Educational Evaluation and Policy Analysis
March 2018, Vol. 40, No. 1, pp. 82–102
DOI: 10.3102/0162373717724002

Veterans Going to College: Evaluating the Impact of the Post-9/11 GI Bill on College Enrollment

Liang Zhang
New York University

In this study, I used American Community Survey (ACS) 2005–2015 data to examine the enrollment effect of the Post-9/11 GI Bill; the analysis resulted in three main findings: First, although the New GI Bill has increased overall college enrollment by about 3 percentage points on average, the effect was much larger immediately after the bill's adoption and has waned in recent years, suggesting that part of the initial enrollment burst was due to the retrospective nature of the bill. Second, the New GI Bill has had a consistent and positive impact on college enrollment among veterans ranging from 20 to 60 years old. Because older individuals on average have lower enrollment rates than younger ones, it follows that the former are relatively more responsive to financial incentives. Third, I found consistent and positive enrollment effects across veterans of all levels of existing educational attainment, with the largest estimates observed among those already holding master's degrees.

Keywords: *New GI Bill, college enrollment, veterans*

The Servicemen's Readjustment Act of 1944, commonly known as the GI Bill, is widely recognized as one of the most significant pieces of federal legislation ever enacted. It enabled World War II (WWII) veterans to increase their investment in college education (Bound & Turner, 2002). By 1956, about 2.2 million veterans had attended colleges and universities, and an additional 5.6 million had participated in training programs under the GI Bill (Olson, 1974), which significantly improved human capital stock in the United States after WWII and contributed to long-term economic growth in the years to follow. Since its inception, the GI Bill has been modified to continue providing educational benefits to military members and veterans, with the most recent significant expansion being the Post-9/11 Veterans Educational Assistance Act of 2008, better known as the Post-9/11 GI Bill or simply the New GI Bill. Compared with its immediate predecessor, the Montgomery GI Bill (MGIB), the New GI Bill offers more generous tuition benefits; it also includes stipends to cover monthly living expenses and miscellaneous educational costs (books, supplies, fees, etc.).

As of 2015, more than 2.7 million post-9/11 veterans had returned from active duty.[1] In Fiscal Year 2016, about 790,000 veterans received education benefits under the Post-9/11 GI Bill with a total payment of US$11.6 billion (U.S. Department of Veterans Affairs, 2017). Enhanced educational benefits provided by the New GI Bill would, as human capital theory (Becker, 1994) posits, increase college enrollment of veterans[2] by reducing the cost side of the cost–benefit equation, making the comparison in favor of college participation for more individuals. Financial subsidies for college education have primarily focused on lowering tuition and fees (e.g., Pell Grant and state merit-aid programs), and very few programs have specifically afforded living expenses and other educational costs to aid recipients (Goldrick-Rab, Kelchen, Harris, & Benson, 2016). Yet, living expenses constitute a significant portion of total college costs. For example, during the 2014–2015 academic year, 4-year

colleges and universities charged on average approximately US$15,000 for tuition and fees, while the average room and board cost another US$10,500. These numbers were US$8,500 and US$10,100 at public institutions, and US$26,700 and US$11,300 at private institutions, respectively (Snyder, de Brey, & Dillow, 2016). As indicated by the figures just cited, at many public institutions room and board expenses exceed tuition and fees. Given the magnitude of living expenses, one would expect a large and significant increase in the college enrollment rate if they were neutralized.

In this study, I examine the impact of the New GI Bill on veterans' college participation. More specifically, the impact under study is for the additional education benefits provided by the New GI Bill as compared with MGIB—mainly monthly housing allowances and stipends to cover miscellaneous educational costs. As an expansion to MGIB, which had been in place since 1985, the New GI Bill took effect in August 2009. Veterans could since choose the benefits between these two bills. This study is closely related to a recent study by Barr (2015) that examined the short-term effect of the New GI Bill within 2 years of its adoption on college enrollment for 23- to 28-year-old high school graduates without college degrees. Barr (2015) found that the New GI Bill increased veterans' college enrollment rate by approximately 5 percentage points, or 15% to 20% based on an average enrollment rate of 26% for veterans in the sample. In another study, Barr (2014) further examined the effect of the New GI Bill on college enrollment and degree attainment for 22- to 39-year-olds. Results suggested that the New GI Bill increased the probability of enrolling in college within 3 years of separation from the military by 7.7 percentage points and the probability of obtaining a degree within 5 years by 4.5 percentage points.

My inquiry extends Barr's (2015) study in three important ways: First, while Barr finds a positive and significant short-term enrollment effect, it is not clear whether this temporary enrollment burst persists into later years (e.g., after 5 or 6 years) or is mainly due to a backlog of would-be college participants that built up before the Bill's inception. Because all veterans who have served in the post-9/11 era (i.e., from September 2001 onward) were eligible for the New GI Bill that was adopted in August 2009, the retrospective eligibility might have encouraged a large number of veterans who did not attend college under MGIB to change their college participation decisions. That being true, the large short-term effect of the New GI Bill could well be short lived. In this study, I utilize more recent waves of American Community Survey (ACS) up to 2015 to investigate whether the effect has persisted or changed over time. To preview my results: Although I find positive and significant effects of the New GI Bill on the order of 3 percentage points on college enrollment rates among post-9/11 veterans, the effect fell off from about 4 percentage points in the early, peak years to about 2 percentage points in more recent years.

Second, while Barr's studies showed a significant enrollment effect for 23- to 28-year-olds (Barr, 2015) and for 22- to 39-year-olds (Barr, 2014), it is important to examine whether the New GI Bill has benefited a wider age spectrum, especially among those above the age of 40. Even though human capital theory suggests that older people are less likely to attend college, one might expect that the monthly housing allowance offered by the New GI Bill would encourage many older veterans, including those with families, to go back to college. In addition, veterans typically follow a different trajectory from that of nonveterans who have a very low college enrollment rate beyond the age of 30. For example, among post-9/11 veterans who are 40 to 50 years old, the college enrollment rate is approximately 13%, much higher than the 4% rate among nonveterans in the same age group.[3] With these relatively high-enrollment rates, one would expect the New GI Bill to affect a much broader population of veterans beyond the age of 30. Consequently, in this study I examine the effect of the New GI Bill on those between 20 and 60 years old and, to preview my results, I find rather steady effects across age groups, even among those who are usually considered less likely to enroll in college. Because older veterans on average have lower enrollment rates than their younger counterparts, it follows that the former are relatively more responsive to the education benefits provided by the New GI Bill, which echoes the empirical evidence that older

students are more responsive to financial aid than younger students (Seftor & Turner, 2002).

The third important dimension of this study is to evaluate the enrollment effects conditional on levels of educational attainment. Because the New GI Bill's educational benefits can be used for a variety of educational and training programs, including both undergraduate and graduate education, I take full advantage of the detailed levels of educational attainment provided in ACS data (i.e., some college but less than 1 year, at least 1 year of college but no degree, associate's, bachelor's, master's, first professional, and doctoral degree) and evaluate the impact of the New GI Bill on students with varying levels of educational attainment. Related to the second contribution of this study discussed above, expanding the age range up to 60 would include many veterans who have enrolled in graduate programs. To preview my results, I find consistent, positive effects across all levels of educational attainment, with the largest estimates observed among those with master's degrees.

The availability of recent waves of ACS data and large sample sizes contained in these data provide a unique opportunity to study the impact of the New GI Bill on college enrollment along these important dimensions. Pooling together 11 years of ACS data, from 2005 to 2015, I obtained a sample of approximately 200,000 veterans who have served in the post-9/11 era, which allowed me to conduct a detailed analysis of how veterans might have reacted differently to the bill over time.

Literature Review

Although an individual's decision about college enrollment depends on a variety of academic, socioeconomic, and individual factors, one of the most studied factors is arguably college costs. This section first synthesizes empirical evidence around the effect of college costs and financial aid on college enrollment, followed by a summary of studies that specifically examined the effect of veterans' education benefit programs. Early studies on student demand for higher education were reviewed by Leslie and Brinkman (1987) and Heller (1997), who confirmed a downward sloping demand curve: As college tuition decreases, college enrollment rates increase.

Recent studies on the effect of financial aid programs on college enrollment have further confirmed that financial subsidies improve college participation, although effects may vary across programs (Angrist, Autor, Hudson, & Pallais, 2016; Bound & Turner, 2002; Castleman & Long, 2016; Cornwell, Mustard, & Sridhar, 2006; Dynarski, 2000, 2004; Goldrick-Rab et al., 2016; Long, 2004; Seftor & Turner, 2002; Sjoquist & Winters, 2012; Zhang & Ness, 2010). These financial aid programs encompass a variety of federal, state, institutional, and private efforts. At the federal level, for example, Seftor and Turner (2002) estimated the effect of changes in Pell Grant eligibility on nontraditional students (i.e., 22- to 35-year-olds) and found that these changes have a large and significant effect on the enrollment decisions of older, nontraditional students; this effect is markedly larger than that for younger, traditional-age students. Long (2004) examined the impact of federal tax credits on college access and found no significant enrollment effects for both traditional and nontraditional students. A variety of reasons may contribute to the lack of enrollment response to federal tax credits, including faster tuition increases at colleges with many credit-eligible students.

