From the Battlefield to the Schoolyard: The Impact of the Post-9/11 GI Bill

Andrew Barr

Department of Economics, University of Virginia. E-mail: barr@virginia.edu

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Abstract

The Post-9/11 GI Bill brought about an enormous expansion in veteran education benefits, roughly doubling the average maximum benefit level and generating large variation in the magnitude of benefit expansion across states. Using this variation, I contribute to the unsettled literature on the effects of financial aid on educational choices. In particular, I address how enrollment of older, non-traditional students responds to educational subsidies. I use a model of investment in education quality to illustrate how a modification in the structure of benefit provision changes veterans' incentives to invest in human capital. The transition from a conditional cash transfer to a more in-kind benefit affects the relative prices of different types of education, pushing veterans to invest in more expensive (plausibly higher quality) schooling. Furthermore, the model demonstrates how nominally flat national transfers, which are generally treated as homogenous, provide substantially different real benefit levels in different areas. Using a difference-in-differences strategy, combined with state level variation in the degree of benefit expansion, I demonstrate how the increased level of benefits provided by the Post-9/11 GI Bill increased college enrollment of males by between fifteen and twenty percent, with larger impacts in states in which veterans received greater benefit increases. I also add to the sparse literature on the persistence effects of educational subsidies, demonstrating a positive impact of the benefit increase across two measures of persistence. Finally, I combine estimates of the enrollment impact with statistics on benefit usage in order to argue that a proportion of benefit use is likely infra-marginal.

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1 Introduction

The Post-9/11 Veterans Educational Assistance Act of 2008 (Post-9/11 GI Bill) brought about the largest expansion in veteran education benefits since the end of World War II, roughly doubling the average maximum benefit level. While the fraction of individuals that join the military has dropped substantially over the last 60 years, it remains an important component of the population with over 5% (and nearly 9% of males) of individuals having served in the military before turning thirty. Over two million of these individuals have seen action in Iraq or Afghanistan. Furthermore, the likelihood of college enrollment for returning veterans is much higher today than after WWII; while roughly 2.2 million of over 16 million WWII veterans attended college under the original GI Bill, over 600,000 returning veterans were enrolled in college during the 2010-2011 school year alone. Thus, while there are one-eighth as many Afghanistan and Iraq War veterans as WWII veterans, it is likely that the new GI Bill will result in nearly as many total veterans obtaining some college education. Furthermore, just as after WWII, today's veterans are an important part of first-generation students, with nearly seventy percent of enrolled combat veterans being the first in their family to attend college–almost double the portion of non-veterans. While research on civilian education subsidies has continued to expand, analysis of veteran education benefits for recent veterans is almost entirely absent.

Previous studies of financial aid find mixed evidence of the effectiveness of education subsidies in increasing enrollment (Hansen 1983, Kane 1995, Seftor and Turner 2002, Dynarski 2003). This study brings new evidence to an unsettled question. Furthermore, unlike in most previous studies, the change in benefits allows for an understanding of how financial aid impacts older, non-traditional students.[1] The size of the benefit expansion makes it one of the largest increases in financial aid in decades: benefits pay in-state tuition and fees, a monthly housing allowance, and a generous stipend for books and supplies. These benefits are roughly double the level provided by the previous GI Bill. In a comprehensive overview of financial aid studies, not a single program provided benefits equal to or greater than those provided by the Post-9/11 GI Bill, and most provided substantially less (Dynarski and Deming 2010). In addition, this the first paper to use both over time and geographic variation in expansion of financial aid; the design of the bill created variation in the size of the benefit increase generated across states: veterans in some states received almost no change in benefit levels, while others received tens of thousands of dollars in additional benefits per year.[2]

[1] Veterans and non-traditional students are similar across a number of characteristics including age, race, motivations for attending a particular institution, institution type, and major (veterans are somewhat more likely to attend BA granting institutions (42 to 32 percent) and more likely to major in business or engineering). Source: Military Service Members and Veterans: A Profile of those Enrolled in Undergraduate and Graduate Education in 2007-2008 (NCES 2011-163).

[2] The merit aid papers use binary changes in merit-aid eligibility at the state level and generally estimate a single effect of merit aid. There is a large body of literature that uses tuition variation to estimate enrollment elasticities, but this variation is likely endogenous.

The nature of the benefit change also allows for an examination of the different effects of an in-kind versus a cash transfer subsidy to education. The change in the benefit structure from a conditional cash-transfer to a largely in-kind benefit alters the budget constraint in such a way as to push individuals towards higher cost (plausibly higher quality) schooling.

The policy change also provides further evidence on the impact of financial aid on student persistence. Access to funds that cover both the cost of housing and schooling may allow students to stay in school longer. Thus, the study contributes to the limited literature on the role of benefit expansion during college on persistence.[3]

I use a difference-in-differences strategy to estimate the overall impact of the benefit change on veteran educational choices. Trends in non-veteran enrollment proxy for the trend that veteran enrollment would have experienced absent the benefit expansion. I explore, through a number of robustness checks, event study analyses, and falsification exercises, the degree to which non-veteran enrollment behavior serves as a reasonable control group for veteran behavior. I find substantial evidence that non-veteran enrollment serves as a reasonable control group for veteran enrollment and no evidence that suggests otherwise. Concern remains, however, that veteran enrollment may respond differently than non-veteran enrollment to the Great Recession.[4] While I find no evidence that veteran enrollment is more responsive to labor market contractions (and thus the Great Recession) than non-veteran enrollment, I also leverage cross-state variation in the degree of benefit expansion to examine the effect of changing benefit levels, mitigating these types of concerns.[5] This geographic variation in covered tuition, fee, and housing allowance levels allows for a triple-difference strategy across multiple benefit dimensions.

Several characteristics of the bill's passage mitigate concerns with selection into the military. First, the Post-9/11 GI Bill was passed and implemented in roughly 13 months; therefore, the exact ramifications of the bill were not clear until the spring before the bill's implementation.[6] This left little time for selection into the military to adjust to higher benefit levels.[7] Second, eligibility for Post-9/11 GI benefits requires certain durations of active duty service and separating from the military with an honorable discharge (i.e., no early separation). The standard enlistment contract over this time period was for three or more years and the average term of service for Active Army recruits has remained between 47.7 and 47.9 months between 2005 and 2009 (USAREC 2012). Therefore, it is extremely

[3]Bettinger (2004) provides some of the only evidence showing a persistence impact of financial aid on those already enrolled, although his estimates are quite sensitive to the specification used.

[4]Estimates using individuals with only guard or reserve service as the control group, and thus ineligible for the Post-9/11 GI Bill, result in somewhat larger and statistically significant point estimates.

[5]Unless, there is some other reason that the states that experienced larger benefit expansions also experienced larger veteran to non-veteran growth in enrollment from before to after implementation of the Post-9/11 GI Bill. I have found no such reason.

[6]The maximum in-state tuition and fee levels necessary to understand the level of benefits provided were not produced until the spring before the bill's implementation.

[7]See Figure 3, which illustrates that awareness of changes to veterans' benefits did not change until mid-2008 at the earliest, and that interest in the bill only began to increase dramatically around its implementation.

unlikely that selection into the military, beginning in mid-2008 at the earliest, would impact enrollment by 2010, the latest survey year in my sample. While the minimum enlistment contract was two years, this contract type was relatively rare. Using data from a slightly earlier period, the 1990s and early 2000s, Simon, Negrusa, and Warner (2010) indicate that only 9.9% of Army contracts were for two years and that this proportion has fallen over time. As the Army allows more short term (2-year) contracts than the other services, selection into the military should not affect my estimates.[8] Furthermore, the median lag between application and accession in July 2008 was over four months, indicating that even with a surge in two-year July 2008 contracts, only a modest number of individuals could potentially make it back to enroll for the fall of 2010.[9]

To preview the results, I find that the expansion of benefits has increased overall enrollment of male veterans by three to five percentage points, a fifteen to twenty-five percent increase over previous enrollment rates, depending on the sample of veterans examined. This enrollment impact is larger in states which experienced larger benefit expansions. In states with a one standard deviation higher monthly housing allowance ($353), individuals are around one percentage point more likely to be enrolled; variation in tuition levels provides suggestive evidence of similar effects. Furthermore, as predicted by the model, the change in the relative prices of different types of education has resulted in more veterans enrolling in, and transferring to, four-year institutions. Finally, I present evidence that the benefit expansion has increased the persistence of veterans.

In the next section, I provide a brief overview of two strands of literature: one on veterans' benefits and the other on more traditional financial aid programs. In Section 3, I describe the Post-9/11 GI Bill and the GI Bill that it replaced. In Section 4, I develop a model of human capital investment to illustrate the changing incentives faced by veterans as the Post-9/11 GI Bill went into effect. Section 5 briefly overviews the relevant data, while Section 6 lays out the estimation strategy used to test the implications of the model. Section 7 presents the results and Section 8 concludes.

2 Veterans and Education Subsidies

The World War II GI Bill (WWII GI Bill) , introduced in 1944, provided educational subsidies of unprecedented magnitude to returning veterans.[10] Substantial research has demonstrated the positive impact that the WWII GI Bill had on post-secondary attainment for cohorts of veterans returning from the war. Bound and Turner (2002) leverage variation

[8] Only 5% of Navy contracts over this time period were for two years, and the Marine Corp and Air Force offered no two year contracts.

[9] Author's calculations using recruiting data.

[10] In 2012 dollars, the WWII GI Bill provided roughly $6,500 per year in tuition and $1,000 per month in living allowance.

provided by the structure of the draft and changing manpower requirements to argue that the combined impact of enlistment and the WWII GI Bill was roughly an additional quarter of a year of college attainment. Stanley (2003) uses differences in eligibility (based on cohort year) for the WWII GI Bill versus the Korean War GI Bill to illustrate similar increases in postsecondary attainment. Outside of the U.S., Card and Lemieux (2001) derive instruments from differences in enlistment rates within provinces over time to estimate positive effects of the Canadian WWII GI Bill on education and wages.

Similar research on education and labor market conditions for Vietnam War veterans finds somewhat different impacts. The Vietnam era GI Bill, unlike the WWII GI Bill, provided benefits directly to veterans in the form of stipends, with benefit levels roughly equal to the stipend provided through the WWII GI Bill.[11] Through repeated use of the structure of the Vietnam War draft, Angrist links Vietnam War participation to educational, labor market, and health-related outcomes. Angrist argues that Vietnam War participation resulted in higher levels of education for veterans, but that this did not translate into higher market wages as the veterans entered their fifties (Angrist and Chen 2011). A closing experience related wage gap between veterans and non-veterans (due to a flattening wage profile for non-veterans in their fifties) reconciles these results with Angrist's previous finding of a wage penalty for white veterans at younger ages (Angrist 1990).

Although studies of WWII, Korea, and Vietnam War veterans benefit from draft structures that generated exogenous variation in enlistment, the all-volunteer nature of the post-1973 armed forces makes it substantially more difficult to study. Perhaps as a result of this, there have been only a handful of studies in economics journals that analyze the educational benefit use of veterans enlisting after 1973. The first, Angrist (1993), focuses on a small group of veterans who participated in the 1987 Survey of Veterans. Angrist presents suggestive evidence of increased benefit usage in response to higher benefit levels. Simon, Negrusa, and Warner (2010) is the only study of which I am aware to focus on veterans separating from the armed forces after 1990.[12] Using plausibly unanticipated changes in the level of education benefits provided by the Montgomery GI Bill, they explore the impact of those changes on retention and veteran benefit usage. They argue that increased benefit levels resulted in lower retention of college-oriented youth while simultaneously increasing benefit usage.

The literature on GI Bill impacts is a subset of a larger body of literature that focuses on the impact of education subsidies on college attainment. Early studies of federal need-based programs found small and mixed results of Pell grants on college attendance (Hansen 1983, Kane 1995, Seftor and Turner 2002). Seftor and Turner's population, older non-traditional

[11]The Vietnam era GI Bill provided no direct tuition benefit. The stipend provided in 1974 was roughly $1,200 per month in 2012 dollars.

[12]There have been a few reports published by the United States Army Research Institute for the Behavioral and Social Sciences which focus more on the retention effects of the Montgomery GI Bill.

students, is most similar to the population studied here. Using a straightforward difference-in-differences framework, they find sizeable effects of Pell eligiblity (four to five percentage points) on enrollment of older students. Dynarski (2003) finds similar effects in examining the elimination of a program that paid the college costs of children of disabled, deceased, or retired Social Security beneficiaries. While addressing a more dissimilar group, the extent of the benefits provided by merit-aid programs is probably the closest to the generous benefits provided by the Post-9/11 GI Bill (Dynarski 2000; Cornwell, Mustard, and Sridhar 2006, etc.). Two of these studies find positive effects of the Georgia Hope Scholarship, although Cornwell et al find limited evidence that the scholarship increased enrollment in four-year colleges, one of the intentions of the bill.[13] While research on civilian education subsidies has continued to expand, analysis of veteran education benefits for post-9/11 veterans is almost entirely absent. In the next section, I outline the relevant features of the new GI Bill and how it differs from the Montgomery GI Bill that it replaced.

3 Montgomery to the Post-9/11 GI Bill

The Montgomery G.I. Bill (MGIB) went into effect in 1985 and remained an option for entering active duty personnel until August of 2009.[14] Eligibility for the Montgomery G.I. Bill has depended largely on three factors. First, an individual had to elect to participate in the program or not by committing to a reduction of pay of $100 for each of their first twelve months on active duty.[15] Second, an individual had to complete the minimum active duty contract agreed to upon enlistment - this was generally at least three years (could be two years for a small proportion of individuals in the Army and Navy). Third, an individual could not have been commissioned through a military academy or have received above a certain level of ROTC scholarship funds.

