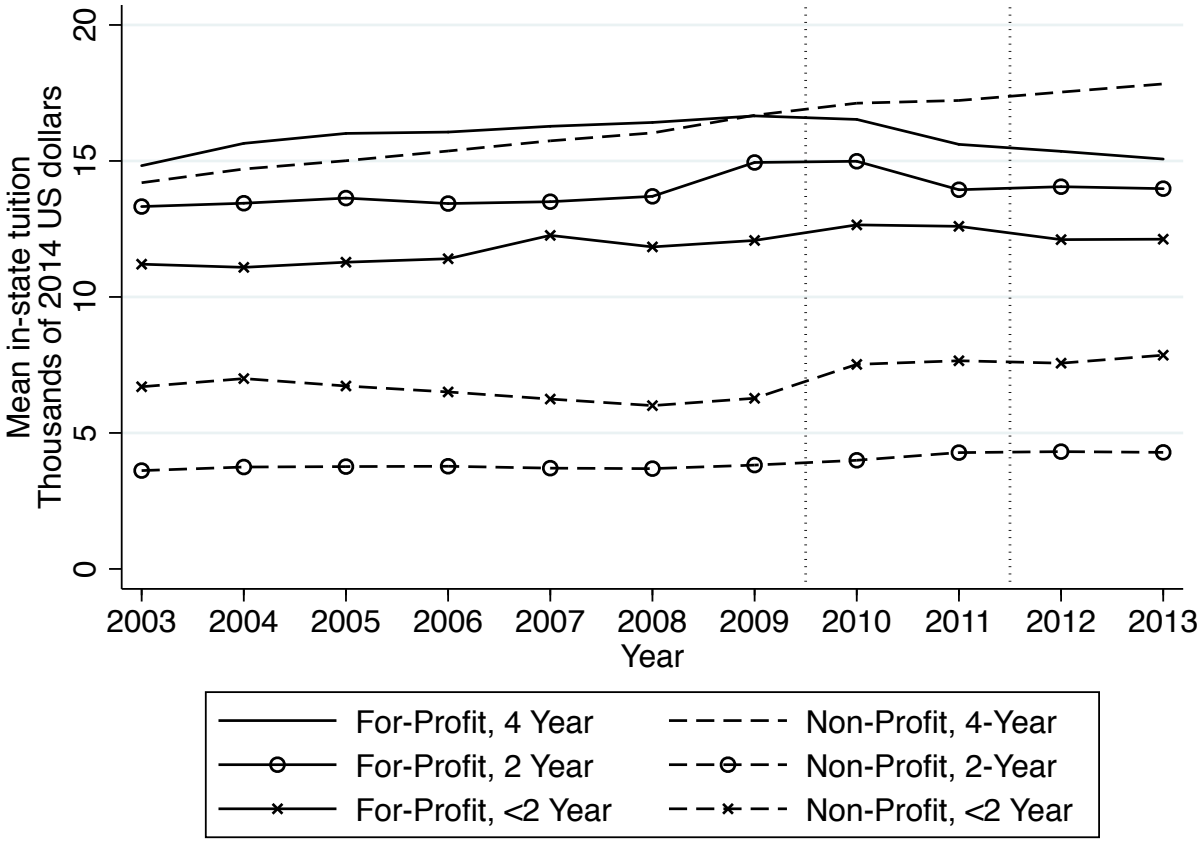


Figure 6: Average tuition, by school type and direction of maximum benefits change