At the state level, the most significant shift in financial aid policies in recent decades is the popularity of state-sponsored merit-aid programs. Using the difference-in-differences (DD) technique and comparing aggregate enrollment between states with and without merit-aid programs, studies in this area have consistently shown large and significant enrollment effects. For example, Dynarski (2000) used the HOPE Scholarship program as a natural experiment and found a 7% to 8% enrollment increase in Georgia. A similar conclusion was reached by Cornwell et al. (2006), who compared Georgia with other southeastern states from 1988 to 1997, and estimated that HOPE increased freshmen enrollment by nearly 6%, with the majority gain occurring at 4-year colleges and universities. Dynarski (2004) expanded the evaluation of the effect of state merit-aid programs in seven states; results show that these programs typically increase college

enrollment by 5% to 7%, with the largest growth occurring at public institutions. Zhang and Ness (2010) found an average of nearly 10% increase in resident enrollment across 13 merit-aid states; however, approximately half of this increase was due to reduced out-migration of resident students to other states. In other words, state merit-aid programs, by lowering in-state tuition for those students who are eligible for the financial subsidies, would substantially increase the resident enrollment in those states that have adopted such policies and at the same time decrease the out-migration of college students to other states, resulting in considerable redistribution of college enrollment across states.

The significant enrollment effects of merit-aid programs at the state level are echoed by individual-level analysis, which utilizes discontinuities in the eligibility criteria to compare those students who are slightly above and below the eligibility threshold. For example, Kane (2003) used a regression discontinuity approach to estimate the effect of the Cal Grant program on college enrollment in California; he concluded that the Cal Grant program improves college enrollment by 4 to 6 percentage points. Using student-level data from Florida, Zhang, Hu, Sun, and Pu (2016) exploited discontinuity in SAT/ACT scores for the Florida's Bright Future program and found an increase of 2 to 3 percentage points in the proportion of students attending Florida's public colleges for those who barely met the lower criteria (qualifying for a 75% reduction in tuition and fees) and an additional 6 percentage points for those who met the higher criteria (qualifying for free public college education).

Studies have also used randomized experiments to ascertain the causal impact of financial aid on college enrollment. Angrist et al. (2016) evaluated a randomized trial of a large, privately funded scholarship program for college applicants to Nebraska's public colleges and universities. They found that this generous program, boosting average grants by US$6,300 per year, significantly improved college enrollment for historically underrepresented groups, including racial minority students, first-generation college students, and students with relatively weak high school grade-point averages (GPAs). However, these award recipients were no more likely to graduate from college within 4 years than nonrecipients. After reviewing recent studies on the effect of financial aid, Deming and Dynarski (2010) concluded that financial incentives—including tuition subsidies, need-based aids, merit-based aids, and loans—have positive and significant impact on college enrollment decisions. On average, an increase of US$1,000 in financial aid improves the likelihood of college enrollment by 4 to 6 percentage points.

The positive enrollment effects of financial incentives among civilian students have also been observed in a handful of studies on the effects of veteran's educational benefits programs. Angrist (1993) used a group of veterans in the 1987 Survey of Veterans and estimated that veteran's educational benefits increased college education by approximately 1.4 years. Kleykamp (2010, 2013) compared employment and college enrollment rates between veterans and nonveterans; results indicated that although veterans suffered an employment penalty, they were more likely to enroll in college than their civilian peers. Bound and Turner (2002) used census data and between-cohort differences to compare the college attainment of veterans and nonveterans after WWII. They found that WWII service, together with the original GI Bill, increased college completed by 0.23 to 0.28 year, translating into a college completion rate increase of 5.6 percentage points. Upon evaluating the effect of midcentury GI bills, including the WWII and Korean War GI Bills, Stanley (2003) found a combined effect on the order of 15% to 20% on college attainment.

Advancing to the MGIB era, Simon, Negrusa, and Warner (2010) estimated the enrollment effect of MGIB and found that a US$10,000 increase in educational benefits improved its usage by about 5 percentage points but did not affect how long veterans use these benefits. In a more recent study on the effect of the New GI Bill, Barr (2015) used the 2006–2011 ACS and Current Population Survey (CPS) October surveys to examine the short-term effect of the post-9/11 GI Bill within 2 years of its adoption for a group of 23- to 28-year-old high school graduates without college degrees. Results suggest that the expansion in veteran education benefits increased college enrollment rate of veterans by approximately 5 percentage points, or 15% to 20%, based on an average college enrollment rate of 26% for veterans. In addition, the in-kind education benefit provided by the

New GI Bill shifted the enrollment from 2-year to 4-year institutions. In a related study, Barr (2014) used the active duty file of the Defense Manpower Data Center to examine the effect of the New GI Bill on veterans' college enrollment and completion. Results suggested that compared with veterans with less than honorable discharges (i.e., not eligible for the education benefits offered by the New GI Bill), veterans with honorable discharges are 7.7 percentage points more likely to enroll in college within 3 years of separation from the military and 4.5 percentage points more likely to obtain a degree within 5 years. The current study focuses on college enrollment and extends these recent studies by considering the effect of the New GI Bill for a wider range of age groups, at different levels of existing educational attainment, and over a longer period of time.

The Post-9/11 GI Bill

To understand the impact of the New GI Bill on college enrollment, a brief description of the bill is in order. The New GI Bill became law in June 2008 and went into effect in August 2009, providing education benefits for military members who have served on active duty since September 10, 2001.[4] The main provision of the New GI Bill includes (a) full tuition and fees at in-state public schools, (b) a monthly housing allowance, and (c) up to US$1,000 a year for books and supplies.[5] For individuals attending private institutions, the program pays the cost of in-state tuition and fees assessed by public institutions, and allows private institutions to voluntarily enter into an agreement to pay tuition and fees that exceeds the limits, in which case the Department of Veterans Affairs matches the contribution. With these provisions and programs, the New GI Bill makes college tuition effectively free for most post-9/11 veterans. In addition, the bill offers a living stipend based on the location of the institution, which could vary greatly, with the current rate (Grade E5 without dependents) of just less than US$1,000/month for the least expensive places to more than US$3,500/month for New York City. Students attending online programs also receive a flat allowance rate; this amount was US$805/month during the 2016–2017 academic year. These benefits are much improved over MGIB, which paid a flat amount of about US$1,400/month in 2008.[6] As the benefits veterans receive under the New GI Bill depend on which college they attend and the location of the college, the actual amount varies across individuals. Barr (2015) estimated that the average annual increase in full benefits was roughly US$13,000 at the time of adopting the New GI Bill.

Several aspects of the bill are particularly relevant to the current study. Although the New GI Bill went into effect in August 2009, all service members who served post-9/11 were eligible for the educational benefits. Apparently, this retrospective eligibility could alter the college decisions of some veterans who did not attend college under MGIB but chose to avail themselves of the improved education benefits under the New GI Bill. Due to the accumulation of these veterans between 2001 and the adoption of the bill in 2008, one might expect an initial burst immediately after 2009. In addition, the provision of the bill is likely to encourage a wide range of veterans—in terms of both age and educational attainment levels—to attend college. For example, the provision of a monthly housing allowance would neutralize a substantial portion of college costs and encourage veterans to attend college, especially for nontraditional-age college participants with families. In addition, because the tuition benefits apply not only to undergraduate education but also to a variety of training programs and advanced degree programs, this would encourage veterans who already hold college degrees to further their education.

Data and Methods

Data used in this study are from ACS 2005–2015.[7] I chose 2005 as the starting point for two reasons: First, ACS public use microdata samples between 2001 and 2004 represented about 0.4% of the U.S. population, whereas the 2005-onward files included 1%, currently at about 3 million individuals each year. Because military members represented a relatively small proportion in the population, larger samples were always preferred, especially when examining effects in subgroups. Second, a total of 4 years of data (i.e., 2005–2008) before the adoption of the New GI Bill provided a reasonable prepolicy period to observe time

trends for my treatment and comparison groups. Because the bill was implemented in August 2009 and because the ACS data were collected throughout the year, the year of 2009 traversed pre- and postpolicy periods. Therefore, Year 2009 was excluded from my pre- and postpolicy comparison; however, it was included when I estimated year-by-year variations in the enrollment effects. For each ACS file, I extracted the following information: state of residence, place of birth, age, sex, race/ethnicity, educational attainment, school enrollment, military status, and, for veterans, whether they served during Gulf War era (i.e., August 1990–August 2001) or the post-9/11 era. In this study, I limited the sample to those individuals who were born and live in the United States. Considering that college enrollment was the main dependent variable, I limited the analytic sample to individuals who had graduated from high school, whether they held college degrees. ACS person weights were used for all analyses reported in this article.

My primary goal was to determine whether the New GI Bill has improved college enrollment for post-9/11 veterans. As in any policy evaluation study of this kind, the most difficult task was to construct a "counterfactual" (i.e., a scenario of what would have happened if there had been no change in veterans' educational benefits). Schneider, Carnoy, Kilpatrick, Schmidt, and Shavelson (2007) provided a detailed discussion on establishing causal relationships based on observational data. A treatment-control research design was employed in this study. The identification of program effect was based on the timing of program implementation; specifically, I used the DD strategy, which has been widely used in recent program evaluations and described in the related literature (e.g., Cornwell et al., 2006; Dynarski, 2000; Zhang & Ness, 2010).