The benefits, which are paid directly to an individual, have been raised periodically since 1985 and pay a different flat amount per month to individuals enrolled half-time, three-quarters time, or full-time. In 2009, this was $1,368 per month for a full-time student who completed three or more years of active-duty service. Veterans are eligible for up to 36 months of benefits and can use their benefits on a wide variety of training programs including vocational training, apprenticeships, flight classes, and test fees as well as formal training leading to a degree.

Following September 11, 2001 and the ensuing wars in Afghanistan and Iraq, discussions began again about the expansion of education benefits for returning veterans. During the

[13]The Georgia Hope program provides scholarships to roughly 200,000 students a year, roughly a quarter of the size of the GI Bill (800,369) in 2010.

[14]Even today, many exiting veterans are eligible for both the MGIB and the Post-9/11 G.I. Bill.

[15]Conversations with Department of Defense officials suggest that Montgomery GI Bill participation (agreeing to a pay reduction) during the first year of enlistment was almost universal.

summer of 2008, Congress approved the Veterans Educational Assistance Act of 2008, more commonly known as the Post-9/11 G.I. Bill. The bill went into effect in August 2009, retroactively providing additional benefits to individuals with active-duty service after September 11, 2001.

Unlike the previous Montgomery GI Bill, the Post-9/11 G.I. Bill does not require individuals to elect into the program upon enlistment or forego the $100 a month for the first year of active-duty service. The vast majority of individuals serving on active duty after September 11, 2001 are eligible, with benefit levels tiered based on active-duty service lengths.[16]

Maximum benefit eligibility is based on the highest full cost of any public college in an individual's state of residence. Unlike under the MGIB, the Department of Veterans Affairs (VA) pays benefits directly to schools, reimbursing the level of tuition and fees up to the in-state maximum. In addition, the VA provides veteran students with a monthly housing allowance based on the zip code of the institution that the student attends. This monthly basic allowance for housing (BAH) ranges from around $800 in many rural areas to over $2700 in New York City. Finally, each full-time student receives an annual book stipend of roughly $1,000.[17]

The most obvious difference between the bills is the level of benefits provided. The MGIB provides roughly $1,400 of benefits per month for up to 36 months, resulting in a maximum total benefit level of roughly $50,000. The maximum per-credit benefit provided under the Post-9/11 GI Bill is over $1,000 in several states, implying a reimbursement of up to $15,000 for a single semester of tuition alone. In addition to this, the new GI Bill provides coverage of more than $10,000 in fees per term in roughly half of all states. If we add in the over $2,000 monthly housing allowance in New York or another high cost of living area and the $1,000 annual book stipend benefits, an individual could receive more than $68,000 in benefits in a single year. While somewhat lower than for New York residents, benefit levels for residents of most states are substantially higher under the new G.I. Bill. (see Table A1 for 2009-2010 per-credit tuition maximums and fee maximums and 2010 state average basic allowances for housing under the Post-9/11 GI Bill).

The second major difference between the two types of veterans' benefits is the degree to which benefits vary geographically (Table A1). This variation in nominal benefit levels across states under the new GI Bill adds another source of variation as it generates fifty-one micro experiments, with varying changes in annual benefit levels (from close to zero in some states to tens of thousands of dollars in others) following passage of the new G.I. Bill. In

[16]Officers commissioned at military academies and individuals previously receiving substantial ROTC scholarships are only eligible after completing an additional period of service above and beyond their initial requirement. Both bills require individuals to have a non-dishonorable discharge. Eligibility for all veterans is based on active duty tiers of 90 days (40%), 6 months (50%), 12 months (60%), 18 months (70%), 24 months (80%), 30 months (90%), 36 months or more (100%).

[17]Another departure from the Montgomery G.I. Bill extends benefit eligibility from ten to fifteen years from the last date of separation from the military.

the next section, I illustrate how we might expect the effect of these new benefits to differ across states based on this variation.

To recap, the salient features of the Post-9/11 GI Bill are differences in cash benefit generosity and the magnitude of the in-kind benefit for tuition. In effect, the GI Bill modification changed the prices (and relative prices) for different educational options, with this variation varying substantially by state.

4 Theory

I develop a model of education choice to generate predictions about how several of these differences will impact enrollment levels, school choice, persistence, and attainment. In addition to the standard prediction that education subsidies increase enrollment, the model provides guidance about how cash versus in-kind transfers result in different optimal schooling choices for potential students. The model also illustrates how variation in the expansion of benefit provision across states is generated by the decision to account for differences in the price of schooling and consumption that enter into veterans' budget constraints.

I assume that a veteran faces the following two-period optimization problem:

$$max\ V(c_1, E) = u(c_1) + \beta u(c_2)$$

subject to

$$c_1 P_c + \sum_{j=1}^{J} \tau_j \cdot 1\{E = j\} \leq I + Transfer_{GI} \cdot 1\{E > 0\} + b$$

$$c_2 P_c \leq wf(E) - b(1 + R)$$

Veterans maximize the stream of utility from consumption, $V(c_1, E) = u(c_1) + \beta u(c_2)$, by choosing a type of education E, which varies from 1 to J.[18] Institutions can be thought of more practically as varying from vocational training and two-year colleges to four-year schools.[19] For expositional purposes, we can think about ordering education types by price such that $\tau_1 < \tau_2 ... < \tau_J$, where tuition increases monotonically with some measure of the benefits provided by each institution.[20] An $E = 0$ represents the choice to not enroll.

Veterans choose which type of institution to attend, balancing the marginal future return to investment in a higher type education with the higher cost of tuition. Expenditures on

[18]The term $\sum_{j=1}^{J} \tau_j \cdot 1\{E = j\}$ indicates that an individual pays the tuition for the particular type of institution chosen, whereas $Transfer_{GI} \cdot 1\{E > 0\}$ indicates that an individual only receives a transfer if they are enrolled.

[19]This is not to say that four-year schools necessarily provide greater human capital or wage gains, just that individuals must perceive them to be higher quality in some sense as they cost more.

[20]Here, I have modeled this as representing different labor market returns ($f(E)$ is increasing in j) to different types of institutions, but it is also possible that more expensive institutions have different consumption values or other qualities which warrant their greater expense.

consumption and education are limited by income I, cash transfers received as part of the GI Bill $Transfer_{GI}$, and the amount an individual is willing to borrow from future income b.

A subsidy to education, coming either through the price of schooling τ_j or the size of the transfer $Transfer_{GI}$, results in increased enrollment ($E > 0$). However, as discussed by Lochner and Monge-Naranjo (2011), there has been a substantial amount of work done to address the extent to which credit constraints ($b \leq \bar{b}$) magnify this effect.[21] Given sizable estimates of the return to college, the presence of credit constraints perhaps explains why small (relative to the return) changes in the cost of college might result in large changes in participation. Thus, there is an efficiency question associated with the decision to subsidize education; this is important to keep in mind in interpreting the magnitude of the results as well as thinking about the costs and benefits of the program.

Just as with initial enrollment, for individuals already enrolled in school the cost of an additional year of schooling decreases with either type of subsidy, making it more likely that an individual will stay in school. Thus, an educational subsidy has two straightforward implications: **(1)** Higher levels of initial enrollment. **(2)** Higher persistence conditional on already being enrolled.[22] An interesting additional feature of the benefit change provides insight into the differential effects of cash versus in-kind transfers. In order to better understand the nature of this change, I describe the structure of benefit provision under each bill in more detail.

4.1 Montgomery GI Bill

Under the MGIB, individuals receive flat transfer amounts regardless of their level of tuition and fees.[23] This shifts veterans' budget constraints out, allowing them to choose among any type of schooling, while keeping any remaining money.[24] Although the MGIB was designed to promote investment in schooling, it does very little to alter the price of education contingent on enrollment. This makes the benefit akin to a conditional cash transfer, allowing veterans to optimally choose education types and use any remaining funds on other consumption needs.[25]

[21] Credit constraints limit borrowing to a certain level $\bar{b}$.

[22] This is not to say that empirically average persistence will not decline as theory predicts lower ability individuals drawn into school may be more likely to drop out.

[23] Individuals attending less than full-time receive a flat transfer amount that is proportional to the full benefit level.

[24] Individuals attending less than half-time receive an amount equivalent to their tuition and fees. This reduced usage only subtracts a proportional amount from their total 36 months of eligibility.

[25] The model abstracts from heterogeneity in preferences or psychic costs of attending school. While adding these aspects rationalizes individuals choosing different types of schooling, it adds little to the basic predictions of the model.

4.2 Moving to the Post-9/11 GI Bill

When the new GI Bill went into effect in August 2009, it increased the level of benefits available to the vast majority of post-9/11 veterans, with this increase varying across states, and it also changed the way that the government provides benefits. In contrast to the MGIB, key benefits under the new GI Bill are limited to tuition and fees, which are now sent directly to schools. As outlined below, this change in the manner of benefit provision has implications for the types of schools chosen by veterans.

As several researchers have demonstrated, subsidies to education are expected to increase enrollment. In the current setting, the new GI Bill lowers the price of all types of education. For those schools that cost at or below the in-state public maximum, the monetary price is dropped to zero; for more expensive schools, the price is still dramatically reduced. For purposes of exposition, I depict E as a continuous ordered measure of education types in Figure 1.

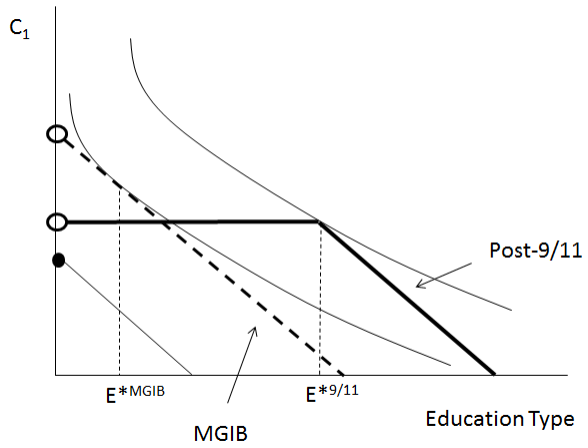


Figure 1: Impact of Post-9/11 GI Bill

The manner in which the government provides a large portion of the benefits under the new GI Bill converts them into an in-kind transfer as opposed to the cash transfer nature of the MGIB (see Figure 1). In contrast to those using the MGIB, post-9/11 GI Bill veterans are unable to obtain the difference between their tuition and fees and the maximum benefit level. This drops the monetary cost of investing in higher return types of education to zero over a segment of the budget constraint.[26] Given standard assumptions on preferences leads to the third prediction, **(3)** composition of human capital investments should shift towards

[26]This, and Figure 1, assumes that individuals' working and leisure hours are fixed. The basic intuition behind enrollment and type of investment impacts is unchanged by adding this dimension. Likewise, any psychic costs of attending a higher type school will result in a non-zero price over the flat portion of the budget constraint in Figure 1, but this does not change the predictions of the model.

plausibly higher quality, four-year schools and away from community colleges, certificate programs, and other less expensive forms of education.

4.3 Cross-State Variation in Benefit Expansion

As discussed previously, the nominal value of the Post-9/11 GI Bill benefit levels varies across states, both in terms of the covered tuition and fee levels as well as the BAH amount. In order to more easily illustrate how one would expect impacts to vary based on this, I rewrite the budget constraint as follows[27]:

$$c_1 + \sum_{j=1}^{J} \frac{\tau_j}{P_c} \cdot 1\{E = j\} \leq \frac{I}{P_c} + \frac{Transfer_{GI}}{P_c} \cdot 1\{E > 0\}$$

Under the MGIB, $Transfer_{GI}$ was the only element of the budget constraint affected. Since the $MGIB$ provided a nominally flat amount nationally, the real value of the benefit varied substantially across states depending on local prices P_c.[28] Thus, individuals in low cost of living and education states received a much larger real benefit than those in high cost states. As demonstrated in Figure 2, some individuals in high-cost states (like New York) likely found the real value of the MGIB too small to induce them to enroll in school. While the MGIB shifted a veteran's budget constraint out in both states, it did so less for a veteran in a high-cost state, resulting in the high-cost state individual optimally locating along the y-axis (not enrolling).

The Post-9/11 GI Bill, in contrast, attempts to implement a relatively equal real benefit across states by providing housing allowances based on the prices of local housing and pegging the maximum benefit to the highest in-state tuition and fee levels. Thus, under the Post-9/11 GI Bill, $Transfer_{GI}$ adjusts to keep $\frac{Transfer_{GI}}{P_c}$ relatively equal across states, while under the MGIB the transfer was set to $\frac{1{,}368}{P_c}$. This results in a larger increase in benefits for individuals living in high cost ("HC") of living states than for those in low cost ("LC") states: $\frac{BAH^{HC}}{P_c^{HC}} - \frac{1{,}368}{P_c^{HC}} > \frac{BAH^{LC}}{P_c^{LC}} - \frac{1{,}368}{P_c^{LC}}$.

[27] I drop borrowing for ease of exposition.

[28] Many federal programs, such as the Food Stamp program, provide a flat benefit nation-wide. While the government is clearly aware of how food prices affect individuals, as the benefit level is raised to account for inflation, the benefit level does not account for geographic variation, thus generating real differences in the level of benefits provided in different areas of the country.