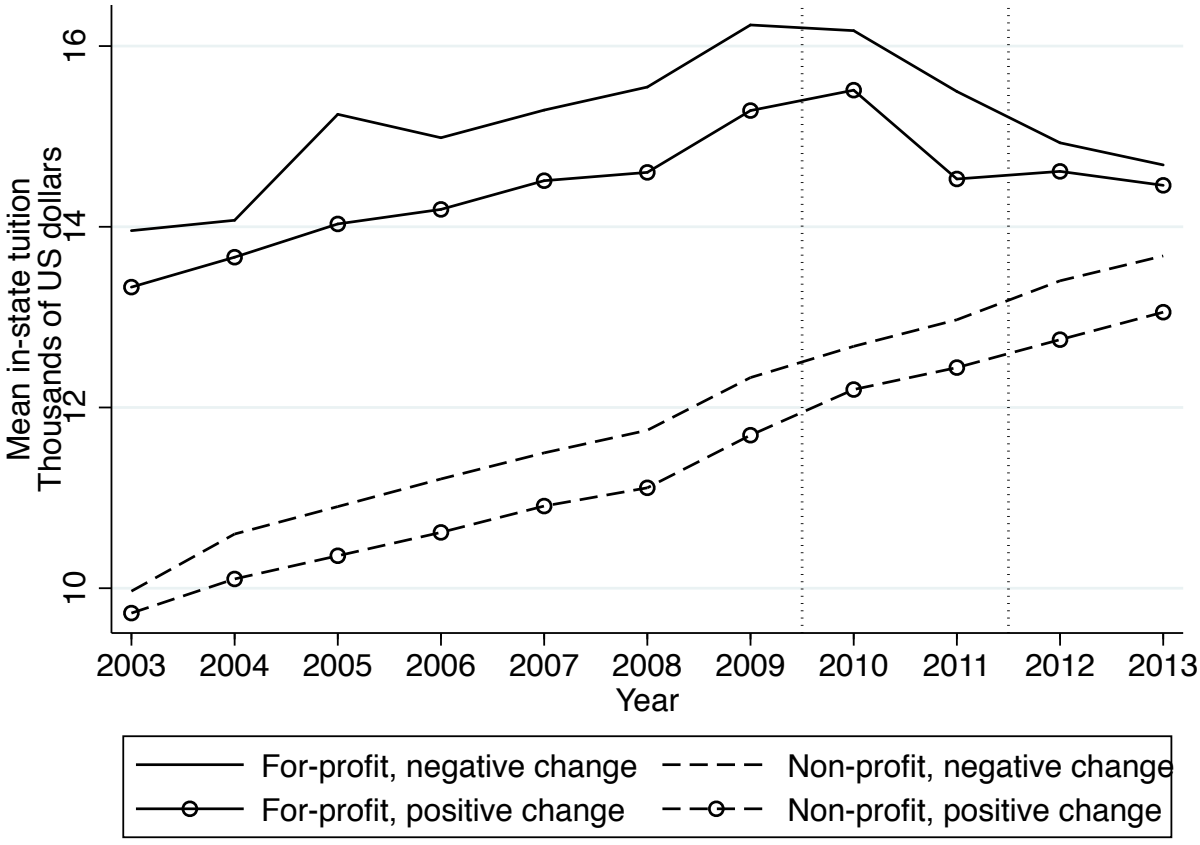
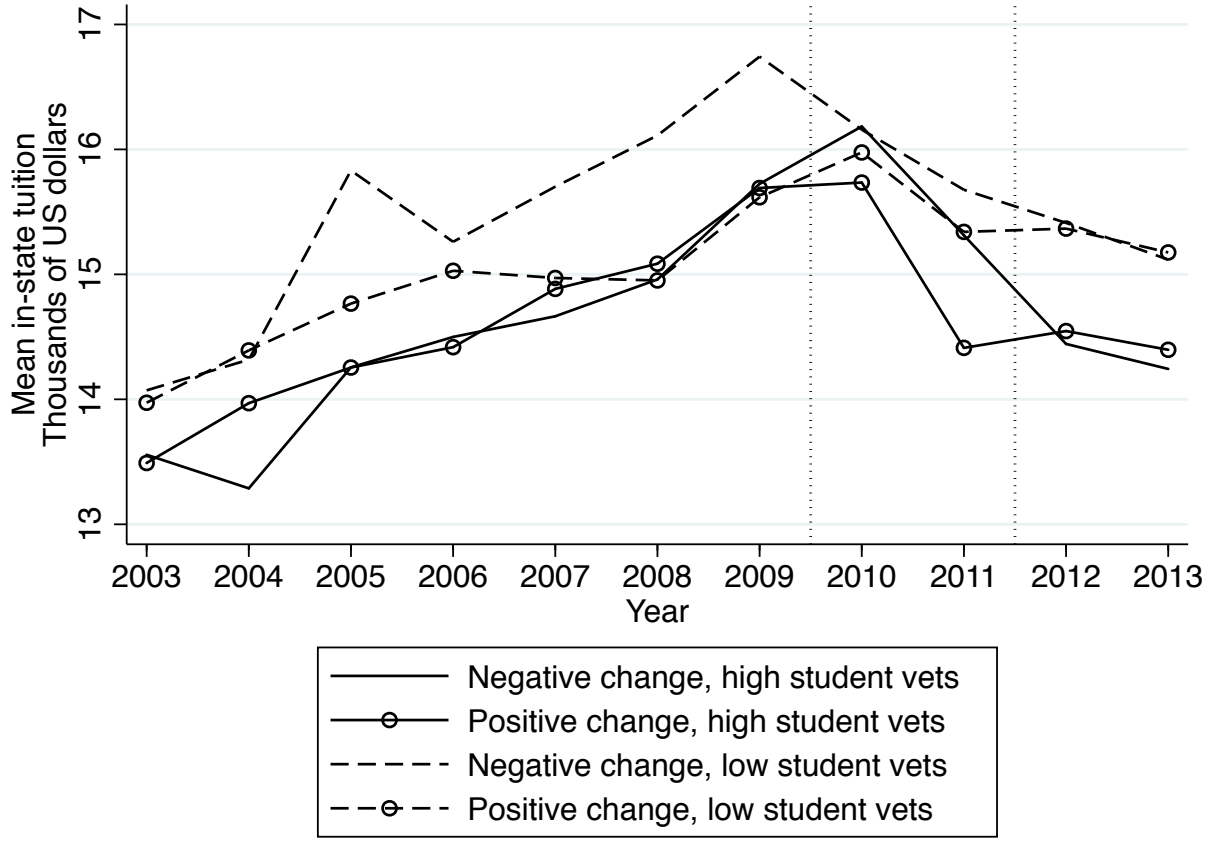