Several issues needed to be addressed when using DD in this study: First is program eligibility—who are in the treatment group? As the New GI Bill was applicable to both active military members and veterans who have served in the post-9/11 era, the treatment group was straightforward. Those who served during both the Gulf War and post-9/11 era were included in the treatment group because they were also covered by the New GI Bill. As the bill only has a restriction on benefit expiration (i.e., within 15 years after separating from active duty) but not on age, I included all individuals between 20 and 60 years old. It is important to clarify, however, that although active duty personnel were covered by the New GI Bill, they were not eligible for the monthly housing allowance. Without this major expanded benefit provided by the New GI Bill, it was expected that active duty military members would be less likely than veterans to change their enrollment decisions. In addition, in 2011, the New GI Bill expanded eligibility for members of the National Guard and full-time Active Guard and Reserve when meeting certain criteria. Because the ACS data did not provide detailed information to identify those eligible individuals, I did not cover National Guard and Reserve in this analysis. For these reasons, this study was focused on post-9/11 veterans and briefly on active duty military members.

Selecting a comparison group, however, was not as straightforward. The selection was crucial because the difference between the pre- and postpolicy period in the comparison group would be substituted for the difference in the treatment group within a DD framework. An obvious comparison group included individuals who never served in military (e.g., Barr, 2015), assuming similar time effects between veterans and nonveterans. However, veterans were different from nonveterans in important ways. For example, in addition to the requirement of physical and mental fitness for military service, serving the military may alter individuals' educational expectations that may in turn affect their college participation decisions. In other words, serving in the military was itself part of the treatment of the New GI Bill.

A possible comparison group with military experience could be veterans from the Gulf War era—those who served between 1990 and 2001. Using Gulf War veterans as a comparison group may greatly reduce the biases caused by the unobserved differences between veterans and nonveterans; however, this approach is not without limitations: First, because the Gulf War era ended in August 2001, Gulf War veterans who did not serve in the post-9/11 era were at least 27 years old in 2010 when the New GI Bill was adopted. This would restrict the study sample to those between the ages of 27 and 60. Second, as MGIB benefits expire 10 years from the last period of active duty, it is possible that some Gulf War veterans were

still eligible for MGIB benefits between 2005 and 2009—although it is probably safe to assume that the majority of veterans would avail themselves of their educational benefits shortly after separating from active duty. In other words, using Gulf War veterans as the comparison group would likely overestimate the effect of the New GI Bill. As using nonveterans and Gulf War veterans as comparison groups has both strengths and limitations, I used both of them in the analysis to check for the robustness and consistency of my estimates.

Another notable background to consider is that the New GI Bill was approved by Congress on the heels of the financial crisis and economic recession that officially started in December 2007. In the following years (i.e., between the 2007–2008 and 2010–2011 academic years), college enrollment in the United States increased from 18 million to 22 million (see Appendix A).[8] Although the increased presence of returning veterans on college campuses could not be ignored in recent years, it is not clear to what extent this increased participation was due to the economic downturn or the adoption of the New GI Bill. The DD estimates could isolate the effect of the economic downturn on post-9/11 veterans to the extent that this effect is similar to the effect for nonveterans; however, it is possible that educational benefits may become more attractive to veterans during economic downturns than in normal times. Therefore, it is difficult to ascertain whether the DD estimates are due to enhanced education benefits or the economic downturn; nonetheless, I attempted to provide some evidence in the result section to isolate these two effects.

Once the treatment and comparison groups were identified, the application of DD was straightforward. Because ACS data are cross-sectional surveys on a rolling basis, pre- and postpolicy periods are clearly defined, except for Year 2009. Formally, I used the following ordinary least squares regression:

$$y_{it} = \alpha_0 + \beta\left(Vet_i \times Post\right) + Vet_i + \theta_t year_t + Z_{it}'\xi + \mu_{it},$$

where y_{it} is college enrollment for individual i in year t; Vet_i is a binary variable for post-9/11 veterans; $post$ is a dummy variable indicating the implementation of the New GI Bill in 2009; $year_t$ is a set of dummy variables representing years (i.e., θ_t is year fixed effect); Z_{it} includes a set of covariates for individual i in year t (i.e., state of residence dummies, age dummies, sex, race/ethnicity dummies). State of residence fixed effects is added to the model to account for the fact that the actual benefit level could vary across states (Barr, 2015).

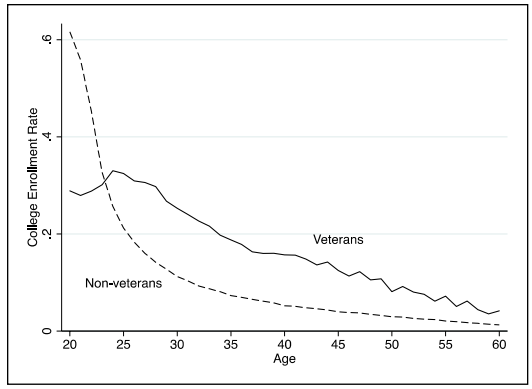


FIGURE 1. *College enrollment rate among high school graduates by age and veteran status.*

One potential problem in estimating this standard DD equation is that the effect of some covariates could be different for treatment and comparison groups. For example, Figure 1 presents college enrollment rates by age for post-9/11 veterans and nonveterans, showing two distinct enrollment-age profiles. For nonveterans, high-enrollment rates occurred in the early 20s and then quickly declined to less than 10% around the age of 30. For those above 40 years old, the enrollment rate was below 5%. For veterans, although college enrollment rates were lower than those for nonveterans in their 20s, they remained at a quite high level even through the 40s and 50s. The different enrollment-age profiles between veterans and nonveterans made it necessary to control for a set of interaction terms between veteran and age dummies. For similar reasons, I included the interaction terms between veterans and other covariates in the model:

$$y_{it} = \alpha_0 + \beta\left(Vet_i \times Post\right) + Vet_i + \theta_t year_t + Z_{it}'\xi + \left(Vet_i \times Z_{it}\right)'\delta + \varepsilon_{it}.$$

One particular issue discussed in the recent literature when using DD estimates is incorrect statistical inference due to serial correlation

TABLE 1

Descriptive Statistics for Post-9/11 Veterans and Nonveterans, ACS 2005–2015

	Nonveterans		Veterans	
	M	*SD*	*M*	*SD*
College enrollment	0.118	0.323	0.216	0.411
Male	0.453	0.498	0.830	0.376
Age	39.466	11.913	34.591	9.730
White	0.760	0.427	0.702	0.457
Black	0.124	0.330	0.162	0.368
Hispanic	0.078	0.269	0.092	0.289
Asian and Pacific Islander	0.014	0.119	0.012	0.107
Native	0.007	0.085	0.008	0.088
Other race/ethnicity	0.016	0.125	0.025	0.155
Less than 1-year college	0.084	0.278	0.120	0.324
1 year or above college	0.203	0.402	0.272	0.445
Associate's	0.096	0.294	0.125	0.331
Bachelor's	0.215	0.411	0.165	0.371
Master's	0.074	0.261	0.074	0.261
First professional	0.019	0.135	0.015	0.122
Doctoral	0.009	0.095	0.006	0.079
N	12,519,873		195,755	

Note. ACS = American Community Survey.

(Bertrand, Duflo, & Mullainathan, 2004); this was especially severe when the number of clusters or the number of treated groups was small (Abadie, Diamond, & Hainmueller, 2010; Cameron, Gelbach, & Miller, 2011; Cameron & Miller, 2015; Conley & Taber, 2011). In the current analysis, given the large difference in college enrollment rates by age, it was reasonable to control for serial correlation within ages after controlling for its fixed effects.[9]

Results

Descriptive Characteristics and Time Trends

Table 1 presents descriptive statistics for post-9/11 veterans and nonveterans in the pooled sample from 2005 to 2015. On average, veterans have a higher college enrollment rate (22%) than nonveterans (12%), mainly for two reasons: First, the wide age range included in this analysis (i.e., between 20 and 60 years) favors veterans. As Figure 1 indicates, college enrollment rates of veterans are higher than those of nonveterans except for those in the early 20s. Second, the age distribution of veterans and nonveterans, as shown in Figure 2, also favors the former. Although the age distribution in the nonveteran sample is quite flat, the majority of veterans are between 25 and 35 years old who have higher college enrollment rates than older groups. This is also evident from the average age reported in Table 1, which shows an average age of approximately 40 for the nonveteran sample and about 35 for the veteran sample. For other demographic characteristics, men overrepresent (83%) in the veteran sample versus the nonveteran sample (45%). Minorities have a slightly higher representation in the veteran sample. Veterans and nonveterans also differ by their educational attainment: Veterans are more likely to have attended some college but less likely to have obtained bachelor's degrees or above. Again, this could be an artifact of distinct age distributions as veterans as a group are younger than nonveterans in my analytical sample.