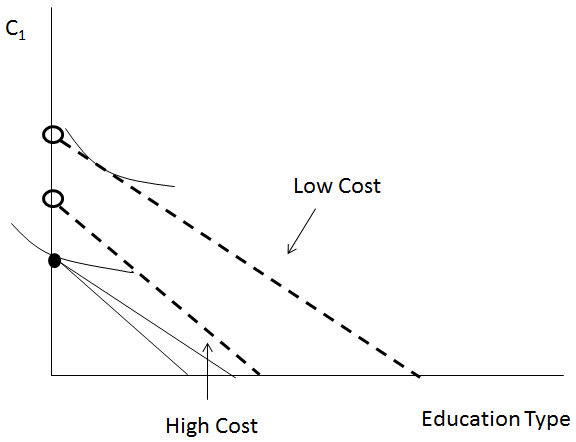


Figure 2: MGIB Impact in Low and High-Cost States

Similarly, the Post-9/11 GI bill attempts to provide similar education benefits across states by covering up to the cost of schooling for the most expensive four-year public in-state institution. Thus, there is a larger price reduction in states with higher relative costs of education ($\frac{\tau}{P_c}$). This leads to a similar prediction as above that enrollment in states with higher maximum tuition and fee levels will likely be affected more strongly by the new benefits.[29]

5 Data

I employ a variety of data sources to address the set of intuitive predictions generated in the previous section. The data for the main analyses of enrollment, school choice, and persistence come from two sources: the American Community Survey (ACS) and the October CPS (Education) supplement. I utilize additional data from the 2010 National Survey of Veterans, the CPS Veteran Supplement, summary benefit usage data provided by the Veteran Affairs administration, and data collected on BAH and maximum in-state covered tuition and fee levels from the Veteran Affairs website.

The relatively large size of the ACS and CPS October samples makes them well-suited for a study of impacts on the subpopulation of veterans. I use the 2006 through 2010 ACS and CPS October surveys, restricting the sample to individuals born and currently residing in the United States.[30] I further restrict the data to individuals age 23-28. This restriction serves three purposes. First, it excludes the traditional non-veteran college-aged population; these individuals likely respond differently than veterans to changing economic and financial

[29] As discussed in the results section, there is reason to believe that covered fee levels may affect public and private enrollment differently. As private institutions generally have substantially lower fees, higher covered fee levels may actually result in a relative reduction in private enrollment as public enrollment becomes more attractive.

[30] The 2006 ACS was the first to contain group quarters (including dormitories).

aid conditions and thus serve as a poor control group.[31] Second, college enrollment rates are very low among individuals in their thirties and beyond; therefore, I am focusing on the population most likely to be impacted by the benefits. Third, the age restriction limits the veteran population during the post-9/11 GI Bill eligible sample years to individuals who are very likely to have served on active duty after September 11, 2001.[32] Including the few veterans aged 23-28 during the post-9/11 GI Bill period who did not serve after September 11, 2001 should only bias my results down, as it includes untreated individuals in the treated group.

The ACS and October CPS contain several veteran and education related variables which allow for the bulk of the analysis presented later in the paper. Table 1 provides summary statistics of the ACS and CPS October samples, illustrating characteristics of the veteran and civilian control group population. Veterans between 23 and 28 are more likely to be enrolled in college, somewhat more likely to be in public and two-year schools contingent upon enrollment, and much more likely to be male.

Although the ACS and the CPS October provide the data for the bulk of the analysis, I also rely on several additional datasets for more detailed descriptive statistics about the young veteran population and to probe the impact of the new bill on benefit uptake. The National Survey of Veterans (NSV) and the Veteran Supplement to the CPS provide additional information on young veterans, while maximum in-state tuition and fee levels and BAHs obtained from the VA public website allow for an analysis of the geographic variation in the impact of the bill. Finally, I combine data on benefit usage with enrollment estimates to better understand the degree to which benefit utilization is infra-marginal.

6 Estimation Strategy

A first question concerns the impact of the post-9/11 GI Bill on overall enrollment as well as the demographic heterogeneity of this impact. The basic specification relies on the identifying assumption that the change in non-veteran enrollment accurately proxies for the change in counter-factual enrollment levels that would have occurred absent the bill. In Section 7, I present a number of robustness checks and falsification exercises to convince the reader that this assumption holds and that other potential threats to the validity of the estimates are unlikely to have biased the estimates. I also outline a strategy immune to many of the potential threats to the difference-in-differences (DD) analysis that leverages geographic variation in the degree of benefit expansion. I set up a test for whether students are, in fact, transitioning to higher cost, presumably higher return, institutions as predicted by the model. I conclude the section by setting up an analysis of the role of the new GI Bill

[31] This also excludes individuals enrolled at military colleges who are ineligible for the benefits.

[32] Making the additional sample restriction that a veteran in the post-9/11 GI Bill period had to serve after September 11, 2001 has little impact on the sample or results, but introduces some sample selection issues.

benefits on student persistence.

6.1 Enrollment

My baseline econometric enrollment specification takes the following difference-in-differences linear probability form[33] :

$$E_{it} = X_{it}\beta_1 + \beta_2 After_t + \beta_3 Vet_i + \gamma After_t * Vet_i + \epsilon_{it} \ , \tag{1}$$

where E_{it} is a binary variable representing enrollment, X_{it} are indicator variables for age, age*veteran, race, and sex characteristics as well as birthplace and year fixed effects; Vet_i indicates whether an individual is a veteran; and $After_t$ is an indicator variable for whether or not an observation occurs after August 1, 2009.[34] The coefficient γ provides a measure of the marginal increase in the probability that a veteran is enrolled in school once the post-9/11 GI benefits became available. In a similar fashion, I distinguish the impacts on undergraduate and graduate enrollment.

The key identifying assumption is that the shift in enrollment patterns of non-veterans from before August 2009 to after effectively proxies for the shift in enrollment patterns that would have occurred among veterans absent the new GI benefits.[35] In addition to the general increase in benefit levels, I seek to exploit several dimensions of heterogeneity in the new GI Bill that did not exist in the MGIB. First, the post-9/11 GI Bill covers tuition and fees up to the highest in-state public levels.[36] As outlined above and in Table A1, this generates large variation in covered tuition and fee amounts across states that did not exist previously. At the same time, the post-9/11 GI Bill provides housing allowances (BAHs) tied to the zip code of the institution attended.[37] This variation in benefit levels is potentially more tangible as the BAH is sent directly to veterans in the full amount and varies from roughly $800 per month in many rural areas to over $2700 per month in New York City.

At first glance one might be concerned that this second source of variation is simply controlling for cost-of-living differences and thus should have little impact on enrollment levels (or migration decisions).[38] However, it is important to remember that prior to the

[33]All marginal effects are estimated using probit and logit specifications as robustness checks.

[34]Regressions using the ACS include only the 2010 observations in the $After_t$ period as it is impossible to separate observations into months without restricted access data. Since veterans were only eligible for post-9/11 benefits during the last four months of 2009, any positive enrollment effects will be captured in the $Before_t * Vet_t$ period and thus should bias the estimate of an enrollment impact towards zero.

[35]I explore the validity of this assumption at length in Section 7.

[36]While individuals can move freely between states to obtain this in-state public tuition maximum, residency conditions for in-state tuition eligibility is generally more stringent. The vast majority of states require an individual to have maintained residency in the state or to meet civilian residency requirements (12 months and demonstration of intent to live in the state) in order to obtain in-state tuition rates.

[37]The BAH is equal to that of an E-5 with dependents on active duty. E-5 is the rank associated with a certain pay grade within the military. It is the rank of Sergeant in the Army and is generally obtained after four to five years of service.

[38]Recall that most states require veterans to live there for 12 months prior to obtaining residency, mitigating the

post-9/11 GI Bill veterans received a flat benefit level regardless of their location of residence or enrollment. Combining this with the cross-sectional variation in benefits provided by the post-9/11 GI Bill generates large changes in benefit levels provided within certain geographic areas from before to after the implementation of the new GI Bill.[39] In order to explore the impact of this heterogeneity, I alter the basic enrollment equation to allow for the impact to vary with the level of benefits (tuition and fee maximums or BAHs):

$$\begin{aligned} E_{izt} =& X_{it}\beta_1 + \beta_2 After_t + \beta_3 Vet_i + \beta_3 Benefit_z + \\ & \beta_4 After_t * Benefit_z + \beta_5 Vet_i * Benefit_z + \gamma_1 After_t * Vet_i + \\ & \gamma_2 After_t * Vet_i * Benefit_z + \epsilon_{izt} \ . \end{aligned} \tag{2}$$

Here, $Benefit_z$ takes on a standardized continuous measure of tuition maximums, fee maximums, or BAHs. State by veteran status fixed effects control for cross-state variation in benefit-levels existing prior to the expansion.[40] The coefficient γ_2 on the triple interaction term indicates how the enrollment impact of the new benefits varies with the benefit level in a certain state. As discussed above, we would expect the benefit expansion to have a larger effect in areas with higher tuition, fee, and BAH levels. While equation (2) only contains one measure of benefit variation, I include all three (and the associated interactions with veteran status and after) in my actual estimation.[41]

6.2 School Choice

While the enrollment sub-section treats the school decision as a binary choice, in reality veterans are making choices from a broad set of educational options. Empirically, my choice set is limited to the options recorded in the October CPS data: two-year, four-year, public, or private (or any interaction of these options). As illustrated by the model, I expect the post-9/11 GI Benefits to push students towards both more and higher quality enrollment, where higher quality enrollment is represented by four-year schools. In order to allow for a polytomous discrete choice setup, I specify the following basic multinomial logit equation:

$$E^*_{itj} = X_{it}\beta_{1j} + \beta_{2j} After_t + \beta_{3j} Vet_i + \gamma_j After_t * Vet_i + \epsilon_{itj} \tag{3}$$

$$E_{itj} = 1 \ \ if \ \ E^*_{itj} > E^*_{itk} \ \ \forall k \neq j$$

incentive to migrate to attend a public institution. Estimates of changing migration and veteran population provide no evidence of an increased flow of veterans to high cost states. This is addressed further below and in Appendix Table A5.

[39] As the ACS does not contain zip code information, I generate state weighted-average BAHs based on 2000 Census population figures indicating the overlap of ZCTAs and PUMAs.

[40] State by veteran status fixed effects are collinear with $Benefit_z$ and $Vet_i * Benefit_z$, thus these terms are dropped in estimation.

[41] Specifications including each benefit level (and the associated interactions) individually produce similar results. I also estimate a specification using a generated measure of the total maximum semester benefit.

Here, E^*_{itj} represents the latent value of choosing one of three options (j=0,1,2): no enrollment, two-year, or four-year enrollment. Individuals choose the option that provides them with the greatest value.[42]

6.3 Persistence

The post-9/11 GI Bill almost certainly had no impact on enrollment prior to the 2008-2009 school year. As the bill was passed less than two months before the beginning of the fall semester of 2008, and did not go into effect until August 1, 2009, it is unlikely that it had much effect on selection into enrollment during the fall semester of the 2008-2009 school year as well.[43] Thus, the new GI Bill provided a large (and likely unexpected) increase in education benefits for many students, already enrolled in school during the fall of 2008, who chose to continue in school during 2009.

I use the October supplement to the CPS, which asks about enrollment in the prior year, to examine enrollment transitions from $t-1$ to t. I also examine how the change in the school type distribution of individuals enrolled at time $t-1$ to time t is affected by the increase in benefits. Because it is difficult to disentangle the impact of initial enrollment changes from type specific differences in persistence or transferring, I interpret estimates from this specification as suggestive. I estimate specifications using both the Post-2009 and Post-2008 effect. While an individual's 2008 enrollment decision is less likely to have been affected by the benefit expansion, that individual's persistence is also less likely to be affected as they only receive additional funds if they enroll an additional year. If credit constraints are at play, or additional funding during year $t-1$ makes enrollment in year t more likely, we might expect to see a larger effect comparing the year over year persistence of those initially enrolled in 2009 compared to those enrolled in pre-treatment years.[44] I discuss this further below.

As a separate test of persistence, I estimate the proportion of individuals finishing a grade in which they were enrolled, using grade enrollment at $t-1$ combined with years of college credit accumulated by year t.[45] Here, additional funds received during the 2009-2010 school year may make it more likely that an individual will complete that school year. While enrollment itself may be affected during the fall of 2009, theory strongly suggests that an increase in benefit levels should result in marginal students, less likely to persist, being drawn

[42] I also present linear probability model results of two-year, four-year public, four-year private, part-time, full-time, graduate school, and vocational training enrollment. This provides further evidence of the aggregate shifts in and out of various education categories.

[43] Figure 3 plots search interest in the GI Bill over time, obtained from Google Insight. As can be seen from the figure, search for the Post-9/11 GI Bill increased somewhat after the bill passed, but then stayed relatively low until mid-2009 just prior to the implementation of the bill.

[44] I drop individuals initially enrolled in 2008 in this specification as they are treated in the sense that they are aware of the additional benefits available in the following year.

[45] For example, an individual indicating they were enrolled in the first year of college in 2007 is said to have persisted if they have completed one year of college credit in 2008.

into college. This suggests that any persistence estimate will be biased down.

7 Results

Overall, I find that the higher benefit levels resulted in between a two and three percentage point increase in college enrollment for all veterans, and a larger four percentage point increase for veterans who have separated from the military. This effect is concentrated in white and black males with no evidence of an impact on females.[46] As expected, the impact on enrollment is stronger in regions that experienced larger increases in benefit levels, underlining the point that nominally flat national benefit levels, which existed under the MGIB, can generate different real benefits based on variation in pricing across markets. While enrollment has increased at both public and private schools, evidence from the October CPS indicates that the Post-9/11 GI Bill has made enrolled veterans more likely to attend costlier four-year institutions. Finally, I present evidence that the higher benefit levels resulted in an increase in persistence of veterans enrolled in college, both within and across years.