Figure 7: Average tuition, by direction of maximum benefits change and veteran density



High (low) student veterans refers to counties estimated to have above (below)-median fraction of students that are veterans.

Table 1: Data summary statistics

Variable	Non-Profit <4 Year	Non-Profit 4 Year	For-Profit < 4 Year	For-Profit 4-Year
Observations	8097	11777	13681	3556
Institutions	1826	2487	3444	900
Tuition Mean	4261	17285	14095	15776
Diff. Mean	3.108	2.840	2.100	-2.200
Diff. Std. Dev.	14.11	13.59	15.95	19.51
Diff. Min.	-74.56	-74.56	-74.56	-74.56
Diff. Max.	17.73	17.73	17.66	17.66
Tuition St. Dev.	3942	12194	4964	4562
Tuition Min.	378.9	71.14	294.7	309.3
Tuition Max.	51569	50524	73696	47480
ln(Tuition) Mean	8.060	9.447	9.497	9.623
ln(Tuition) St. Dev.	0.757	0.859	0.344	0.313
ln(Tuition) Min.	5.937	4.265	5.686	5.734
ln(Tuition) Max.	10.85	10.83	11.21	10.77
Enrollment Mean	678.2	744.2	125.0	274.8
Enrollment Std. Dev.	868.2	1085	127.8	616.2
Enrollment Min.	1	1	1	1
Enrollment Max.	5542	10241	8498	16577
Frac. Vets. Mean	0.0766	0.0693	0.0683	0.0684
Frac. Vets. Std. Dev.	0.0241	0.0233	0.0235	0.0230
Frac. Vets. Min.	0.0201	0.0201	0.0201	0.0201
Frac. Vets. Max.	0.246	0.246	0.246	0.246
County Population Mean	771426	938510	1.298e+06	1.449e+06
County Unemployment Rate Mean	84.67	81.94	85.19	80.57
County Poverty Proportion Mean	160.1	155.9	154.5	146.6
County Per Capita Income Mean	39317	42698	42218	44839

Notes: Institution data from Integrated Postsecondary Education Data System, veteran data authors' estimates from the American Community Survey 2009-2011 3 year file, county data from Area Health Resource Files. Std. Dev. is the standard deviation, min. is the minimum, max. is the maximum. Diff. is the change in the maximum benefits in going from the state-varying levels pre-2011 to the federal constant level, in thousands of dollars. Frac. Vets. is the estimated fraction of the student population in the county that are U.S. military veterans, and thus likely eligible for PGIB. Poverty proportion is the proportion of the county that are below the poverty line*1000.