Figure 3 plots average enrollment rates for post-9/11 veterans and nonveterans from 2005 to 2015. Comparing the time trend for veterans (the

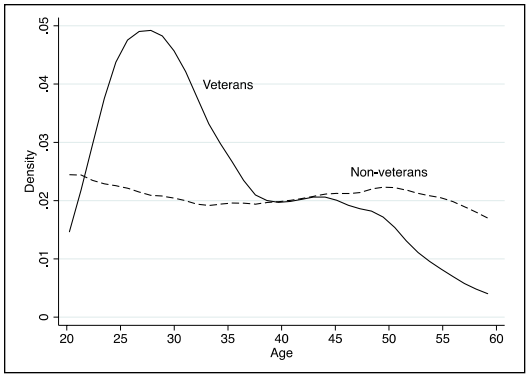


FIGURE 2. *Kernel density distribution of age by veteran status.*

line with triangle marks) and for nonveterans (the line with circle marks) suggests similar time trends between these two groups before 2009 and a rather significant increase in the gap immediately after the implementation of the New GI Bill. However, the gap has narrowed in the years since 2012. In terms of gender differences, the temporary increase in the overall sample appears to be mainly driven by men. In fact, within the female sample, the change is not obvious except for a spike in 2011. These observations foreshadow my regression results presented in the next section.

Average Effects and Change Over Time

Table 2 presents the results from a series of DD regression models using various specifications. Due to space limitations, only the effects of the New GI Bill (i.e., the coefficient for the interaction between veteran and postperiod dummy) are reported in this table and subsequent tables. For each model specification and sample, two separate models were estimated: one with the average effect and the other with the effect over time. The first three columns present results based on fixed effects, and the last three columns include interaction terms between veteran and covariates. For reasons previously given, Year 2009 was excluded from data analysis in this table. Using nonveterans as the comparison group and controlling for a variety of fixed effects, the first column indicates that the New GI Bill increased college enrollment rates by 4.7 percentage points in the

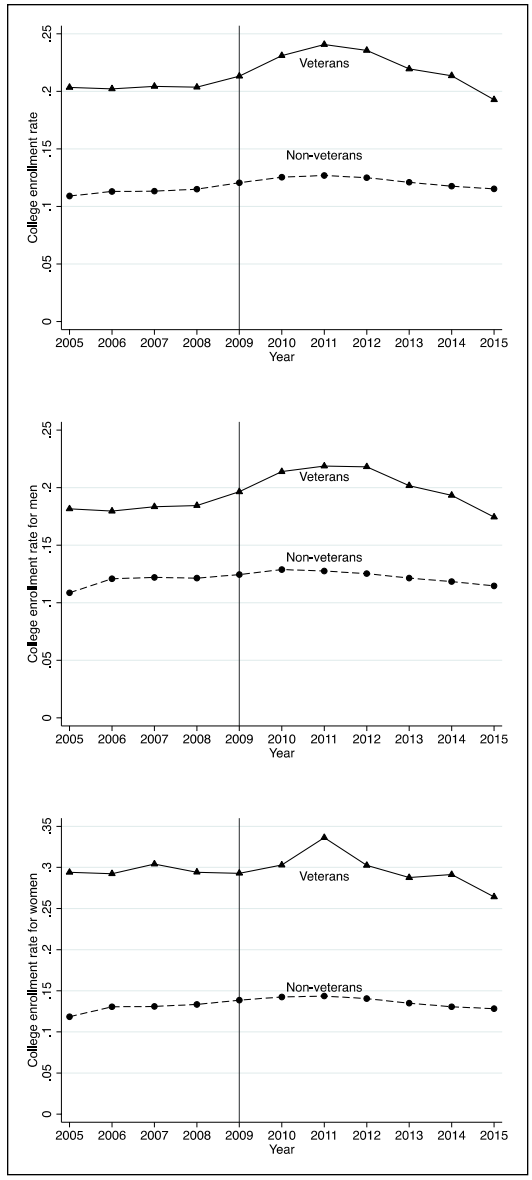


FIGURE 3. *College enrollment by year and veteran status.*

overall sample, with slightly larger effects for men than for women (i.e., 4.7 vs. 3.9 percentage points). Estimating the effect over time suggests uneven effects during the postpolicy period. An increase in college enrollment rates immediately follows the implementation of the bill, quickly reaches its peak in 2011 and 2012, and then decreases in more recent years, especially in 2015. This time trend is more pronounced for men than for women.

TABLE 2

Difference-in-Differences Estimates of the Effect of Post-9/11 GI Bill on College Enrollment (Comparison Group: Nonveterans)

	Fixed effects			Fixed effects and interactions		
	All	Men	Women	All	Men	Women
Veteran × After 2009	.0469***	.0469***	.0387**	.0288***	.0312***	.0125
	(.0066)	(.0061)	(.0129)	(.0034)	(.0033)	(.0068)
Veteran × Year 2010	.0324***	.0364***	.0103	.0207***	.0254***	−.0026
	(.0058)	(.0058)	(.0115)	(.0057)	(.0059)	(.0099)
Veteran × Year 2011	.0502***	.0477***	.0620***	.0352***	.0351***	.0361**
	(.0055)	(.0052)	(.0162)	(.0059)	(.0060)	(.0126)
Veteran × Year 2012	.0542***	.0574***	.0346**	.0357***	.0409***	.0084
	(.0063)	(.0065)	(.0118)	(.0042)	(.0042)	(.0100)
Veteran × Year 2013	.0521***	.0529***	.0397*	.0324***	.0358***	.0113
	(.0084)	(.0071)	(.0189)	(.0031)	(.0038)	(.0093)
Veteran × Year 2014	.0513***	.0485***	.0508**	.0312***	.0313***	.0203*
	(.0090)	(.0086)	(.0160)	(.0041)	(.0041)	(.0082)
Veteran × Year 2015	.0395***	.0381***	.0326	.0179***	.0192***	.0018
	(.0101)	(.0096)	(.0180)	(.0037)	(.0037)	(.0107)
N	11,563,147	5,221,978	6,341,169	11,563,147	5,221,978	6,341,169
Veteran	Yes	Yes	Yes	Yes	Yes	Yes
Age	Yes	Yes	Yes	Yes	Yes	Yes
Race/ethnicity	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
State of residence	Yes	Yes	Yes	Yes	Yes	Yes
Veteran × Age	No	No	No	Yes	Yes	Yes
Veteran × Race	No	No	No	Yes	Yes	Yes
Veteran × State	No	No	No	Yes	Yes	Yes

Note. All covariates (veteran status, age, race/ethnicity, year, state of residence, and their interaction terms) were dummy coded. Year 2009 was excluded from the analysis. All models were weighted by ACS person weights. Standard errors (in parentheses) were clustered by age. ACS = American Community Survey.
*$p < .05$. **$p < .01$. ***$p < .001$.

Moving to my preferred specification that controls for interaction terms between veteran status and individual covariates, I see a clear reduction in DD estimates. Detailed analyses by adding interaction terms one at a time (results available upon request) suggest that the interaction terms between veteran and age dummies are responsible for the majority of this reduction. This is consistent with my observation in Figure 1 that the enrollment-age profiles differ substantially between veterans and nonveterans. These regressions indicate that the New GI Bill increases college enrollment rates by 2.9 percentage points in the overall sample, with larger effects for men than for women (i.e., 3.1 vs. 1.3 percentage points). The enrollment increase in the female sample is statistically insignificant. Considering the overall enrollment of 22%, an increase of 3 percentage points represents a boost of approximately 14% induced by the New GI Bill.

There are, however, uneven effects over time, especially for male veterans. In peak years, the effect is above 4% for male veterans, but the effect decreases in more recent years to about half of its peak value. To visualize this change over time, I further estimate a variation of the time effect model by using 2005 as the base year.

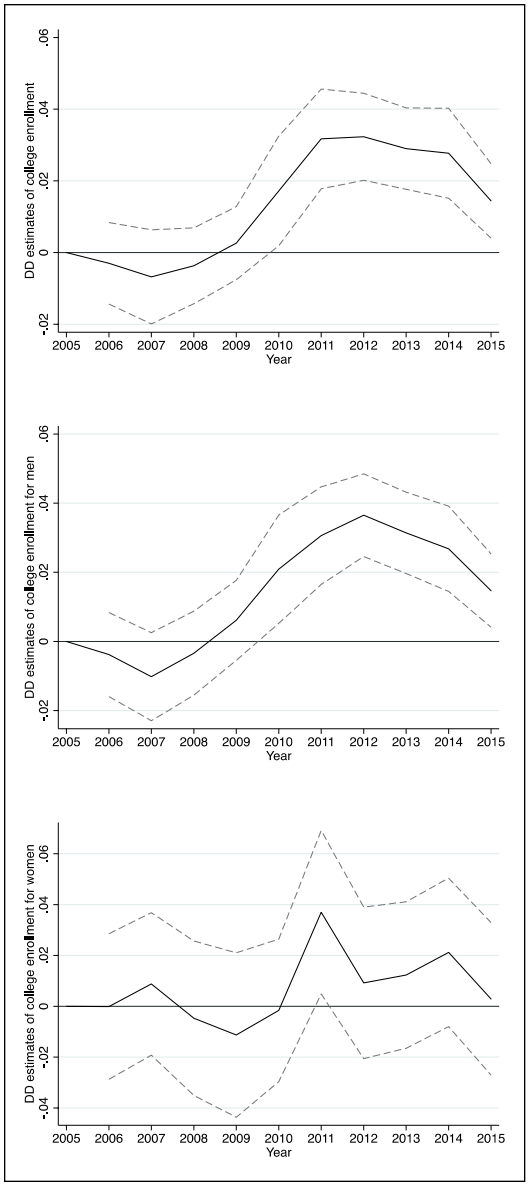


FIGURE 4. *Effects of Post-9/11 GI Bill on college enrollment by year, by gender.*
Note. DD = difference-in-differences.