7.1 Enrollment

Table 2 presents the key results from regressions that estimate the impact of the Post-9/11 GI Bill on enrollment using the ACS. Each cell contains the simple difference-in-differences estimate; the coefficient on the interaction of $Post$ and $Veteran$ provides the percentage point impact of the new benefits on veteran enrollment (robust standard errors are clustered at the state level throughout). The coefficient for college enrollment in column (1), 0.0212, indicates that the new benefits increase enrollment by slightly over two percentage points, a roughly ten-percent increase. This impact appears to be occurring almost entirely in terms of undergraduate matriculation with no observed impact on graduate school enrollment.[47]

I estimate several additional specifications of the basic enrollment equation as robustness checks and to explore how the impact differs among different groups of veterans. I first exclude 2009 from ACS estimations as it should bias results downwards since veterans are eligible for the higher level of benefits beginning in the fall of 2009. I present these estimates in column (3). The result is a slightly larger point estimate of the impact of the bill on enrollment, roughly 0.023, which is statistically indistinguishable from the base specifications. In column (4), I allow for a veteran specific trend. Veteran enrollment has a slight downward

[46] I interpret the lack of an impact on females as inconclusive as samples sizes of female veterans are relatively small and the female veteran and non-veteran populations are more dissimilar. However, female veterans were substantially more likely to be enrolled prior to the expansion of benefits, so one hypothesis is that the vast majority of female veterans would have gone to college with or without the expanded benefits.

[47] There is some suggestive evidence of a graduate school effect in the October CPS data. It is also possible that these graduate school effects are operating on older individuals; however, introducing older individuals into the sample causes other issues with sample selection.

trend relative to non-veteran enrollment during the 2006-2008 period; thus, inclusion of trends results in slightly higher, although less precisely estimated, point estimates.

To capture the effect of the bill on those recently separated from the military, I restrict the sample to veterans who were on active duty in the past year but are not currently on active duty. As benefit usage is significantly higher during the first twelve months after separation (Negrusa, Simon, and Warner 2010), this specification provides an estimate of the impact of the bill on those most likely to use education benefits in the first place. I also estimate specifications that restrict the veteran sample to individuals no longer working for the military.[48] This is the traditional veteran group and the group most likely to be affected by the benefit expansion. Furthermore, this is the group most likely to be impacted by variation in housing allowance levels as individuals remaining in the military have housing provided to them.[49]

As expected, the point estimate impact of the benefits on those active during the last year, presented in column (5), is somewhat higher, 0.032. Finally, in column (6), I restrict the veteran subgroup to individuals not currently employed by the military. This group exhibits an even larger response to the benefits, a roughly four-percentage point or roughly twenty percent increase in enrollment.

The substantial sample size of the ACS makes it possible to explore heterogeneity in treatment effects across subpopulations. I present these subgroup results in Table 3. Specifically, I divide the analytical sample by gender and race. These subgroup results indicate that the enrollment impact is entirely accounted for by males with the point estimate reaching .0272. I further divide the sample by race, finding that the higher level of benefits has a similar impact on white and black males.

7.1.1 Robustness Checks and Falsification Exercises

While these and the main results provide substantial evidence of a sizable effect of the Post-9/11 GI Bill on enrollment, I conduct a series of falsification tests to provide further support for the notion that these effects are the result of benefit expansion and not some underlying trend or spurious relationship in the data. I exclude 2010 from the sample and present estimates of placebo GI effects, interacting 2006, 2007, and 2008 with veteran status in separate regressions (Table A2). The point estimates from these placebo impacts are consistently close to and statistically indistinguishable from zero for all years and types of enrollment, supporting the claim that the true GI Bill estimates are reflecting a response to

[48] While this potentially introduces selection (out of the military) into the sample, the degree to which the military enforced contracts and the use of stop-loss measures implemented throughout this time period make it unlikely that this is much of a concern. I discuss this concern further below.

[49] Individuals using benefits on active duty are not eligible for the BAH.

the expansion in benefits.[50]

I also present event study plots to explore the degree to which pre-existing trends in enrollment of veterans and non-veterans may be driving the results. I employ a similar specification as in (1), but with the full set of $Year_t$, Vet_i, and $Year_t * Vet_i$ indicator variables. Figure A1 plots the coefficient estimates for each $Year_t * Vet_i$ indicator variable for the outcomes with significant effects in Table 2.[51] These plots provide strong evidence of parallel trends among these two groups during the pre-treatment period (2006-2008), with near zero coefficients for all outcomes. If anything, there is a slight downward trend in veteran enrollment relative to non-veteran enrollment during the pre-treatment period, suggesting that the estimates in Table 2 and 3 may be biased down. In 2009, treated for only 4 of the 12 months, there is a slight uptick in veteran enrollment followed by a larger increase in 2010, consistent with the results in Table 2.

While the pre-treatment trends suggest that the enrollment of veterans and non-veterans trends together, it is possible that the Great Recession affected veterans' enrollment behavior differently than non-veterans' behavior. However, it is not clear in which direction this bias should go. In particular, the generosity of financial aid programs increased markedly over this period; to the degree that veterans' own aid crowded this aid out (as much aid is earmarked for tuition and fee coverage), the estimates presented here may be biased downward. Or, perhaps, veterans are more responsive to labor market contractions and so would shift toward investing in education more than the general population. I present two pieces of evidence to argue that the latter possibility is not driving the results.[52] First, I leverage cross-state variation in the severity of the recession to examine the differential enrollment response of veterans to changing labor market conditions using an identical specification as in Table 2, but with the inclusion of the state-year unemployment rate $Unemp_{st}$ and the unemployment rate interacted with veteran status $Unemp_{st} * Vet_i$. While the unemployment rate has a significant effect on enrollment, there is no differential effect and the point estimate on the GI Bill effect is essentially unchanged (See Table A3).[53] Second, in the next section, I present estimates of the enrollment response using geographic variation in benefit levels that is unrelated to the state-specific variation in the labor market contraction.[54]

[50]Results presented for white males as I focus on this population moving forward. Results are similar for the full sample or all males.

[51]The dashed lines present the 95% confidence intervals for the coefficient estimates.

[52]As an additional piece of evidence, I have also estimated these effects using individuals with training for the reserves or national guard only as the control group (i.e., no active duty service). These individuals are ineligible for Post-9/11 GI Bill benefits. I find statistically significant effects which are generally slightly larger than those presented in Table 2 and 3 (full results available from author upon request).

[53]The coefficient on the unemployment rate (.0017, se .0009) implies a one point change in the unemployment rate increases the probability of enrollment by slightly under two tenths of a percentage point. The coefficient on the unemployment veteran status interaction term (.0003, se .0014) indicates that the effect of the unemployment rate on veterans is indistinguishable from that on non-veterans. The point estimate on the overall GI Bill effect on college enrollment is .0297, statistically indistinguishable from the estimates in column (2) of Table 3. Results are similar using all males.

[54]More specifically, the state-specific expansion in benefits is unrelated to the degree of labor market contraction

Another concern is that the estimates in Table 2 and 3 may merely reflect a change in the composition of veterans, either through entry or exit from the military. If veterans who are more likely to enroll separate more quickly following the expansion of benefits, the estimated increase in enrollment may reflect only a change in the composition of veterans. I present several pieces of evidence that suggest that this is not likely to be a problem. First, the first few columns of Table 2 and Table 3 include both separated veterans and those currently on active duty. This means that the pool of individuals who appear to be affected by the benefit expansion is not experiencing a change in composition as a result of separation. The estimated enrollment effect may then incorporate the decision to separate from the military, but it is not driven by compositional changes in the types of individuals who are veterans in the sample.

However, there are several reasons to believe that separation itself was not greatly affected and should not bias the estimates. First, earlier work using veterans separating between 1988 and 2003 finds small effects of benefit increase on separation and notes "that failing to control for the simultaneity of the decision to separate from the military and use education benefits does not appear to lead to serious bias in the estimated effects of education benefits, *particularly the unanticipated component*" (Simon, Negrusa, and Warner 2010). In fact, the estimates of benefit size on benefit usage in this study, using administrative data from the military, were generally somewhat larger once the authors controlled for separation out of the military. Second, while I do not have detailed information on the separation of veterans over this time period, I can examine the duration of active duty service of individuals separating before and after the Post-9/11 GI Bill's announcement using the 2007, 2009, and 2010 Veteran Supplements to the CPS. If enlisted individuals are changing their decisions to separate in order to enroll in school, we would expect the distribution of active duty service durations to shift to the left following the announcement of the benefit expansion (i.e., for those separating in 2009 and 2010). Figure A2 plots the distribution of active-duty service durations for both periods. The distributions are quite similar and, if anything, veterans appear to be serving on active duty slightly longer. This is inconsistent with separation driving the results.

Third, I look for changes in the characteristics of separating veterans relative to those on active duty. In Table A4, I investigate how the difference between those on active duty within the past year and those currently on active duty changes from before the GI Bill to after. I restrict the ACS sample to those on active duty at the time of the survey or on active duty within the last year. If the Post-9/11 GI Bill is driving differential separation from the military, we would expect to see a change in the difference in characteristics of those on active duty within the last year and those currently on active duty. There are no significant differences observed. In fact, while not statistically significant, it appears that

that occurred between 2007 and 2010 (full results available from author upon request).

those separating after 2008 (or after 2009) were slightly less likely to have a high-school degree, suggesting that individuals less likely to avail themselves of the GI Bill were more likely to separate.[55] In sum, there is little reason to suspect that changing separation is a major concern.

Concern remains, however, that the changing level of benefits may have drawn individuals more likely to use the education benefits into the military. This is likely the case; however, the short period of time between passage of the Post-9/11 GI Bill on June 30, 2008 and enrollment in the fall of 2010 (the latest period of enrollment in my sample) makes it extremely unlikely that this type of changing composition is a major concern. The shortest duration contract offered is two years. Thus, if an individual enrolled the day after passage of the new GI Bill, before many of the benefit details including the tuition and fee maximums were known, they would return only a month or two before enrolling for the fall of 2010 at the earliest. But, most individuals cannot enlist overnight; the median duration between application and accession of those applying during July 2008 was approximately 140 days.[56] This would result in half of those enlisting for two years in July 2008 separating in November 2010 at the earliest, too late to enroll. Furthermore, the proportion of contracts that are two-year obligations has been very low. Over the period of the 1990s and early 2000s, they made up only 9 percent of Army contracts and 5 percent of Navy contracts (Simon, Negrusa, Warner 2010). The Air Force and Marine Corps offered no contracts of this duration over this period. Furthermore, in the Army, the average first term of service for individuals without previous military experience has held steady between 47.7 and 47.9 months from 2005 to 2009 (U.S. Army Accessions Command). Thus, while it is possible that a very small number of individuals may have enlisted during the summer of 2008 and returned in time to enroll during the fall of 2010, it is unlikely that this is affecting the results in a meaningful way.

7.1.2 Geographic Heterogeneity

In Table 4, I explore the impact of the three types of geographic heterogeneity generated by the Post-9/11 GI Bill on white males. As discussed above, the new GI benefits vary both across states (in terms of covered tuition and fee levels) as well as across zip codes (in terms of housing allowances). I generated average housing allowances at the state level in order to merge them with the available data.[57]

[55]This is perhaps driven by somewhat lower quality recruits enlisting from 2006 through early 2008 (as measured by median AFQT and percentage with a high school diploma). These individuals are likely finishing a standard three-year active duty service obligation in 2009 or 2010. As lower AFQT and not having graduated from high school at entry are correlated with lower benefit usage (Simon, Negrusa, and Warner 2010), this should bias the estimate of the effect of the Post-9/11 GI Bill down.

[56]Author's calculations using application and accession data to active duty service. This lag time did not differ substantially based on the ability score (AFQT) of the recruit.

[57]While it is possible to merge BAHs at the PUMA level, this introduces greater endogeneity concerns as veterans are free to move within states and maintain eligibility for in-state tuition. Furthermore, merging at the state level mitigates concerns related to many PUMAs within states not having institutions of higher learning. Analogous

Table 4 presents results of the econometric specification presented in equation (3) for white male veterans. Here, the coefficient on "Post-9/11 Impact*Tuition Maximum" demonstrates how enrollment varies with maximum tuition credit levels. The tuition credit maximums are standardized so that the coefficients can be interpreted in terms of a one standard deviation ($353) increase in maximum tuition per credit coverage. Similarly, the coefficients on "Post-9/11 Impact*Fee Maximum" and "Post-9/11 Impact*BAH" demonstrate how enrollment varies with maximum fee levels and the basic housing allowance provided.

In the first row of each section, I confirm that the estimate of the Post-9/11 GI Bill impact holds after inclusion of the cross-state variation. These estimates indicate the effect of the Post-9/11 GI Bill at the mean of each benefit level. In the second row, we see estimates of the role of the maximum tuition per credit level interacted with the GI Bill effect. While not significantly different from zero at conventional levels (p-value=.11), these estimates suggest larger impacts in states with higher maximum tuition per credit levels, in line with expectations generated from the model. A one standard deviation higher per credit tuition maximum ($353) results in a .7 percentage point larger increase in enrollment.

The estimates are similarly suggestive (p-value=.17) of a larger enrollment response in states with higher maximum fee levels. In the third row, we see that a standard deviation ($14,967) higher maximum covered fee level per term results in an additional one percentage point increase in enrollment in public schools, but a half percentage point decrease in private school enrollment. While at first this seems puzzling, it is likely a result of the fact that public schools generally have significantly higher fee levels.[58] Thus, higher covered fee levels should shift students towards public schools as additional covered fees will generally provide little benefit for students attending private institutions. As the state-set maximum fee levels covered by the Post-9/11 GI Bill are extremely large in a few states, I rerun the specifications setting the few outlier fee maximums above $30,000 to $30,000. This has little effect on the estimates.