Table 2: Log tuition regression results for for-profit institutions

	(1)	(2)	(3)	(4)
Pos. X Post 2011	0.035**	0.026*	0.029**	0.029**
	(0.017)	(0.014)	(0.013)	(0.012)
Pos.	-0.076***			
	(0.019)			
Post 2011	-0.011	-0.023*		
	(0.014)	(0.012)		
2007			0.026***	
			(0.007)	
2008			0.048***	
			(0.010)	
2009			0.087***	
			(0.012)	
2010			0.097***	0.034**
			(0.017)	(0.014)
2011			0.070***	-0.000
			(0.021)	(0.018)
2012			0.068**	-0.023
			(0.028)	(0.022)
2013			0.064**	-0.044*
			(0.030)	(0.023)
Institution FE		X	X	X
Control Variables			X	X
Years Included	All	All	All	2009+
Observations	11,470	11,470	8,473	5,709
R-squared	0.007	0.001	0.056	0.060

Standard errors in parentheses, clustered at the institution level., ***p-value<.01; **p-value<.05; **p-value<.1

Pos. refers to institutions that saw an increase in the maximum tuition benefit in going from the state-level to national-level maximum tuition.

Control variables, available starting in 2006: degree-granting status, county-level variables, lagged one year: race proportions, log population, unemployment rate, per-capita income, and proportion below poverty line

Table 3: Log tuition regression results by for-profit status and type of degrees

	(1)	(2)	(3)	(4)	(5)	(6)
		Non-Profit			For-Profit	
	All	4 Year	<4 Year	All	4 Year	<4 Year
Pos. X Post 2011	0.009*	-0.001	0.020*	0.029**	0.045***	0.001
	(0.005)	(0.004)	(0.010)	(0.012)	(0.010)	(0.026)
2010	0.006	0.011**	0.004	0.034**	0.026	0.030
	(0.005)	(0.005)	(0.011)	(0.014)	(0.016)	(0.023)
2011	0.027***	0.027***	0.031**	-0.000	-0.005	-0.003
	(0.006)	(0.006)	(0.013)	(0.018)	(0.021)	(0.032)
2012	0.042***	0.051***	0.036**	-0.023	-0.061**	0.032
	(0.008)	(0.007)	(0.017)	(0.022)	(0.025)	(0.039)
2013	0.064***	0.074***	0.056***	-0.044*	-0.097***	0.035
	(0.009)	(0.008)	(0.019)	(0.023)	(0.027)	(0.039)
Institution FE	X	X	X	X	X	X
Control Variables	X	X	X	X	X	X
Observations	15,637	9,921	5,716	5,709	3,172	2,537
R-squared	0.221	0.220	0.271	0.060	0.131	0.059

Standard errors in parentheses, clustered at the institution level, ***p-value<.01; **p-value<.05; **p-value<.1

Pos. refers to institutions that saw an increase in the maximum tuition benefit in going from the state-level to national-level maximum tuition.

Sample restricted to 2009 and later.

Control variables: degree-granting status, county-level variables, lagged one year: race proportions, log population, unemployment rate, per-capita income, and proportion below poverty line