An advantage of this approach is that it reveals whether there are noticeable enrollment changes before the policy implementation; it also serves as a falsification test. Regression coefficients together with their 95% confidence intervals are plotted in Figure 4. Confirming my observations in Figure 3, all estimates before 2009 are statistically insignificant when compared with Year 2005. Starting from 2009, there was a significant boost in enrollment rates for veterans when compared with nonveterans. The effect, however, quickly plateaued in 2011 and 2012 and then decreased gradually in subsequent years. Not surprisingly, because men represent the vast majority of veterans, the result in the overall sample has been mainly driven by the male sample. For female veterans, the pattern is less clear. There seem to be some positive effects, but they are not statistically significant in most years, except for the obvious spike in 2011.

Several factors may have led to the temporary bump in the effect of the New GI Bill shortly after its implementation. For one, the retrospective eligibility may inherently have encouraged a large number of veterans who did not attend college under MGIB to take advantage of the improved educational benefits under the New GI Bill, resulting in a larger temporary burst than the long-term effect. Another possibility is that the Great Recession had different enrollment effects on veterans and nonveterans. While it is difficult to definitely disentangle these two possible explanations due to the coincidence of the Great Recession and the New GI Bill, it is important to address the potential extraneous effect of the Great Recession on veterans and nonveterans. Accordingly, I attempt to offer some evidence that helps rule out this possibility. The different enrollment effects of the Great Recession on veterans and nonveterans, if true, could be attributed to two reasons: First, veterans may be different from nonveterans in unobserved ways. Second, education benefits provided by the New GI Bill could be more attractive during economic downturns.

To test whether being veterans per se—not related to the education benefits they received—makes individuals more likely to attend colleges during economic downturns, I used Gulf War veterans as the comparison group and reestimate the effect of the New GI Bill. In these comparisons, however, the age range was restricted to veterans between 27 and 60 years. Results are reported in Table 3. Two observations are noteworthy here: First, unlike using nonveterans as the comparison group as in Table 2, the estimates based on models with fixed effects in this table are similar to those after controlling for interaction terms. This is not surprising because the enrollment–age relationship is likely to be similar between the Gulf

TABLE 3

Difference-in-Differences Estimates of the Effect of Post-9/11 GI Bill on College Enrollment (Comparison Group: Gulf War Veterans)

	Fixed effects			Fixed effects and interactions		
	All	Men	Women	All	Men	Women
Veteran × After 2009	.0260***	.0263***	.0290*	.0298***	.0308***	.0284*
	(.0043)	(.0041)	(.0109)	(.0041)	(.0037)	(.0108)
Veteran × Year 2010	.0160*	.0190**	.0032	.0178*	.0212**	.0032
	(.0066)	(.0063)	(.0164)	(.0066)	(.0061)	(.0164)
Veteran × Year 2011	.0381***	.0308***	.0761***	.0403***	.0335***	.0754***
	(.0065)	(.0076)	(.0190)	(.0064)	(.0074)	(.0189)
Veteran × Year 2012	.0365***	.0387***	.0260	.0398***	.0426***	.0259
	(.0062)	(.0062)	(.0147)	(.0060)	(.0061)	(.0148)
Veteran × Year 2013	.0264***	.0300***	.0158	.0307***	.0350***	.0143
	(.0049)	(.0051)	(.0144)	(.0048)	(.0049)	(.0142)
Veteran × Year 2014	.0255***	.0262***	.0261*	.0305***	.0320***	.0244
	(.0059)	(.0057)	(.0115)	(.0055)	(.0052)	(.0120)
Veteran × Year 2015	.0132*	.0131*	.0251	.0191***	.0198***	.0247
	(.0053)	(.0051)	(.0164)	(.0051)	(.0049)	(.0160)
N	344,104	291,287	52,817	344,104	291,287	52,817
Veteran	Yes	Yes	Yes	Yes	Yes	Yes
Age	Yes	Yes	Yes	Yes	Yes	Yes
Race/ethnicity	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
State	Yes	Yes	Yes	Yes	Yes	Yes
Veteran × Age	No	No	No	Yes	Yes	Yes
Veteran × Race	No	No	No	Yes	Yes	Yes
Veteran × State	No	No	No	Yes	Yes	Yes

Note. All covariates (veteran status, age, race/ethnicity, year, state of residence, and their interaction terms) were dummy coded. Year 2009 was excluded from the analysis. All models were weighted by ACS person weights. Standard errors (in parentheses) were clustered by year. ACS = American Community Survey.
*$p < .05$. **$p < .01$. ***$p < .001$.

War veterans and post-9/11 veterans, further confirming the need to control for interaction terms when using nonveterans as the comparison group. Second, the estimates using Gulf War veterans as the comparison group are very similar to those using nonveterans as the comparison group, especially for the overall and male groups. When I restricted the nonveteran sample to 27- to 60-year-olds, results were very similar. Not surprisingly, when I compared Gulf War veterans with nonveterans (results available upon request), there was no statistically significant effect whatsoever after 2009. In other words, being a veteran per se does not seem to have higher enrollment effects during economic downturns. With regard to the second reason (i.e., education benefits provided by the New GI Bill could be more attractive during economic downturns), I will provide some counterevidence in the following section in the context of varying effect by age.

Effects by Age

The overall effect estimated in Table 2 might have masked variations across age groups. In this step of analysis, I estimated the effect by age. Due to the large number of estimates (i.e., a total of 41 regressions, one for each year of age), I plot

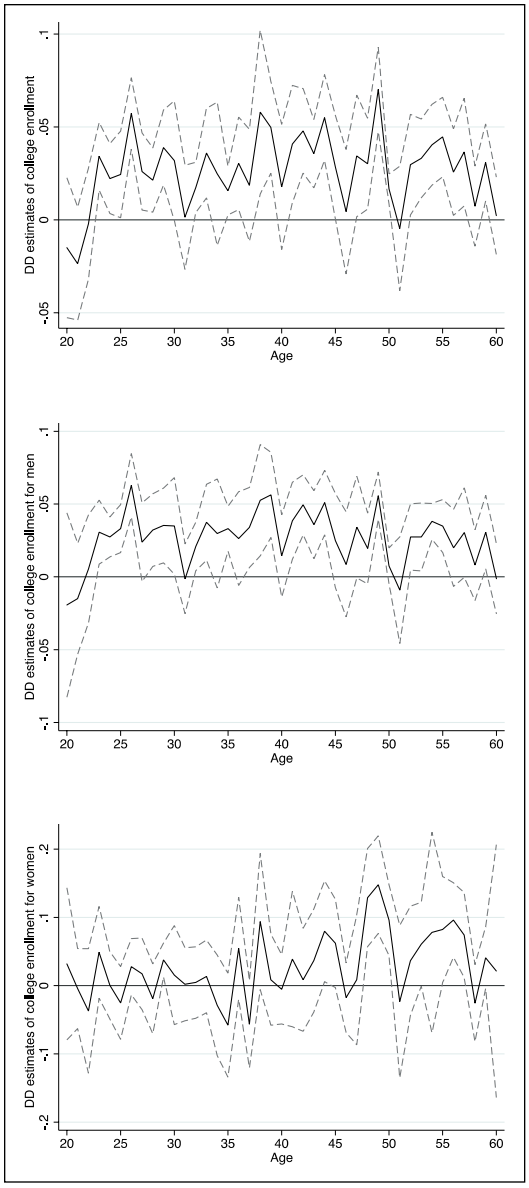


FIGURE 5. *Effects of Post-9/11 GI Bill on college enrollment across age groups, by gender.*
Note. DD = difference-in-differences.

these estimates and their 95% confidence interval in Figure 5. Overall, the differences across age groups are hardly noticeable, suggesting consistent effects across all age groups. This seems to be true for both male and female groups. For men, the effect oscillates about 3 percentage points across age groups, whereas for women the effect hovers near the zero line for younger groups and becomes positive for older groups, although these positive effects are statistically insignificant in most cases. Considering that the average enrollment rate decreases with age, a similar percentage increase in enrollment would translate into larger relative change for older veterans than for their younger counterparts. For example, the average enrollment rate for the 25- to 30-year-old male veterans is approximately 27%; an increase of 3 percentage points is equivalent to 11% increase in enrollment rate. For the 45- to 50-year-olds, the average enrollment rate is about 10%; the same 3 percentage point increase is equivalent to nearly 30% increase in enrollment rate.

Comparing the effect of the New GI Bill by age groups over time might provide some evidence as to whether the observed bump in the estimated effect immediately after the bill's implementation is due to the accumulation of would-be college participants over time or due to veterans' larger response to the Great Recession. If the former is true, one might expect no obvious bump in the estimated effect among those in their early 20s because most first-term enlistments require a commitment to 4 years of active duty, and in fact the average length of active duty in U.S. military is about 7 years (Taylor, 2011). In other words, a 22-year-old veteran in 2010 is not likely to be separated from active duty for a long time. In contrast, if the temporary burst in college enrollment is due to a larger response of veterans than nonveterans to the Great Recession, one would expect a larger bump for those in their early 20s than for older groups because younger workers tend to have lower educational attainment and they are disproportionately concentrated in industries hard hit by the Great Recession (Katz, 2010).