The fourth row of the first section demonstrates a strong relationship between housing allowance levels and enrollment, with individuals in states with one standard deviation ($353) higher monthly housing allowances experiencing a statistically significant one percentage point larger increase in enrollment as a result of the GI Bill. Private school enrollment appears to be more responsive to this level of variation.[59] Overall, the results are consistent with the expected effects of the variation in benefit expansion.[60]

estimates using PUMA level averages produce qualitatively similar results.

[58] Average required fees ($763) for U.S. public institutions were nearly three times the average ($268) for private institutions. (author's calculations using IPEDS).

[59] This is consistent with increased migration after passage of the Post-9/11 GI Bill as the cost of migration is lower for individuals attending private schools who are not eligible for in-state tuition rates. However, analyses provide no evidence that migration was affected by the benefit expansion. It is also consistent with individuals more likely to attend for-profit schools being more responsive to cash in hand.

[60] A similar analysis using the log of the aggregate number of veteran education beneficiaries by state (data obtained from the VA) from 2006-2010 indicates a statistically significant 3.3 (robust se=.018) percent larger increase in the

While these results suggest that veterans are responding to higher benefit levels, concern remains that the estimates are perhaps driven by migration of those interested in enrolling to the states experiencing larger benefit expansions. I address this concern by indexing state of residence by each benefit level (in turn) and then estimating the effect of the Post-9/11 GI Bill on this index. If there is sorting to high benefit states, we would expect a positive effect on this index. In Table A5, I present the estimates on the index of each benefit type as well as a constructed variable equal to the maximum semester housing and tuition benefit for a full-time student (4.5*BAH + 12*Maximum Tuition).[61] As above, the benefit variables are standardized to mean zero, standard deviation one. There is no significant effect on migration. Most point estimates are close to zero or slightly negative, indicating, if anything, a move away from high-benefit states.[62] This buttresses the interpretation of the estimates in Table 4 as the causal effects of higher benefit levels on enrollment.

Table 5 provides further evidence of veteran response to different benefit levels. In the second row, I present estimates of the effect of a higher combined tuition and housing benefit level. The results are consistent with those in Table 4. I also split the sample by quartile of combined benefit level, estimating the basic DD effect in each quartile.[63] With the exception of the second quartile, the estimates of the GI Bill effect are higher in areas with higher combined benefit levels. Appendix Figure A3 presents event studies for each quartile; there is no evidence of a pre-trend in any of the four quartiles. Panel E plots the coefficients from the event study in one figure, illustrating that the 2010 effects are exactly in order of benefit size.[64]

7.2 In-Kind Transfers and College Choice

While the previous section demonstrated a strong and relatively large impact of the bill on enrollment, here I examine the degree to which the Post-9/11 GI Bill impacted the types of schools that veterans chose to attend. I focus on the effect on separated white males because the CPS does not ask schooling questions to individuals still in the military.

number of beneficiaries associated with a one standard deviation increase in housing allowance levels. This is somewhat smaller than the just under 5 percent effect (.01/.22) reported in Table 4, likely a result of my focus on a younger population of veterans who are more responsive to the benefit expansion. Results for tuition and fee levels are not significantly different from zero.

[61] This is an approximation of the maximum level of benefits in a semester. Fee maximums are excluded as they are generally orders of magnitude larger than those required by a state's flagship institution.

[62] While perhaps somewhat surprising, veterans consistently list location among the most important attributes when choosing a school. In the 2004 BPS, 79 percent of veteran (both current and separated) students listed location as a reason they are attending their institution (author's calculations using BPS: 04/09).

[63] Appendix Table A6 presents the basic Post-9/11 GI Bill effect estimated using samples with above or below the median benefit levels separately. While this ignores the correlation between the benefit levels, it provides additional evidence that the greater enrollment increases are occurring in states experiencing larger benefit expansions. Furthermore, it illustrates that the results in Table 4 are driven by an increase in veteran vs. non-veteran enrollment in high benefit states and not a decrease in low benefit states. This provides further evidence that the results in Table 4 are not a result of sorting of veterans with high preferences for enrolling into high benefit states.

[64] The Q2 estimate in Table 5 appears to be driven by a larger increase in enrollment in 2009.

As discussed in Section 4, a shift in the structure of the benefits towards a more in-kind provision generates changes in the budget constraint that should push more individuals towards four-year schooling. Table 6 presents the impacts on enrollment in different types of institutions for white males. As the linear probability model estimates illustrate, full-time and four-year enrollment (particularly at public institutions) appear to rise dramatically as a result of the Post-9/11 GI Bill.[65]

Table 7 presents the average marginal effect from multinomial logit estimation of the college choice problem. Overall enrollment increases roughly six percentage points, which is similar to the point estimates for separated white males in Table 3. Perhaps more interesting are the marginal effects on two-year and four-year college enrollment presented in Table 7. While two-year enrollment appears to be relatively unaffected by the benefit increase, the probability of four-year enrollment increases substantially, accounting for the majority of the increase in enrollment. The results in Table 6 and 7 suggest that the change in the manner of benefit provision has pushed veterans to invest in more expensive (plausibly higher-quality) schooling.

7.3 Persistence

Tables 8 and 9 present estimates of the impact of the Post-9/11 GI Bill on college persistence in the October CPS. Table 8 provides estimates of the impact of the higher benefit levels on the probability that an individual enrolled in college completes that year of school. The higher level of benefits provided by the Post-9/11 GI Bill causes veterans to be over fifteen percentage points more likely to complete the grade they were enrolled in during the prior year.[66] Appendix Figure A4 presents the corresponding event studies which suggest that veteran and non-veteran persistence was trending together prior to the implementation of the Post-9/11 GI Bill. Interestingly, there is no evidence of an increase in grade completion for those enrolled in 2008-2009. As higher levels of benefits were available to these individuals in 2009-2010, this is somewhat surprising and suggests that there may be meaningful credit constraints for these individuals.[67]

While it is possible that changing enrollment during the fall of 2009 increased the proportion of high quality students who were more likely to persist, I argue that this cannot account for the results. First, economic theory would suggest that an increase in benefits would draw in the marginal student, thus leading to a composition of students that, without the increased benefits, would be less likely to complete a grade. Second, it is difficult to for-

[65] This shift to full-time enrollment suggests that the benefits may have eased credit constraints; veterans could receive the same total benefit by attending part-time, but they are now choosing to increase enrollment intensity. However, this is inconclusive, as the shift to four-year institutions likely raises the cost of attending part-time as many of these types of institutions do not allow and are not designed for part-time attendance.

[66] As with enrollment, there is no effect on females.

[67] As these individuals would have had access to additional funds during the 2009-2010 school year, and knew it, they should have experienced an increase in persistence absent constraints.

mulate a credible story that explains the magnitude of the increase in persistence. Even if all of the marginal enrollment effect (five percentage points) was comprised of individuals who were certain to complete the grade, this would only raise average persistence by four to five percentage points, well short of the observed change. Thus, to explain the fifteen percentage point increase in persistence, it must be the case that higher risk students were less likely to enroll (and were replaced by students more likely to persist) when the benefit to enrolling was substantially increased. This seems highly unlikely, suggesting that the Post-9/11 GI Bill did have a large positive effect on grade retention. This finding adds support to the relatively small literature demonstrating financial aid impacts on the persistence of enrolled individuals.[68]

We might also care about whether veterans are more likely to remain in school for an additional year due to the benefit expansion. In Table 9, regressions are restricted to individuals enrolled as freshmen, sophomores, or juniors in the prior year. Estimates in the first two columns suggest that higher benefit levels make an individual more likely to persist in college. This increase in persistence appears to contribute to higher enrollment levels at four-year public institutions, as individuals enrolled in 2008 or 2009 are over fifteen percentage points more likely to be enrolled in a four-year school during the following year. As this may be an artifact of the inclusion of the 2010 data, and thus including individuals already pushed to four-year schools initially in 2009 by the higher benefit levels, I estimate similar specifications dropping the 2010 data. Presented in the final two columns, the same pattern of results remains, indicating that the higher level and change in structure of the benefits potentially drove veterans to transfer to four-year institutions.[69]

In the middle two columns, I focus on the increase in persistence of those individuals who actually received benefits at time $t-1$. If there are meaningful liquidity constraints for these individuals (as there likely were during late 2008 and 2009), there should be a larger effect on persistence for those that received funds at both time $t-1$ and time t. Estimates in columns (3) and (4) are in line with this expectation, with male veterans enrolled during 2009 substantially more likely to enroll the following year. Of course, this introduces selection of individuals drawn into college by the benefits during the fall of 2009 suggesting that we interpret these results with caution. But, as above, we expect this to shift the composition of students towards individuals less likely to persist.

[68] Bettinger finds suggestive evidence that an additional $1,000 in aid (much smaller than the GI expansion) reduces drop out between the first and second year of college by between one and nine percent.

[69] Veterans changing their initial enrollment patterns towards four-year schools in 2008 is also consistent with this pattern, although there is no evidence that enrollment of veterans was affected at this time.

8 Discussion and Conclusion

This paper uses variation generated by the new GI Bill to add to the evidence on the impact of financial aid on enrollment. In particular, I add to the sparse literature on the impact of financial aid on older, non-traditional students, demonstrating strong effects of the new GI Bill on enrollment. Using a simple model, I illustrate how a nominally flat national benefit replaced by a benefit which arguably provides more equivalent real benefit levels, actually generated differences in the size of the benefit expansion received by veterans. This is then the first paper to use cross-state variation in benefit expansion over time to estimate the effect of education subsidies; estimates indicate that enrollment is responsive to the size of the benefit expansion along multiple dimensions and using multiple strategies.

It appears that even at relatively high initial levels of financial aid, additional funding has a sizable impact on enrollment, resulting in fifteen to twenty percent higher enrollment for males. In order to better quantify the degree of infra-marginal use, I obtained data on the total number of beneficiaries provided by the Veterans Affairs department. I find that although enrollment of male veterans has increased by fifteen to twenty percent, benefit usage has increased by nearly 50%.[70] This leads one to wonder how much of the increase in benefit uptake is infra-marginal. According to a US department of Education brief, only 37.7% of enrolled military students received GI Bill education benefits during the 2007-2008 academic year (Radford 2011).[71] If we use the upper bound (20%) and lower bound (10%) estimate of the veteran enrollment increase for the full sample, and assume that all marginal enrollees received benefits, this would imply an increase in benefit usage of between 27% and 53%. Thus, while it is possible that benefit use has increased only among marginal enrollees, it seems likely that there is some degree of infra-marginal usage, and likely a significant amount.

A high level of infra-marginal use calls into question the cost effectiveness of the program. What makes the finding even more dramatic is that the average benefit level paid out has risen substantially. Given the estimates here, the VA has roughly doubled its annual expenditures on veteran education and training programs in order to increase male veteran enrollment by fifteen to twenty percent.

Of course, one must keep in mind that persistence and the quality of enrollment have increased as well.[72] Furthermore, to the degree that the benefit expansion helped veterans overcome credit constraints and enroll, there may be additional large efficiency gains associated with the bill. Understanding the role that credit constraints play in independent students' decisions to enroll is an important question for future work. As more time passes

[70] The total number of beneficiaries was 498,123 in 2006, 523,344 in 2007, 541,439 in 2008, 564,487 in 2009, and 800,369 in 2010.

[71] Military students includes both separated veterans and current military service members.

[72] Although it is not clear that pushing individuals towards higher-quality schooling is actually welfare enhancing if veterans prefer to attend cheaper schools and consume the rest of their benefits.

and Post-9/11 GI Bill users enter the workforce, better estimates of the overall benefits associated with the benefit expansion will become available.

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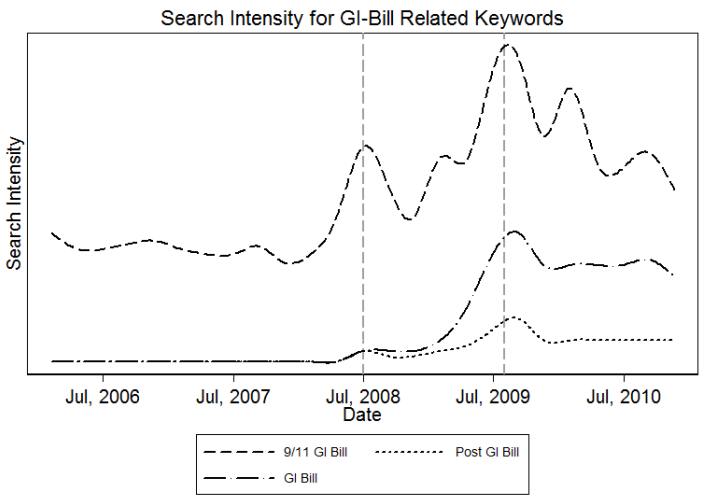


Figure 3: Interest in the Post-9/11 GI Bill

Note: The vertical lines represent the passage (June 30, 2008) and the implementation (August 1, 2009) of the Post-9/11 GI Bill. Search intensity for each set of keywords is scaled so that all may be depicted on the same graph. Weekly data on search intensity is smoothed using a median spline. Search intensities collected from Google Insight. See Google Insight documentation for explicit documentation.