Table 4: Tuition regression results by for-profit status and type of degrees

	(1)	(2)	(3)	(4)	(5)	(6)
		Non-Profit			For-Profit	
	All	4 Year	<4 Year	All	4 Year	<4 Year
Pos. X Post 2011	-87.643*	-67.216	-36.967	460.899**	655.722***	-135.773
	(46.197)	(62.026)	(51.549)	(181.171)	(168.439)	(425.407)
2010	382.602***	477.348***	157.557***	430.571	250.689	497.196
	(42.186)	(59.545)	(53.061)	(270.753)	(301.043)	(471.203)
2011	525.337***	648.696***	279.177***	-53.732	-296.313	107.633
	(53.810)	(72.215)	(77.484)	(327.768)	(403.824)	(540.228)
2012	776.022***	978.412***	381.697***	-321.524	-1.1e+03**	933.649
	(72.544)	(96.250)	(108.122)	(381.285)	(465.654)	(656.855)
2013	1011.046***	1329.080***	453.463***	-633.453	-1.7e+03***	1030.335
	(78.219)	(105.457)	(111.759)	(400.401)	(501.506)	(664.732)
Institution FE	X	X	X	X	X	X
Control Variables	X	X	X	X	X	X
Observations	15,637	9,921	5,716	5,709	3,172	2,537
R-squared	0.220	0.291	0.100	0.075	0.135	0.080

Standard errors in parentheses, clustered at the institution level, ***p-value<.01; **p-value<.05; **p-value<.1

Pos. refers to institutions that saw an increase in the maximum tuition benefit in going from the state-level to national-level maximum tuition.

Sample restricted to 2009 and later.

Control variables: degree-granting status, county-level variables, lagged one year: race proportions, log population, unemployment rate, per-capita income, and proportion below poverty line

Table 5: Tuition regression results for for-profit institutions by type of degrees, dosage model

	(1) ln(Tuition) All	(2) ln(Tuition) 4 Year	(3) ln(Tuition) <4 Year	(4) Tuition All	(5) Tuition 4 Year	(6) Tuition <4 Year
Diff. X Post 2011	0.064**	0.073***	0.026	1018.197**	1062.027**	-71.970
	(0.030)	(0.027)	(0.068)	(468.349)	(467.303)	(1045.519)
2010	0.034**	0.023	0.031	422.140	210.618	507.812
	(0.014)	(0.016)	(0.023)	(270.457)	(298.157)	(473.967)
2011	-0.000	-0.009	-0.003	-58.086	-350.976	115.368
	(0.018)	(0.021)	(0.032)	(327.545)	(399.366)	(543.194)
2012	-0.001	-0.031	0.032	28.491	-704.117	829.456
	(0.022)	(0.025)	(0.034)	(374.977)	(475.779)	(601.612)
2013	-0.021	-0.066**	0.036	-277.792	-1.3e+03**	924.742
	(0.023)	(0.027)	(0.035)	(385.935)	(503.449)	(605.592)
Institution FE	X	X	X	X	X	X
Control Variables	X	X	X	X	X	X
Observations	5,709	3,172	2,537	5,709	3,172	2,537
R-squared	0.059	0.126	0.059	0.074	0.132	0.080

Standard errors in parentheses, clustered at the institution level, ***p-value<.01; **p-value<.05; **p-value<.1

Diff. refers to the change in maximum tuition benefit in going from the state-level to national-level maximum tuition, in 100,000 USD.

Sample restricted to 2009 and later.

Control variables: degree-granting status, county-level variables, lagged one year: race proportions, log population, unemployment rate, per-capita income, and proportion below poverty line

Table 6: Triple Differences Model with Tuition and Log Tuition

	(1) Tuition	(2) Ln(Tuition)
Post 2011 × For Profit	-1260.301***	-0.145***
	(176.698)	(0.013)
Positive × Post 2011	437.128**	-0.021
× For Profit	(211.523)	(0.016)
Positive × Post 2011	12.116	0.035***
	(51.331)	(0.009)
2010	-425.991***	-0.074***
	(95.018)	(0.012)
2011	-522.984***	-0.071***
	(79.098)	(0.009)
2012	4.067	-0.012***
	(29.799)	(0.003)
Institution FE	X	X
Control Variables	X	X
Observations	21562	21562
R-squared	0.950	0.979

Standard errors in parentheses, clustered at the state level, ***p-value<.01; **p-value<.05; **p-value<.1
Pos. refers to institutions that saw an increase in the maximum tuition benefit in going from the state-level to national-level maximum tuition. Sample restricted to 2009 and later.
Control variables: degree-granting status, county-level variables, lagged one year: race proportions, log population, unemployment rate, per-capita income, and proportion below poverty line