To test this hypothesis, I divided my sample (i.e., 20–60 years of age) into eight age groups with 5-year intervals and estimated the effect of the New GI Bill for each group over time. Results are presented in Figure 6. For most age groups, I see a peak around 2010 and then a gradual decrease in subsequent years, with an exception for the 40- to 44-year-old group, which has a spike in 2014. The youngest group (i.e., 20–24 years old) does not follow this general pattern, with the enrollment rate gradually increasing immediately after the bill's adoption, and then hovering between 1 and 2 percentage points between 2012 and 2015.

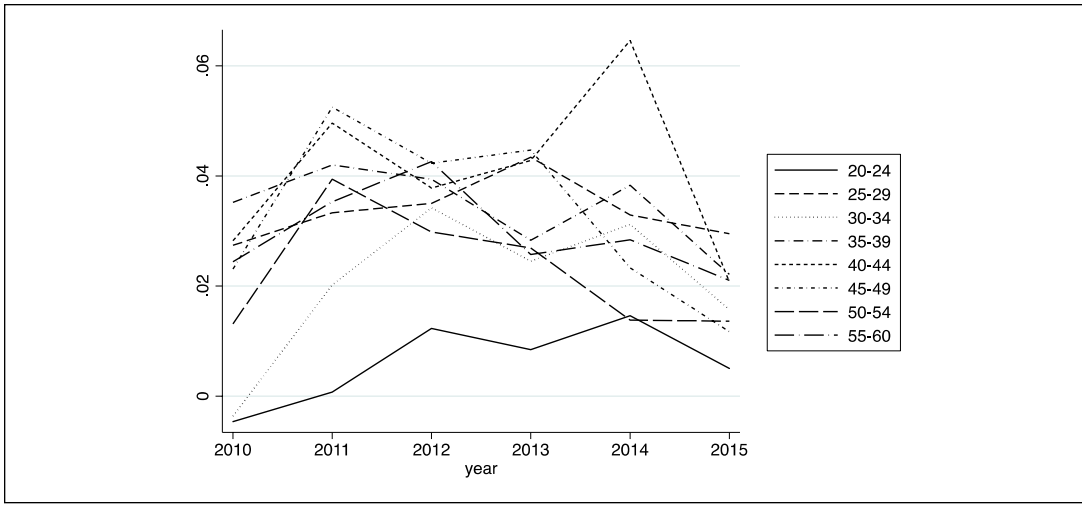


FIGURE 6. *Effects of Post-9/11 GI Bill on college enrollment by year, by age groups.*

The 30- to 34-year-old group also has a small enrollment increase right after the bill's adoption; however, the enrollment effect grows quickly to more than 3 percentage points in 2012 and decreases after that. It is important to note that the observed difference between the 20- to 24-year-old group and other age groups is not an artifact of sample sizes, as the 20- to 24-year-old group has a substantial sample size of 21,886, only slightly lower than the average sample size of 22,648 in other age groups. The slower take-up rate for the 20- to 24-year-olds than other age groups is consistent with the interpretation that the temporary bump in veterans' enrollment rate is due to the retrospective nature of the New GI Bill rather than due to a greater impact of the Great Recession on veterans.

Effects Conditional on Educational Attainment

Because education benefits provided by the New GI Bill can be used for a variety of degree and training programs, it is important to examine how veterans with different levels of educational attainment react to the financial incentives. ACS provides details of participants' level of postsecondary educational attainment, including (a) some but less than 1 year of college, (b) 1 or more years of college but no degree, (c) associate's degree, (d) bachelor's degree, (e) master's degree, (f) first professional degree, and (g) doctoral degree. Table 4 reports separate regressions for individuals with each level of educational attainment. Results in Table 4 indicate that the New GI Bill has significantly increased college enrollment rates for almost all levels of educational attainment, except for those with first professional and doctoral degrees. Interestingly, the largest effects by far are observed among those with master's degrees, indicating that many veterans have taken advantage of the educational benefits to pursue advanced degrees.[10] This result is somewhat surprising at first glance because veterans with master's degrees are about 8 years older than average veterans in the sample and given that older people are less likely to attend schools. From another perspective, however, because education improves one's decision making, better educated veterans may be more likely to make informed decisions and take full advantage of the generous education benefits offered by the New GI Bill.

Separate analyses are performed for men and women subgroups; detailed results are available upon request. The results for men are similar to those in Table 4, with positive and significant enrollment effects for almost all levels of educational attainment (except for the two highest levels) and the largest effects for those already having master's degrees. The results for women show a different pattern. Consistent with the overall impact for female veterans, the enrollment effects for each level of educational attainment are very small and in most cases not statistically significant. Again, however, the largest impact occurs for those with master's degrees.

TABLE 4

Effects of Post-9/11 GI Bill on College Enrollment by Levels of College Attainment

	All	<1 year college	≥1 year, no degree	Associate's degree	Bachelor's degree	Master's degree	First professional degree	Doctoral degree
Veteran × Year 2010	.0207***	.0309*	.0063	.0183	.0160	.0188	.0271	.0235
	(.0057)	(.0121)	(.0126)	(.0132)	(.0108)	(.0138)	(.0251)	(.0337)
Veteran × Year 2011	.0352***	.0451**	.0270	.0338**	.0323*	.0702***	−.0114	.1567**
	(.0059)	(.0143)	(.0142)	(.0124)	(.0123)	(.0126)	(.0163)	(.0445)
Veteran × Year 2012	.0357***	.0349*	.0429***	.0314*	.0284*	.0383**	.0096	.0228
	(.0042)	(.0156)	(.0109)	(.0144)	(.0117)	(.0124)	(.0257)	(.0427)
Veteran × Year 2013	.0324***	.0295	.0387***	.0118	.0412***	.0536***	−.0199	−.0125
	(.0031)	(.0157)	(.0107)	(.0112)	(.0100)	(.0106)	(.0295)	(.0356)
Veteran × Year 2014	.0312***	.0394*	.0373***	.0239*	.0227*	.0669***	.0021	.0560
	(.0041)	(.0163)	(.0100)	(.0114)	(.0100)	(.0144)	(.0189)	(.0428)
Veteran × Year 2015	.0179***	.0384**	.0184	.0147	.0079	.0367***	−.0257	.0004
	(.0037)	(.0130)	(.0092)	(.0124)	(.0098)	(.0090)	(.0175)	(.0300)
N	11,563,147	1,024,799	2,186,535	1,139,431	2,518,977	922,802	236,034	113,547
R^2	.215	.289	.422	.215	.139	.073	.113	.077

Note. This table uses model specification as in Table 1 fixed effects and interactions. Year 2009 was excluded from the analysis. All models were weighted by ACS person weights. Standard errors (in parentheses) were clustered by age. ACS = American Community Survey.

*$p < .05$. **$p < .01$. ***$p < .001$.

TABLE 5

Effects of Post-9/11 GI Bill on College Enrollment for Active Duty Service Members

	Fixed effects			Fixed effects and interactions		
	All	Men	Women	All	Men	Women
Veteran × After 2009	−.0161**	−.0176**	−.0017	.0015	.0008	.0095
	(.0059)	(.0063)	(.0121)	(.0048)	(.0052)	(.0120)
Veteran × Year 2010	−.0213**	−.0230**	−.0077	−.0077	−.0077	−.0044
	(.0063)	(.0079)	(.0162)	(.0074)	(.0090)	(.0174)
Veteran × Year 2011	−.0168	−.0202*	.0241	.0008	−.0029	.0437*
	(.0090)	(.0094)	(.0216)	(.0075)	(.0076)	(.0185)
Veteran × Year 2012	−.0154	−.0167	.0054	.0059	.0041	.0268
	(.0085)	(.0091)	(.0293)	(.0084)	(.0088)	(.0283)
Veteran × Year 2013	−.0184*	−.0175	−.0187	−.0004	.0013	−.0089
	(.0088)	(.0092)	(.0161)	(.0059)	(.0066)	(.0162)
Veteran × Year 2014	−.0090	−.0102	−.0046	.0087	.0079	.0069
	(.0083)	(.0088)	(.0186)	(.0077)	(.0081)	(.0186)
Veteran × Year 2015	−.0153	−.0177	−.0075	.0022	.0023	−.0038
	(.0094)	(.0090)	(.0198)	(.0071)	(.0075)	(.0174)
N	11,465,305	5,144,039	6,321,266	11,465,305	5,144,039	6,321,266
Veteran	Yes	Yes	Yes	Yes	Yes	Yes
Age	Yes	Yes	Yes	Yes	Yes	Yes
Race/ethnicity	Yes	Yes	Yes	Yes	Yes	Yes
Year	Yes	Yes	Yes	Yes	Yes	Yes
State	Yes	Yes	Yes	Yes	Yes	Yes
Veteran × Age	No	No	No	Yes	Yes	Yes
Veteran × Race	No	No	No	Yes	Yes	Yes
Veteran × State	No	No	No	Yes	Yes	Yes

Note. All covariates (veteran status, age, race/ethnicity, year, state of residence, and their interaction terms) were dummy coded. Year 2009 was excluded from the analysis. All models were weighted by ACS person weights. Standard errors (in parentheses) were clustered by year. ACS = American Community Survey.
*$p < .05$. **$p < .01$. ***$p < .001$.