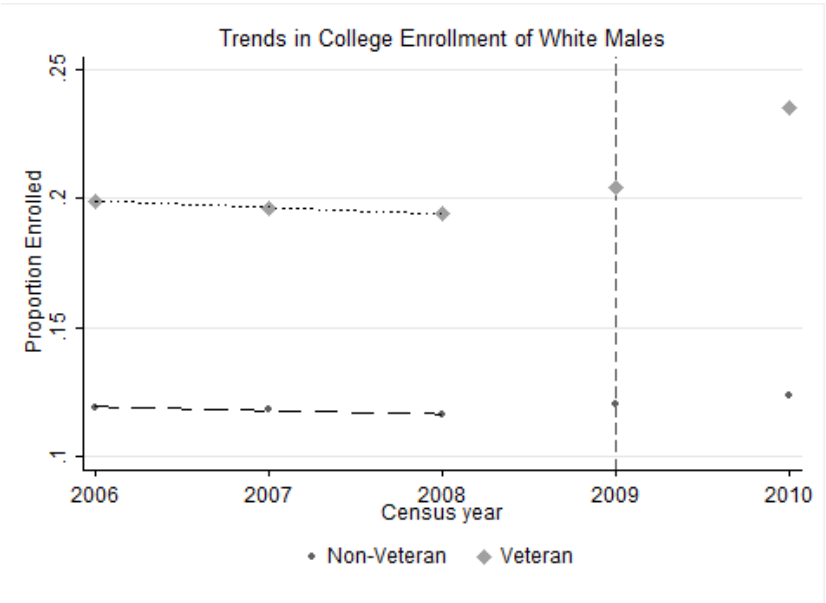


Figure 4: Veteran vs. Non-Veteran Enrollment: White Males

Note: Shaded line represents the implementation (August 1, 2009) of the Post-9/11 GI Bill. Markers represent the (weighted) proportion of veterans and non-veterans aged 23-28 enrolled in college using the American Community Survey 2006-2010.

TABLE 1

DESCRIPTIVE STATISTICS

Variable	Full Sample (ACS)		Full Sample (CPS)		White Males (ACS)	
	Veteran	Non Veteran	Veteran	Non Veteran	Veteran	Non Veteran
Male	0.82	0.48	0.79	0.48	1.00	1.00
White	0.73	0.73	0.77	0.77	1.00	1.00
Black	0.12	0.12	0.12	0.11	0.00	0.00
School	0.26	0.20	0.25	0.17	0.23	0.18
College	0.23	0.13	0.23	0.13	0.21	0.12
Public	0.19	0.11	0.19	0.09	0.17	0.10
Private	0.04	0.02	0.03	0.02	0.03	0.02
Two-Year			0.09	0.04		
Four-Year Public			0.14	0.09		
Four-Year Private			0.03	0.03		
Part-Time			0.07	0.06		
Full-Time			0.18	0.11		
Grad School	0.03	0.06	0.03	0.06	0.02	0.06
N	38,999	824,118	1,238	41,687	24,099	285,634

Note: ACS statistics calculated for individuals aged 23-28 from ACS years 2006-2010. CPS statistics calculated for individuals aged 23 28 from CPS years 2006-2010.

TABLE 2

IMPACT OF POST-9/11 GI BILL ON ENROLLMENT: ACS

Dependent Variable	Vet Mean	(1)	(2)	(3)	(4)	(5)	(6)
Enrolled	0.26	0.0210***	0.0210***	0.0219***	0.0251	0.0267**	0.0388***
		(0.00520)	(0.00520)	(0.00536)	(0.0157)	(0.0122)	(0.00628)
College	0.23	0.0212***	0.0212***	0.0230***	0.0246	0.0323***	0.0406***
		(0.00443)	(0.00443)	(0.00457)	(0.0149)	(0.0104)	(0.00534)
Public	0.19	0.0159***	0.0159***	0.0170***	0.0175	0.0255***	0.0314***
		(0.00408)	(0.00407)	(0.00420)	(0.0149)	(0.00952)	(0.00491)
Private	0.04	0.00537***	0.00536***	0.00597***	0.00709	0.00673	0.00919***
		(0.00205)	(0.00205)	(0.00211)	(0.00544)	(0.00480)	(0.00247)
Grad School	0.03	-0.00122	-0.00118	-0.00235	0.00160	-0.00780	-0.00267
		(0.00311)	(0.00310)	(0.00319)	(0.00430)	(0.00741)	(0.00376)
N		863,117	863,117	687,626	687,626	830,288	850,125
State Fixed Effects		No	Yes	Yes	Yes	Yes	Yes
Exclude ACS 2009		No	No	Yes	Yes	No	No
Veteran Trend		No	No	No	Yes	No	No
Vet Restriction: Active Last Year		No	No	No	No	Yes	No
Vet Restriction: Not in Military		No	No	No	No	No	Yes

Note: Each cell is a separate regression. Coefficients are for interaction of post-2009 indicator variable with veteran status (robust standard errors clustered at the state level in parentheses). All specifications include age, age*veteran indicators, and year and state of birth fixed effects. Regressions are limited to individuals age 23-28 from ACS years 2006-2010. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

TABLE 3

IMPACT OF POST-9/11 GI BILL ON COLLEGE ENROLLMENT: ACS
DEMOGRAPHIC HETEROGENEITY

Subgroup	N	Vet Mean	(1)	(2)	(3)	(4)	(5)	(6)
Males	426,444	0.21	0.0273***	0.0272***	0.0293***	0.0246	0.0432***	0.0516***
			(0.00479)	(0.00478)	(0.00493)	(0.0149)	(0.0110)	(0.00578)
White	336,282	0.21	0.0298***	0.0297***	0.0316***	0.0378*	0.0535***	0.0559***
			(0.00529)	(0.00528)	(0.00546)	(0.0199)	(0.00640)	(0.0123)
Black	49,728	0.20	0.0294**	0.0289**	0.0308**	0.0523	0.0408	0.0585***
			(0.0142)	(0.0142)	(0.0146)	(0.0370)	(0.0314)	(0.0168)
Females	436,673	0.32	-0.00378	-0.00375	-0.00180	-0.00454	-0.00340	-0.0108
			(0.0107)	(0.0107)	(0.0110)	(0.0252)	(0.0124)	(0.0250)
State Fixed Effects			No	Yes	Yes	Yes	Yes	Yes
Exclude ACS 2009			No	No	Yes	Yes	No	No
Veteran Trend			No	No	No	Yes	No	No
Vet Restriction: Active Last Year			No	No	No	No	Yes	No
Vet Restriction: Not in Military			No	No	No	No	No	Yes

Note: Each cell is a separate regression. Coefficients are for interaction of post-2009 indicator variable with veteran status (robust standard errors clustered at the state level in parentheses). All specifications include age, age*veteran indicators, and year and state of birth fixed effects. Regressions are limited to individuals age 23-28 from ACS years 2006-2010. Sample sizes provided for columns (1) and (2). Sample sizes somewhat smaller for columns (3)-(6).
***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

TABLE 4

IMPACT OF POST-9/11 GI BILL ON COLLEGE ENROLLMENT OF WHITE MALES: ACS GEOGRAPHIC HETEROGENEITY IN BENEFIT LEVELS

Benefit Examined	(1)	(2)	(3)	(4)
College				
Post-9/11 Impact	0.0337***	0.0581***	0.0339***	0.0581***
	(0.00564)	(0.00724)	(0.00560)	(0.00728)
Post-9/11 Impact*Tuition Maximum	0.00669	0.00764	0.00570	0.00654
	(0.00431)	(0.00722)	(0.00420)	(0.00725)
Post-9/11 Impact*Fee Maximum	0.00700	0.00778	0.00752	0.00852
	(0.00514)	(0.00555)	(0.00531)	(0.00590)
Post-9/11 Impact*BAH	0.0111**	0.0113*	0.0119**	0.0122*
	(0.00500)	(0.00657)	(0.00501)	(0.00666)
Public College				
Post-9/11 Impact	0.0236***	0.0409***	0.0239***	0.0410***
	(0.00559)	(0.00716)	(0.00556)	(0.00727)
Post-9/11 Impact*Tuition Maximum	0.00459	0.00610	0.00318	0.00425
	(0.00433)	(0.00713)	(0.00425)	(0.00730)
Post-9/11 Impact*Fee Maximum	0.0102**	0.0134***	0.0102**	0.0132**
	(0.00467)	(0.00487)	(0.00485)	(0.00563)
Post-9/11 Impact*BAH	0.00658	0.00263	0.00767*	0.00409
	(0.00432)	(0.00665)	(0.00429)	(0.00681)
Private College				
Post-9/11 Impact	0.0101***	0.0172***	0.0100***	0.0171***
	(0.00214)	(0.00276)	(0.00215)	(0.00279)
Post-9/11 Impact*Tuition Maximum	0.00211	0.00154	0.00252	0.00229
	(0.00176)	(0.00209)	(0.00178)	(0.00212)
Post-9/11 Impact*Fee Maximum	-0.00324**	-0.00565***	-0.00263	-0.00467*
	(0.00146)	(0.00204)	(0.00189)	(0.00257)
Post-9/11 Impact*BAH	0.00447*	0.00867***	0.00420*	0.00815***
	(0.00248)	(0.00301)	(0.00249)	(0.00306)
Vet Restriction: Not in Military	No	Yes	No	Yes
Fee Maximum Top-Coded at $30,000	No	No	Yes	Yes

Note: Each cell is a separate regression. Coefficients are for interaction of post-2009 indicator variable with veteran status and triple interaction with benefit maximums (robust standard errors clustered at the state level in parentheses). Benefits are standardized to be mean zero standard deviation one variables. Standard deviations are: $352 for tuition credit maximums; $14,967 ($8,200 when top-coded at $30,000) for semester fee level maximums; $353 for monthly housing allowances. All specifications include age, age*veteran indicators, and year, state of birth, state, and state*veteran fixed effects as well as the full set of interactions between Post-2009, veteran status, and the state benefit level. Regressions are limited to individuals age 23-28 from ACS years 2006-2010. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

TABLE 5

IMPACT OF POST-9/11 GI BILL ON COLLEGE ENROLLMENT OF WHITE MALES: ACS GEOGRAPHIC HETEROGENEITY IN COMBINED TUITION AND HOUSING

	(1)	(2)
Post-9/11 Impact	0.0330***	0.0574***
	(0.00653)	(0.00776)
Post-9/11 Impact*Combined Tuition and Housing	0.0103**	0.0113*
	(0.00455)	(0.00614)
Effect by Quartile of Combined Tuition and Housing		
Post-9/11 GI Bill Impact: Quartile 1	0.0258*	0.0469***
	(0.0132)	(0.0148)
Post-9/11 GI Bill Impact: Quartile 2	0.0174	0.0425**
	(0.0145)	(0.0152)
Post-9/11 GI Bill Impact: Quartile 3	0.0305*	0.0542**
	(0.0148)	(0.0201)
Post-9/11 GI Bill Impact: Quartile 4	0.0580***	0.0807***
	(0.00953)	(0.0140)
Vet Restriction: Not in Military	No	Yes

Note: The top panel provides coefficients similar to those in Table 4, but only including the combined measure of tuition and housing benefits. Coefficients are for interaction of post-2009 indicator variable with veteran status and triple interaction with benefit maximum (robust standard errors clustered at the state level in parentheses). Each cell in the bottom panel represents a separate regression. Coefficients are for interaction of post-2009 indicator variable with veteran status (robust standard errors clustered at the state level in parentheses). "Combined Tuition and Housing" is a generated variable equal to 4.5*BAH plus 12*Tuition Maximum. Benefits are standardized to be mean zero standard deviation one variables. Standard deviation of "Tuition and Housing Combined" is $4,489. All specifications include age, age*veteran indicators, and year, state of birth, state, and state*veteran fixed effects. The top panel includes the full set of interactions between Post-2009, veteran status, and the state benefit level. Regressions are limited to individuals age 23-28 from ACS years 2006-2010. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

TABLE 6

IMPACT OF POST-9/11 GI BILL ON ENROLLMENT OF SEPARATED WHITE MALES: CPS
BY TYPE OF SCHOOLING: LINEAR PROBABILITY ESTIMATES

Dependent Variable	Vet Mean	(1)	(2)	(3)	(4)
School	0.25	0.0642*	0.0682**	0.0621*	0.0655*
		(0.0336)	(0.0332)	(0.0343)	(0.0339)
College	0.23	0.0470	0.0493	0.0419	0.0434
		(0.0315)	(0.0314)	(0.0319)	(0.0318)
Full-Time	0.18	0.0676**	0.0698**	0.0650**	0.0667**
		(0.0275)	(0.0277)	(0.0278)	(0.0279)
Part-Time	0.06	-0.00222	-0.00180	-0.00169	-0.00116
		(0.0194)	(0.0195)	(0.0192)	(0.0192)
Four-Year	0.17	0.0528	0.0558	0.0509	0.0535
		(0.0357)	(0.0353)	(0.0358)	(0.0354)
Public	0.14	0.0482	0.0511	0.0459	0.0484
		(0.0321)	(0.0320)	(0.0322)	(0.0319)
Private	0.03	0.00465	0.00473	0.00499	0.00514
		(0.0129)	(0.0130)	(0.0130)	(0.0131)
Two-Year	0.09	0.0125	0.0122	0.0124	0.0121
		(0.0225)	(0.0230)	(0.0227)	(0.0232)
Two-Year Public	0.08	0.00458	0.00417	0.00399	0.00349
		(0.0218)	(0.0223)	(0.0219)	(0.0225)
Graduate School	0.03	0.0183	0.0187	0.0214	0.0221
		(0.0152)	(0.0154)	(0.0152)	(0.0154)
Vocational Courses	0.05	-0.00696	-0.00766	-0.00692	-0.00745
		(0.0137)	(0.0138)	(0.0136)	(0.0137)
N		15,572	14,542	15,572	14,542
Sample Restriction: >=HS Deg.		No	Yes	No	Yes