Table 7: Enrollment regression results by for-profit status and type of degrees

	(1) All	(2) 4 Year	(3) <4 Year
Pos. X Post 2011	-15.294**	-51.523**	-2.974
	(7.251)	(24.613)	(3.712)
2010	-0.364	-30.476	8.693***
	(7.827)	(41.600)	(3.192)
2011	-7.359	-64.067	6.493
	(9.551)	(51.051)	(4.217)
2012	-5.220	-67.894	3.446
	(10.779)	(58.651)	(4.753)
2013	-9.069	-73.788	-2.232
	(11.757)	(60.886)	(6.786)
Institution FE	X	X	X
Control Variables	X	X	X
Observations	16,658	3,510	13,148
R-squared	0.008	0.022	0.013

Standard errors in parentheses, clustered at the institution level, ***p-value<.01; **p-value<.05; **p-value<.1
Pos. refers to institutions that saw an increase in the maximum tuition benefit in going from the state-level to national-level maximum tuition.
Sample restricted to 2009 and later.
Control variables: degree-granting status, county-level variables, lagged one year: race proportions, log population, unemployment rate, per-capita income, and proportion below poverty line

Table 8: Log tuition regression results by type of degrees, Interaction with Pre-Change Tuition Being Above Maximum

	(1) All	(2) 4 Year	(3) <4 Year
Pos. X Post 2011 X Above Max.	-0.023**	-0.036***	0.011
	(0.012)	(0.012)	(0.028)
Pos. X Post 2011	0.035***	0.059***	-0.001
	(0.013)	(0.012)	(0.026)
2010	0.034**	0.028*	0.027
	(0.014)	(0.016)	(0.024)
2011	-0.001	-0.004	-0.006
	(0.018)	(0.021)	(0.032)
2012	-0.026	-0.065***	0.030
	(0.022)	(0.025)	(0.039)
2013	-0.048**	-0.104***	0.034
	(0.023)	(0.027)	(0.039)
Institution FE	X	X	X
Control Variables	X	X	X
Observations	5,350	3,020	2,330
R-squared	0.059	0.137	0.060

Standard errors in parentheses, clustered at the institution level, ***p-value<.01; **p-value<.05; **p-value<.1
Pos. refers to institutions that saw an increase in the maximum tuition benefit in going from the state-level to national-level maximum tuition.
Above Max. refers to whether the intitution's 2011 tuition was above the new 2012 national-level maximum tuition.
Sample restricted to 2009 and later.
Control variables: degree-granting status, county-level variables, lagged one year: race proportions, log population, unemployment rate, per-capita income, and proportion below poverty line

Table 9: Log tuition regression results by type of degrees, interacted with veteran student density

	(1) All	(2) 4 Year	(3) <4 Year
Pos. X Post 2011	0.025*	0.053***	-0.049
	(0.015)	(0.016)	(0.031)
Post 2011 X Top 50	-0.008	0.026*	-0.100**
	(0.021)	(0.015)	(0.051)
Pos. X Post 2011 X Top 50	0.008	-0.018	0.105**
	(0.023)	(0.021)	(0.053)
2010	0.034**	0.029*	0.025
	(0.014)	(0.017)	(0.024)
2011	-0.000	-0.001	-0.010
	(0.019)	(0.022)	(0.032)
2012	-0.020	-0.069***	0.073*
	(0.023)	(0.027)	(0.041)
2013	-0.040	-0.106***	0.079*
	(0.025)	(0.029)	(0.042)
Institution FE	X	X	X
Control Variables	X	X	X
Observations	5,688	3,163	2,525
R-squared	0.060	0.132	0.065

Standard errors in parentheses, clustered at the institution level, ***p-value<.01; **p-value<.05; **p-value<.1

Pos. refers to institutions that saw an increase in the maximum tuition benefit in going from the state-level to national-level maximum tuition.

Top 50 refers to the institution being located in a county that has above-median fraction of the students that are veterans.

Sample restricted to 2009 and later.

Control variables: degree-granting status, county-level variables, lagged one year: race proportions, log population, unemployment rate, per-capita income, and proportion below poverty line