Active Duty Military Members

For active duty military members, the educational benefits offered by the New GI Bill become less attractive in the absence of a monthly housing allowance. Therefore, I expect minimal change in their college enrollment rates. Table 5 reports regression results from a series of models that are similar to those in Table 2, except that here I used active duty military members as the treatment group and nonveterans as the comparison group. Again, due to the possibility that the enrollment–age profile may differ between military personnel and nonveterans, models with both fixed effects and their interactions with the military dummy are preferred. Not surprisingly, my results (i.e., the last three columns of the table) do not reveal any positive and significant impact of the New GI Bill on college enrollment for active duty service members; this holds for both men and women.

Robustness Checks and Other Considerations

I modified my final analytical sample in various ways to check the robustness of my findings. First, relaxing the criterion of the United States as the place of birth, instead including all U.S. citizens, did not change the results presented here. Second, the current analysis was also extended to those above 60 years of age. Not surprisingly, because of the small sample size and very low college enrollment for this group of individuals, most estimates were small and not

statistically significant. Third, when I restricted the sample to those high school graduates without college degrees, the results were essentially the same, which is consistent with the values provided in Table 4, where the enrollment effects are quite consistent across different levels of educational attainment. Fourth, I also examined whether the enrollment effects of the New GI Bill varied by race/ethnicity categories and found no meaningful variations.

One particular concern about the DD estimate is that the higher enrollment rates after 2009 might reflect the change in the composition of veterans because of an increasing number of veterans returning from active duty in recent years, assuming that new veterans are more likely to take advantage of the educational benefits. To investigate this possibility, I tabulated the number of veterans surveyed in ACS by year (shown in Appendix B). Based on the weighted number of post-9/11 veterans, the annual growth between 2005 and 2009 was about 7%, whereas the annual growth between 2009 and 2015 was about 8%. In other words, although these numbers showed a slightly larger influx of veterans in the postpolicy period, the difference was quite small. In addition, before 2012 ACS data also provided information on whether a veteran had served on active duty during the preceding 12 months. A simple tabulation revealed almost identical college enrollment rates between those who had served during the preceding 12 months (21.9%) and those whose service ended more than 12 months previously (22.0%). Therefore, it is unlikely that the slightly faster growth in the number of new veterans would have contributed to the estimated effects in this study.

One final consideration is whether some veterans have chosen to serve in the military because of the enhanced educational benefits provided by the New GI Bill, which would have led to overestimation of the enrollment effects. Because most first-term enlistments require a commitment to 4 years of active duty, it is unlikely that this selection—if it happened—would affect the estimates in the initial years right after the bill's adoption; however, this could potentially upwardly bias the real effect of the New GI Bill in more recent years, for example, since 2013. Interestingly, my analyses revealed a gradual decrease in the estimated effect after the initial years of the bill's adoption. In other words, although I cannot rule out the possibility of individuals choosing to enter the military services because of the New GI Bill, this selection—if it existed at all—would only reinforce my conclusion that the long-term enrollment effects of the New GI Bill are lower than those immediately after its adoption.

Discussion and Conclusion

To summarize, this study resulted in three main findings: First, although the New GI Bill has increased overall college enrollment by about 3 percentage points on average, the effect was much larger immediately after the bill's adoption and has waned in recent years, suggesting that part of the initial enrollment burst was due to the retrospective nature of the bill. Second, the New GI Bill has had a consistent and positive impact on college enrollment for a wide age range between 20 and 60 years. Because older individuals on average have lower enrollment rates than younger ones, it follows that the former are relatively more responsive to financial incentives. Third, I found consistent and positive effects across all levels of educational attainment, with the largest estimates observed among those already holding master's degrees.

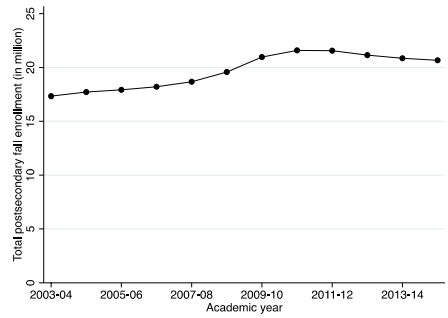
Assuming an average increase of US$13,000 in education benefits provided by the New GI Bill compared with MGIB, my estimates suggest a small effect of these educational benefits on college enrollment, on the order of a quarter percentage point per US$1,000. The long-term effect is even lower. These effects are much lower than the effects of typical financial aid programs, which improve college enrollment by about 3 to 6 percentage points for every US$1,000 reduction in college costs (see, for example, Deming & Dynarski, 2010). Because the New GI Bill is an expansion of the existing MGIB, which already provided quite generous educational benefits, the marginal effect of providing additional financial incentives becomes small. In addition, the financial assistance provided by the New GI Bill is different from typical forms of financial aid, which are designed to reduce or eliminate the credit constraints facing prospective college enrollees. As a result, the fraction of veterans whose college decisions were altered by these additional funds could be quite small.

Although this study has examined the effect of the New GI Bill on college enrollment, it is not clear to what extent the improved college

enrollment has translated into college degree attainment. Barr (2014) compared veterans separating between 2002 and 2004 with those separating between 2008 and 2009 and found that the New GI Bill increases the 5-year degree completion rate by 4.5 percentage points. This appears to be quite large. Considering that the average 6-year college graduation rate at all 4-year colleges and universities in the United States is slightly more than 50%, the impact of the bill on college degree attainment could be lower than that on college enrollment. Without degree attainment, college education in the form of college credits still matters but much less (Jaeger & Page, 1996; Kane & Rouse, 1995). Nevertheless, because the New GI Bill has encouraged individuals with college degrees to further their education, it might have boosted educational attainment of advanced degrees. I will leave this to future studies as more waves of ACS data and other data sources become available.

In concluding this article, I contend that although it is appropriate and important to evaluate the effect of the New GI Bill on college enrollment decisions of veterans, the social impact of the bill is broader and more profound than any college-related outcomes could possibly measure. The original GI Bill, for example, not only significantly improved the human capital in the United States after WWII but also, as many would argue, democratized American higher education and created a robust middle class. Education benefits provided by various iterations of the GI Bill not only allowed veterans to go back to college and obtain necessary knowledge and skills but also served as an important entry point back to civilian life. While providing generous education benefits to veterans could ease the financial burden for many veterans to attend college, research on veterans' college experience suggests that, beyond the point of access, they face additional challenges often associated with service-related injuries and disabilities as well as being nontraditional-age students (Ford & Vignare, 2014; Steele, Salcedo, & Coley, 2010; Vacchi & Berger, 2014). Therefore, higher education institutions must continue to better understand and support this unique, growing, yet potentially vulnerable student population, to best serve those who served the country.

Appendix A



Total postsecondary fall enrollment by year.
Source. The Integrated Postsecondary Education Data System (IPEDS) Enrollment survey. Enrollment represents total fall enrollment during a given academic year.

Appendix B

Number of Post-9/11 Veterans Included in the Sample, by ACS Year

Year	No. of observations	Weighted
2005	11,460	1,302,386
2006	13,633	1,547,377
2007	13,833	1,575,452
2008	14,388	1,594,952
2009	15,330	1,692,925
2010	18,031	2,017,355
2011	18,995	2,220,029
2012	20,882	2,459,372
2013	21,610	2,402,311
2014	23,166	2,605,197
2015	24,427	2,738,513

Note. ACS = American Community Survey.

Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

Funding

The author(s) received no financial support for the research, authorship, and/or publication of this article.

Notes

1. Author's calculation from American Community Survey (ACS) 2015. According to U.S. Department of

Veterans Affairs (2015), the population of post-9/11 veterans is expected to increase from about 2.6 million in 2014 to just less than 3.6 million in 2019.

2. Because this study focuses on the effect of the New GI Bill on college enrollment, I use the word "veterans" to mainly refer to those who have served in the post-9/11 era but are not currently serving on active duty. I use "active duty military members" to refer to those who are on active duty.

3. Author's calculation from ACS 2005–2015. Veterans here include only those who have served in the post-9/11 period.

4. Benefit tiers are determined by the length of active duty service since 9/11. A service member receives 100% benefits after serving at least 36 cumulative months or being discharged for disability after at least 30 days of active duty. About 40% of full benefits are provided to those serving at least 90 days and 50% for at least 6 cumulative months. Each additional 6 months of service increases the benefit tier by 10 percentage points.

5. Other benefits include a one-time relocation allowance, the "Yellow Ribbon" program that helps pay for expensive private colleges, the option to transfer benefits to family members after serving 10 years, extending the benefit eligibility period to 15 years (up from 10 years under Montgomery GI Bill [MGIB]), and elimination of the US$1,200 enrollment fees required by MGIB (or the refund of MGIB enrollment fees when electing to convert to the New GI Bill).