Note: Each cell is a separate regression. Coefficients are for interaction of post-2008 indicator variable with veteran status (robust standard errors clustered at the state level in parentheses). All regressions include age and age*vet indicators and state fixed effects. Regressions are limited to individuals age 23-28 from October CPS years 2006-2010. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

TABLE 7

IMPACT OF POST-9/11 GI BILL ON COLLEGE CHOICE OF SEPARATED WHITE MALES: CPS
AVERAGE MARGINAL EFFECTS FROM MULTINOMIAL LOGIT ESTIMATION

Sample	Not Enrolled	Two-Year	Four-Year
Separated from Military	-0.0630**	0.0171	0.0493*
	(0.02761)	(0.01711)	(0.02787)

Note: Average marginal effects for the veteran group are calculated for the cross derivative with respect to Post-2008 and Vet Status. Bootstrapped standard errors are in parentheses. All regressions include age and age*veteran indicators as well as state and year fixed effects. Regressions are limited to individuals age 23-28 from October CPS years 2006-2010, resulting in 15,572 observations after restricting the veteran sample to individuals having separated from the military. Of these, 757 are veteran observations. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

TABLE 8

IMPACT OF POST-9/11 GI BILL ON GRADE COMPLETION: OCTOBER CPS

Dependent Variable	Vet Mean	(1)	(2)	N
Males	0.78	0.163***	0.158***	2,157
		(0.0512)	(0.0552)	
White Males	0.79	0.192***	0.182**	1,652
		(0.0641)	(0.0702)	
State Fixed Effects		No	Yes	

Note: Each cell is a separate regression. Coefficients are for interaction of post-2009 indicator variable (i.e, first treated year is the 2009-2010 school year, which is referenced in the 2010 survey) with veteran status (robust standard errors clustered at the state level in parentheses). Grade completion variable is constructed using grade enrolled during the prior year combined with years of college credit accumulated by current year and current education attainment level. All regressions include race, age, and age*veteran indicators. Regressions are limited to individuals age 23-28 from October CPS years 2007-2010 (referencing 2006-2007 through 2009-2010 school year). ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

TABLE 9

IMPACT OF POST-9/11 GI BILL ON PERSISTENCE AND TRANSFER: OCTOBER CPS

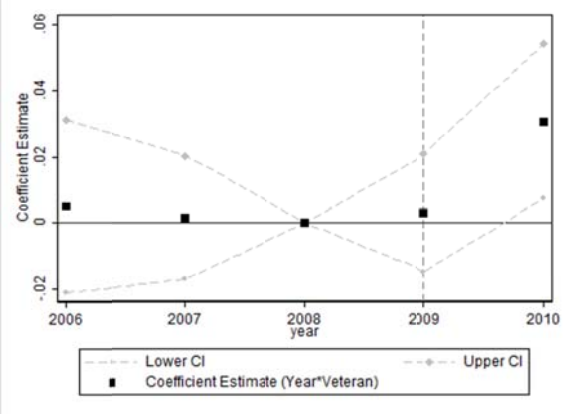
	ALL YEARS				EXCLUDE 2010	
	Post-2008 Effect		Post-2009 Effect		Post-2008 Effect	
Dependent Variable	Males	White Males	Males	White Males	Males	White Males
College	0.0680	0.132	0.166*	0.211*	0.00670	0.0566
	(0.0776)	(0.0856)	(0.0942)	(0.115)	(0.0951)	(0.0978)
Four-Year	0.171*	0.170*	0.164	0.100	0.201*	0.219*
	(0.0891)	(0.0973)	(0.106)	(0.128)	(0.106)	(0.113)
Two-Year	-0.106	-0.0479	-0.0104	0.0873	-0.189**	-0.162*
	(0.0742)	(0.0882)	(0.0970)	(0.115)	(0.0735)	(0.0844)
N	1,956	1,439	1,566	1,146	1,549	1,150

Note: Each cell is a separate regression. Coefficients are for interaction of Post-2008 or Post-2009 indicator variable with veteran status (robust standard errors clustered at the state level in parentheses). Regressions using Post-2009 indicator and interaction drop 2009 observations. All regressions control for age, age*vet, race, and state fixed effects and are restricted to individuals enrolled at the freshman, sophomore, or junior level during the prior year. Coefficients are for interaction of post-2008 indicator variable with veteran status. Regressions are limited to individuals age 23-28 from CPS October years 2006-2009/2010.***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

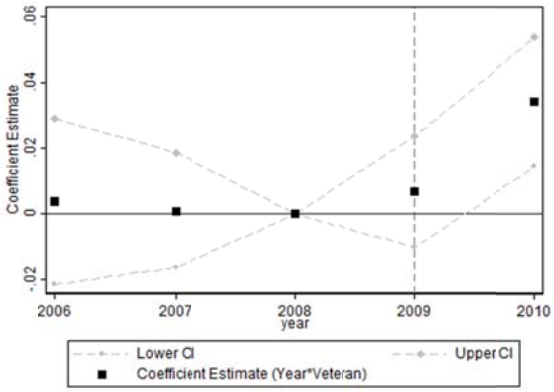
Figure A1:

Event Study Figures

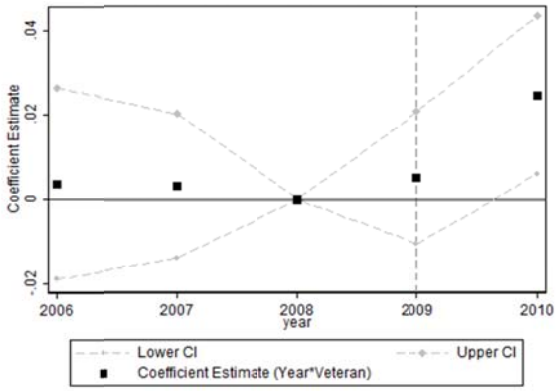
A: School



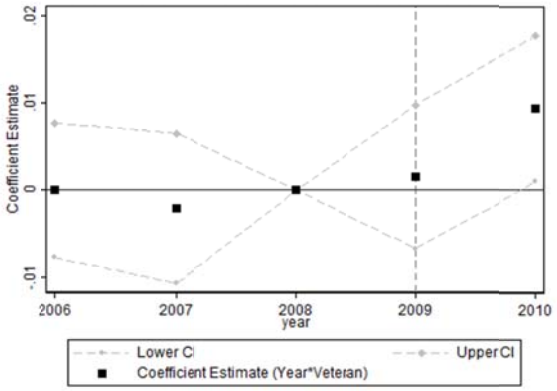
B: College



C: Public College



D: Private College

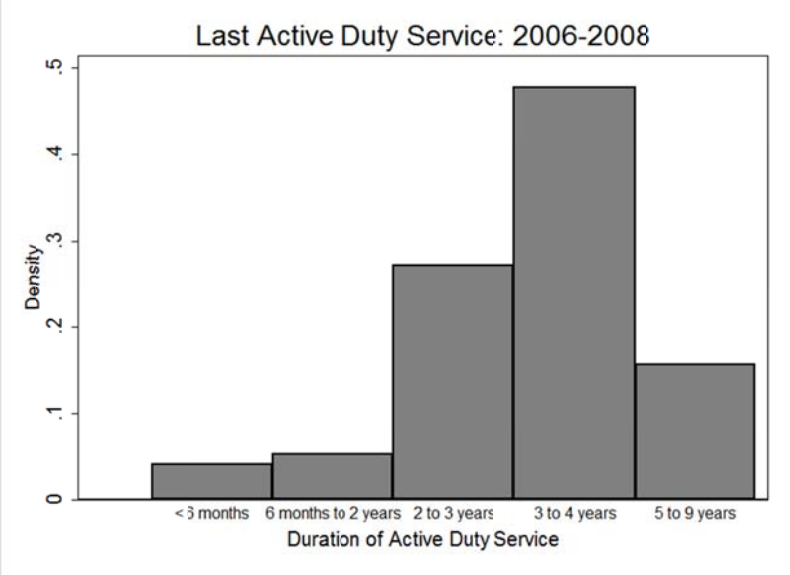


Note: Based on the author's calculations using the 2006-2010 ACS. Solid black squares plot coefficients on the interaction of veteran status and the respective year from a single regression. Sample restricted to white males ages 23-28. All regressions include sex, race, age, and age*vet indicators, and state of birth and residence fixed effects. Robust standard errors are clustered at the state level. Dotted lines represent upper and lower 95 percent confidence intervals. Each panel reports information from a separate regression with the dependent variable indicated by the title of the panel.

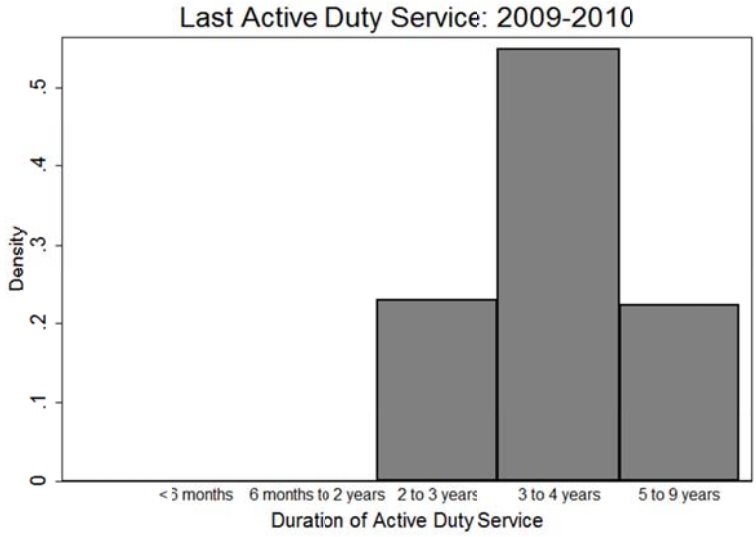
Figure A2:

Duration of Male Active Duty Service Before and After GI Bill: Age 22-28

Panel A



Panel B



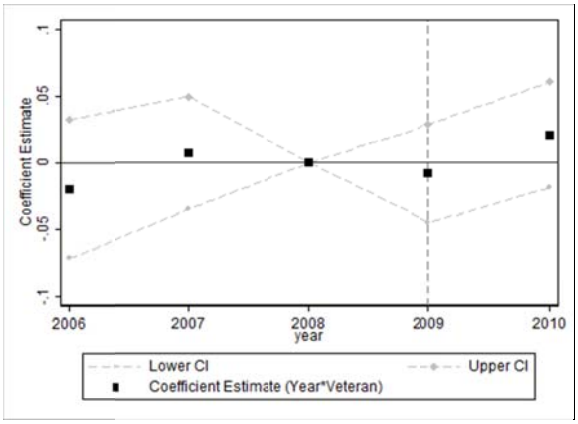
Note: Panel A shows the (weighted) distribution of active duty service of those veterans whose last active duty service occurred between 2006 and 2008. Panel B shows the analagous distribution for those whose last active duty service occurred between 2009 and 2010. Figures created using data from the 2007, 2009, and 2010 Veteran Supplements to the Current Population Survey. Sample restricted to males age 23-28 whose last active duty service was not the result of a call-up from the Reserves or National Guard.

Figure A3:

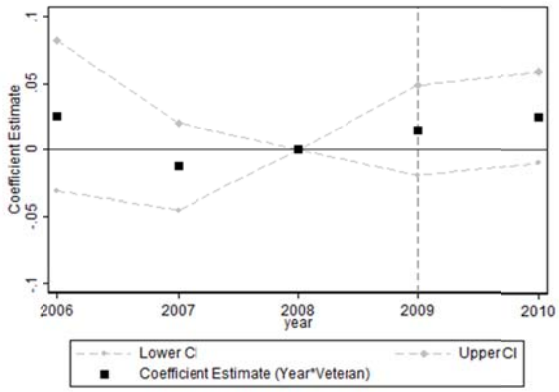
College Effect by Quartile of Combined Tuition and Housing: White Males

Event Study Figures

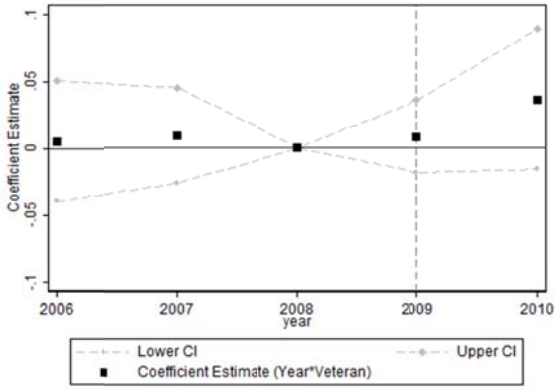
A: Q1



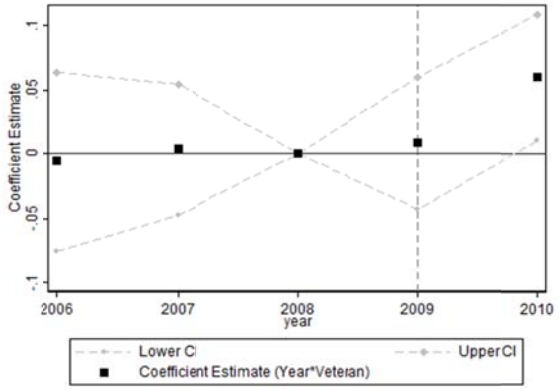
B: Q2



C: Q3

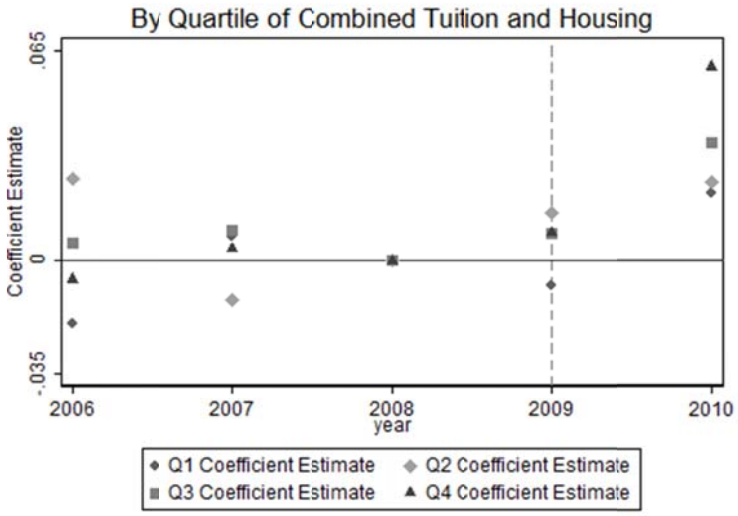


D: Q4



Note: Based on the author's calculations using the 2006-2010 ACS. Solid black squares plot coefficients on the interaction of veteran status and the respective year from a single regression. Sample restricted to white males ages 23-28. All regressions include sex, race, age, and age*vet indicators, and state of birth, state of residence, and state of residence*veteran fixed effects. Robust standard errors are clustered at the state level. Dotted lines represent upper and lower 95 percent confidence intervals. Each panel reports information from a separate regression with the sample split based on the combined tuition and housing variable described in the paper.