6. The rate for MGIB in Fiscal Year 2017 is US$1,857/month.

7. Several data sources have been used to study the effect of the New GI Bill, each with unique strengths and limitations. Barr (2015) used ACS and CPS data to compare post-9/11 veterans and nonveterans. ACS data have the advantage of a large sample size, which allows for in-depth subgroup analysis as performed in the current study. CPS data contain fewer veterans, but college information such as types of college allows for the analysis of college choice. Barr (2014) used data from the active duty file of the Defense Manpower Data Center, merged with the National Student Clearinghouse data to track veterans' postsecondary enrollment. However, because this data source only contains information on military personnel, comparison groups are limited. For example, Barr (2014) used veterans with less than honorable discharges as a comparison group, which is probably systematically different from those with honorable discharges, as the control group.

8. These numbers reflect the aggregated fall enrollment numbers across all U.S. postsecondary institutions in the respective years.

9. I use *reghdfe* command in Stata to absorb a large number of fixed effects and also estimate clustered standard errors (Correia, 2016). Standard errors are noticeably larger when clustered by age. Other additional clusters (e.g., year) have little impact on standard errors.

10. The question asked in the ACS survey about educational attainment is "What is the highest degree or level of school this person has COMPLETED?" and the question about college enrollment is "At any time IN THE LAST 3 MONTHS, has this person attended school or college?" According to these two questions, if a person completed his or her master's degree within the past 3 months, he or she would be considered as being enrolled in college regardless of his or her current enrollment status. In other words, the estimate here could be biased slightly upward, assuming that the New GI Bill has a positive effect on attaining master's degrees.

References

Abadie, A., Diamond, A., & Hainmueller, J. (2010). Synthetic control methods for comparative case studies: Estimating the effect of California's tobacco control program. *Journal of the American Statistical Association*, *105*, 493–505.

Angrist, J. D. (1993). The effect of veterans benefits on education and earnings. *ILR Review*, *46*, 637–652.

Angrist, J. D., Autor, D., Hudson, S., & Pallais, A. (2016). *Updated results from a randomized evaluation of post-secondary aid*. Retrieved from https://www8.gsb.columbia.edu/faculty-research/sites/faculty-research/files/finance/Applied%20Microeconomics/Fall%202016/AAHP_20161017%20(2).pdf

Barr, A. (2014). *Fighting for education: Veterans and financial aid*. CESifo conference paper. Retrieved from http://www.economics.illinois.edu/seminars/documents/Barr.pdf

Barr, A. (2015). From the battlefield to the schoolyard: The short-term impact of the Post-9/11 GI Bill. *Journal of Human Resources*, *50*, 580–613.

Becker, G. S. (1994). *Human capital: A theoretical and empirical analysis with special reference to education* (3rd ed.). Chicago, IL: The University of Chicago Press.

Bertrand, M., Duflo, E., & Mullainathan, S. (2004). How much should we trust differences-in-differences estimates? *The Quarterly Journal of Economics*, *119*, 249–275.

Bound, J., & Turner, S. (2002). Going to war and going to college: Did World War II and the GI Bill increase educational attainment for returning veterans? *Journal of Labor Economics*, *20*, 784–815.

Cameron, A. C., Gelbach, J. B., & Miller, D. L. (2011). Robust inference with multiway clustering. *Journal of Business & Economic Statistics*, *29*, 238–249.

Cameron, A. C., & Miller, D. L. (2015). A practitioner's guide to cluster-robust inference. *Journal of Human Resources*, *50*, 317–372.

Castleman, B. L., & Long, B. T. (2016). Looking beyond enrollment: The causal effect of need-based grants on college access, persistence, and graduation. *Journal of Labor Economics*, *34*, 1023–1073.

Conley, T. G., & Taber, C. R. (2011). Inference with "difference in differences" with a small number of policy changes. *The Review of Economics and Statistics*, *93*, 113–125.

Cornwell, C., Mustard, D., & Sridhar, D. J. (2006). The enrollment effects of merit-based financial aid. *Journal of Labor Economics*, *24*, 761–786.

Correia, S. (2016). *REGHDFE: Stata module to perform linear or instrumental-variable regression absorbing any number of high-dimensional fixed effects. Statistical Software Components.* Boston, MA: Boston College Department of Economics.

Deming, D., & Dynarski, S. (2010). College aid. In P. Levine & D. Zimmerman (Eds.), *Targeting investments in children: Fighting poverty when resources are limited* (pp. 283–302). Chicago, IL: The University of Chicago Press.

Dynarski, S. (2000). Hope for whom? Financial aid for the middle class and its impact on college attendance. *National Tax Journal*, *53*, 629–661.

Dynarski, S. (2004). The new merit aid. In C. M. Hoxby (Ed.), *College choices: The economics of where to go, when to go, and how to pay for it* (pp. 63–100). Chicago, IL: The University of Chicago Press.

Ford, K., & Vignare, K. (2014). The evolving military learner population: A review of the literature. *Online Learning*, *19*(1), 33–51.

Goldrick-Rab, S., Kelchen, R., Harris, D. N., & Benson, J. (2016). Reducing income inequality in educational attainment: Experimental evidence on the impact of financial aid on college completion. *American Journal of Sociology*, *121*, 1762–1817.

Heller, D. (1997). Student price response in higher education: An update to Leslie and Brinkman. *Journal of Higher Education*, *68*, 624–659.

Jaeger, D. A., & Page, M. E. (1996). Degrees matter: New evidence on sheepskin effects in the returns to education. *The Review of Economics and Statistics*, *78*, 733–740.

Kane, T. J. (2003). *A quasi-experimental estimate of the impact of financial aid on college-going* (No. w9703). Cambridge, MA: National Bureau of Economic Research.

Kane, T. J., & Rouse, C. E. (1995). Labor-market returns to two- and four-year college. *The American Economic Review*, *85*, 600–614.

Katz, L. (2010). *Long-term unemployment in the Great Recession* (Vol. 29). Washington, DC: Testimony for the Joint Economic Committee, U.S. Congress.

Kleykamp, M. (2010). Where did the soldiers go? The effects of military downsizing on college enrollment and employment. *Social Science Research*, *39*, 477–490.

Kleykamp, M. (2013). Unemployment, earnings and enrollment among post 9/11 veterans. *Social Science Research*, *42*, 836–851.

Leslie, L. L., & Brinkman, P. T. (1987). Student price response in higher education: The student demand studies. *Journal of Higher Education*, *58*, 181–204.

Long, B. T. (2004). The impact of federal tax credits for higher education expenses. In C. M. Hoxby (Ed.), *College choices: The economics of where to go, when to go, and how to pay for it* (pp. 101–168). Chicago, IL: The University of Chicago Press.

Olson, K. W. (1974). *The GI Bill, the veterans, and the colleges*. Lexington: University Press of Kentucky.

Schneider, B., Carnoy, M., Kilpatrick, J., Schmidt, W., & Shavelson, R. (2007). *Estimating causal effects using experimental and observational designs*. Washington, DC: American Educational Research Association.

Seftor, N. S., & Turner, S. (2002). Back to school: Federal student aid policy and adult college enrollment. *Journal of Human Resources*, *37*, 336–352.

Simon, C. J., Negrusa, S., & Warner, J. T. (2010). Educational benefits and military service: An analysis of enlistment, reenlistment, and veterans' benefit usage 1991-2005. *Economic Inquiry*, *48*, 1008–1031.

Sjoquist, D. L., & Winters, J. V. (2012). Building the stock of college-educated labor revisited. *Journal of Human Resources*, *47*, 270–285.

Snyder, T. D., de Brey, C., & Dillow, S. A. (2016). *Digest of education statistics 2015*. Washington, DC: National Center for Education Statistics.

Stanley, M. (2003). College education and the midcentury GI Bills. *The Quarterly Journal of Economics*, *118*, 671–708.

Steele, J. L., Salcedo, N., & Coley, J. (2010). *Service members in school: Military veterans' experiences using the Post-9/11 GI Bill and pursuing postsecondary education*. Santa Monica, CA: RAND.

Taylor, P. (2011). *The military-civilian gap: War and sacrifice in the post-9/11 era*. Washington, DC: Pew Research Center.

U.S. Department of Veterans Affairs. (2015). *Profile of post-9/11 veterans: 2012*. Available from https://www.va.gov/

U.S. Department of Veterans Affairs. (2017). *Veterans benefits administration annual benefits*

report fiscal year 2016. Available from http://benefits.va.gov/

Vacchi, D. T., & Berger, J. B. (2014). Student veterans in higher education. In M. Paulsen (Ed.), *Higher education: Handbook of theory and research* (pp. 93–151). The Netherlands: Springer.

Zhang, L., Hu, S., Sun, L., & Pu, S. (2016). The effect of Florida's bright futures program on college choice: A regression discontinuity approach. *Journal of Higher Education*, *87*, 115–146.

Zhang, L., & Ness, E. (2010). Does state merit-based aid stem brain drain. *Educational Evaluation and Policy Analysis*, *32*, 143–165.

Author

LIANG ZHANG is a professor of higher education at NYU Steinhardt School of Culture, Education, and Human Development; email: lz65@nyu.edu. His research focuses on higher education economics, finance, and public policy, particularly on the role of governments and institutions in affecting institutional performances and student outcomes.

Manuscript received March 15, 2017
Revision received June 1, 2017
Accepted July 12, 2017