E: Coefficient Estimates from Panels A-D Combined

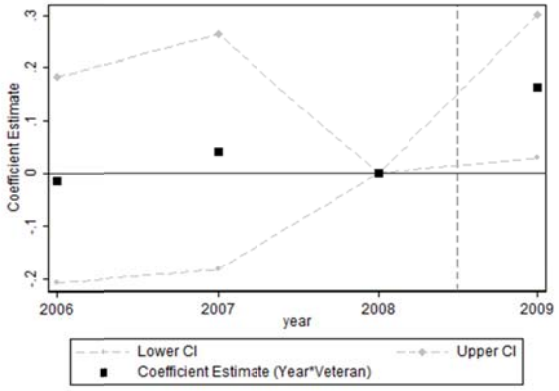


Note: Each type of dot plots coefficients on the interaction of veteran status and the respective year from a single regression. The four dot types correspond to the four quartiles of combined tuition and housing used in Panels A-D.

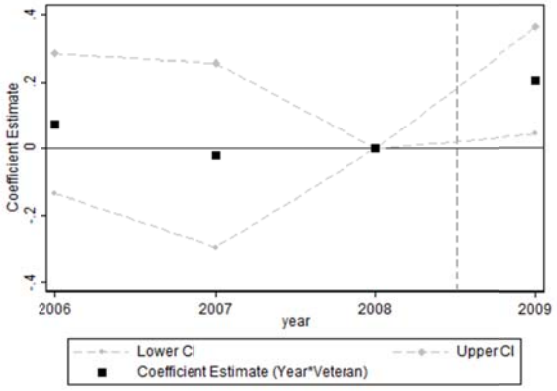
Figure A4:

Event Study Figures (Persistence)

A: Males



B: White Males



Note: Based on the author's calculations using the 2007-2010 CPS (years on x-axis represents beginning of school year referenced – i.e., 2006 refers to whether the individual asked in 2007 had completed the grade enrolled in during the 2006-2007 school year). Solid black squares plot coefficients on the interaction of veteran status and the respective. Sample restricted to ages 23-28. All regressions include race, age, and age*vet indicators, and state of residence fixed effects. Robust standard errors are clustered at the state level. Dotted lines represent upper and lower 95 percent confidence intervals. Each panel reports information from a separate regression.

TABLE A1

GEOGRAPHIC VARIATION IN BENEFIT LEVELS UNDER THE POST-9/11 GI BILL

State	Tuition Per Credit Maximum	Fees Per Term Maximum	Basic Allowance for Housing
Alabama	$292	$13,328	$1,010
Alaska	$159	$13,429	$1,900
Arizona	$657	$15,001	$1,243
Arkansas	$200	$1,811	$880
California	$336	$2,165	$1,877
Colorado	$497	$45,388	$1,335
Connecticut	$516	$2,509	$1,875
Delaware	$356	$523	$1,572
District of Columbia	$198	$620	$1,917
Florida	$295	$62,000	$1,471
Georgia	$434	$15,215	$1,103
Hawaii	$282	$1,449	$1,972
Idaho	$259	$2,821	$957
Illinois	$575	$12,836	$1,425
Indiana	$322	$12,438	$1,039
Iowa	$324	$11,817	$921
Kansas	$394	$3,804	$992
Kentucky	$430	$11,235	$931
Louisiana	$430	$2,623	$1,090
Maine	$329	$2,805	$1,170
Maryland	$458	$2,380	$1,721
Massachusetts	$330	$17,787	$1,838
Michigan	$990	$9,792	$1,129
Minnesota	$750	$4,494	$1,242
Mississippi	$449	$805	$995
Missouri	$269	$9,863	$1,030
Montana	$205	$4,250	$980
Nevada	$136	$2,839	$1,289
New Hampshire	$933	$4,977	$1,507
New Jersey	$451	$5,736	$1,879
New Mexico	$213	$11,342	$1,044
New York	$1,010	$12,697	$2,076
North Carolina	$494	$2,164	$1,058
North Dakota	$410	$25,928	$933
Ohio	$477	$15,134	$1,023
Oklahoma	$151	$11,546	$918
Oregon	$438	$22,190	$1,164
Pennsylvania	$886	$6,391	$1,364

Rhode Island	$343	$2,020	$1,674
South Carolina	$484	$4,306	$1,076
South Dakota	$93	$4,748	$916
Tennessee	$248	$13,190	$1,041
Texas	$1,471	$12,130	$1,240
Utah	$209	$63,577	$1,119
Vermont	$488	$2,511	$1,416
Virginia	$326	$3,840	$1,358
Washington	$380	$14,445	$1,303
West Virginia	$267	$4,030	$924
Wisconsin	$663	$30,979	$1,082
Wyoming	$94	$4,335	$1,022

Note: Tuition credit maximums and fee level maximums are for 2009-2010 obtained from http://www.gibill.va.gov/gi_bill_info/ch33/tuition_and_fees_2009.htm. Basic allowances for housing are population weighted state averages of zip code BAH levels for 2010.

TABLE A2

PLACEBO YEAR EFFECTS FOR WHITE MALES: ACS

Dependent Variable	(1)	(2)	(3)	(4)	(5)
College					
2006	0.001	0.001	0.003	-0.007	-0.006
	(0.0068)	(0.0068)	(0.0072)	(0.0165)	(0.0085)
2007	-0.003	-0.003	-0.001	-0.012	-0.005
	(0.0068)	(0.0067)	(0.0072)	(0.0173)	(0.0085)
2008	-0.003	-0.004	-0.002	0.022	-0.001
	(0.0068)	(0.0068)	(0.0072)	(0.0196)	(0.0087)
Public College					
2006	0.001	0.001	0.002	-0.009	-0.003
	(0.0064)	(0.0064)	(0.0067)	(0.0156)	(0.0081)
2007	0.000	0.000	0.001	-0.014	-0.002
	(0.0063)	(0.0063)	(0.0067)	(0.0164)	(0.0080)
2008	-0.004	-0.004	-0.003	0.024	-0.006
	(0.0063)	(0.0063)	(0.0067)	(0.0187)	(0.0082)
Private College					
2006	0.000	0.000	0.001	0.001	-0.003
	(0.0030)	(0.0030)	(0.0032)	(0.0070)	(0.0036)
2007	-0.003	-0.003	-0.002	0.002	-0.003
	(0.0029)	(0.0029)	(0.0031)	(0.0073)	(0.0036)
2008	0.001	0.000	0.001	-0.002	0.005
	(0.0030)	(0.0030)	(0.0032)	(0.0078)	(0.0039)
N	247,098	247,098	184,106	230,541	240,276
State Fixed Effects	No	Yes	Yes	Yes	Yes
Exclude ACS 2009	No	No	Yes	No	No
Vet Restriction: Active Last Year	No	No	No	Yes	No
Vet Restriction: Not in Military	No	No	No	No	Yes

Note: Each cell is a separate regression. Coefficients are for interaction of Year listed indicator variable with veteran status (robust standard errors clustered at the state level in parentheses). All specifications include age, age*veteran indicators, and year and state of birth fixed effects. Regressions are limited to individuals age 23-28 from ACS years 2006-2009. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

TABLE A3

IMPACT OF POST-9/11 GI BILL ON COLLEGE ENROLLMENT OF WHITE MALES: ACS UNEMPLOYMENT CONTROLS INCLUDED

Subgroup	(1)
Post-9/11 Impact	0.0297***
	(0.0101)
UR	0.0017*
	(0.0009)
UR*Veteran	0.0003
	(0.0014)

Note: Each cell is a separate regression. Coefficients are for interaction of post-2009 indicator variable with veteran status (robust standard errors clustered at the state level in parentheses). All specifications include age, age*veteran indicators, and year, state of birth, and state of residence fixed effects. Regressions are limited to individuals age 23-28 from ACS years 2006-2010. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

TABLE A4

EFFECTS OF POST-9/11 GI BILL ON CHARACTERISTICS OF LIKELY SEPARATORS: ACS

Dependent Variable	Post-2008	Post-2009
Black	0.00436	0.00749
	(0.0141)	(0.0156)
Male	0.0174	0.00643
	(0.0166)	(0.0113)
Age	-0.00867	0.0542
	(0.0654)	(0.0723)
HS Degree or More	-0.00393	-0.00567
	(0.00469)	(0.00410)

Note: Each cell is a separate regression. Coefficients are for interaction of post-2008 or post-2009 indicator variable with an indicator variable for whether an individual was on active duty within the past year (robust standard errors clustered at the state level in parentheses). Sample limited to those who were on active duty at the time of the survey or were on active duty within the past year Thus, the coefficient indicates how the difference in the characteristics of those on active duty within the past year and those currently on active duty changed from before to after the implementation of the Post-9/11 GI Bill. All specifications include an indicator variable for whether an individual was on active duty within the past year and state of birth fixed effects. Regressions are limited to individuals age 23-28 from ACS years 2006-2010.
***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

TABLE A5

EFFECTS OF POST-9/11 GI BILL ON MIGRATION OF WHITE MALES: ACS

Dependent Variable	(1)	(2)	(3)	(4)
Housing Allowance (BAH)	-0.00250	-0.00265	-0.000648	-0.00139
	(0.0126)	(0.0159)	(0.0136)	(0.0318)
Tuition Maximum	-0.00494	-0.000907	-0.00273	0.00989
	(0.0124)	(0.0152)	(0.0131)	(0.0233)
Fee Maxium	-0.00915	-0.00956	-0.0186	-0.0300
	(0.0167)	(0.0145)	(0.0262)	(0.0546)
Combined Tuition and Housing	-0.00554	-0.00179	-0.00280	0.00882
	(0.0128)	(0.0149)	(0.0138)	(0.0212)
Veteran Trend	No	Yes	No	No
Exclude ACS 2009	No	No	Yes	No
Vet Restriction: Active Last Year	No	No	No	Yes

Note: Each cell is a separate regression. "Combined Tuition and Housing" is a generated variable equal to 4.5*BAH plus 12*Tuition Maximum. Benefits are standardized to be mean zero standard deviation one variables. Standard deviations are: $352 for tuition credit maximums; $14,967 for semester fee level maximums; $353 for monthly housing allowances; $4,489 for combined tuition and housing. Coefficients are for interaction of post-2009 indicator variable with veteran status (robust standard errors clustered at the state level in parentheses). All specifications include age, age*veteran indicators, and year and state of birth fixed effects. Regressions are limited to individuals age 23-28 from ACS years 2006-2010. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.

TABLE A6

IMPACT OF POST-9/11 GI BILL ON COLLEGE ENROLLMENT OF WHITE MALES: ACS GEOGRAPHIC HETEROGENEITY IN BENEFIT LEVELS

Sample	(1)	(2)
Housing Allowance		
BAH ≥ Median	0.0341**	0.0642***
	(0.0123)	(0.0140)
BAH ≤ Median	0.0296***	0.0490***
	(0.00770)	(0.0105)
Tuition Maximum		
Tuition Maximum ≥ Median	0.0416***	0.0631***
	(0.0109)	(0.0137)
Tuition Maximum ≤ Median	0.0238**	0.0497***
	(0.00950)	(0.00990)
Fee Maximum		
Fee Maximum ≥ Median	0.0385***	0.0551***
	(0.0104)	(0.0125)
Fee Maximum ≤ Median	0.0267**	0.0580***
	(0.0100)	(0.0115)
Combined Tuition and Housing		
Combined ≥ Median	0.0417***	0.0672***
	(0.0100)	(0.0132)
Combined ≤ Median	0.0219**	0.0450***
	(0.00965)	(0.0101)
Vet Restriction: Not in Military	No	Yes
Fee Maximum Censored at $30,000	No	No

Note: Each cell is a separate regression. Coefficients are for interaction of post-2009 indicator variable with veteran status (standard errors clustered at the state level in parentheses). All specifications include age, age*veteran indicators, and year, state of birth, state, and state*veteran fixed effects. Regressions are limited to individuals white males age 23-28 from ACS years 2006-2010. ***Significant at the 1 percent level. **Significant at the 5 percent level. *Significant at the 10 percent level.