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ABSTRACT

Weighing the Military Option: The Effects of Wartime Conditions on Investments in Human Capital*

Military service is an important vehicle through which young Americans invest in their human capital. Using internal military data, we show that county-level exposure to U.S. combat casualties during the Iraq and Afghanistan wars decreased the supply of new soldiers in that county, and changed the observable characteristics of soldiers who enlisted in that county. Using data from the American Community Survey, we find that exposure to casualties at a young age (17-18) increases the probability of dropping out from high school, and decreases the probability of attaining a college degree. The results suggest that increasing access to higher education and skill training positively impacts the human capital investments of marginal students.

JEL Classification: I20, I22, I26, J22

Keywords: military service, training, college aid, human capital

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1. Introduction

Educational wage differentials have risen significantly in the past 30 years. Heckman et al. (2010) estimate that the return to graduating from high school in the U.S. has risen by 50 percent in recent decades. Acemoglu and Autor (2011) estimate that between 1980 and 2008, the college wage premium has roughly doubled. These large returns are not only present for average students, but also for those who are academically marginal (Zimmerman 2014; Goodman et al. Forthcoming; Canaan and Mouganie 2016).

A series of influential papers attribute these wage differentials, in part, to an insufficient investment in human capital, particularly by American youth (Katz and Murphy 1992; Goldin and Katz 2008; Acemoglu and Autor 2011). Previous studies have argued that constraints in accessing post-secondary education could explain why the supply of skilled labor continues to lag behind the demand (Zimmerman 2014). For example, lack of access to short-term credit may prevent some individuals from attending college (Avery and Kane 2004; Dynarski and Scott-Clayton 2008). Decreasing the accessibility or increasing the cost of post-secondary education and training may deter marginal students from making such investments (Bound and Turner 2007; Zimmerman 2014). Consequently, some students may perceive a reduced benefit from a high school degree if they are unable to access post-secondary education or other skill training that requires a high school degree.[1]

[1] Many studies have used demand-driven shocks to estimate the impact of local economic conditions on human capital accumulation. For some examples see Topel (1986), Batrik (1991), Blanchard and Katz (1992), Black et al. (2005a), Black et al. (2005b), Atkin (Forthcoming), and Jacobsen and Parker (Forthcoming). See also Kane (1994) and Berger and Kostal (2002). The relationship between economic conditions and educational choices can also vary by gender, race, family background, degree level, and ability (Bedard and Herman 2006; Black and Sufi 2002).

Serving in the U.S. military is an important pathway through which young Americans can invest in their human capital. The military trains youth with no previous labor market experience in a variety of valuable skills, and offers subsidized college education for those who qualify (Lutz 2008; Patten and Parker 2011).[2] The military option is particularly important for individuals from low socioeconomic backgrounds who otherwise might not be able to enroll in college or obtain similar skills.[3]

The cost of military service, and thus the cost of obtaining these educational and training benefits, increases during wartime. In this paper we study the impact of a change in the (perceived) desirability of military service on the decision to enlist in the military and subsequent schooling outcomes. A change in the desirability of enlisting in the military can affect the educational outcomes and human capital investments for marginal candidates through two main channels. First, because high school graduation is one of the military's main enlistment criteria, increasing the cost of military service decreases the benefits to potential military recruits from graduating high school and could result in an increase in the probability of marginal students dropping out. Second, conditional on high school graduation, forgoing the military option can limit access to college education for individuals at the margin of college attendance by increasing its cost. Both of these channels can subsequently impact the long-run labor market outcomes of potential recruits.

[2] Historically, a large proportion of federal college aid grants were provided to veterans, increasing the lifetime benefits from military service (Deming and Dynarski 2010).

[3] According to data drawn from the Defense Manpower Data Center (DMDC), more than 2.6 million young men and women enlisted into the military between the years 1997-2013.

We measure changes in the desirability of military service using monthly (and yearly) variation in U.S. combat casualties across counties (and states) during 1997-2013. During this time period there were 6,823 combat casualties that occurred during the Afghanistan and Iraq Wars. Our identifying assumption is that the assignment of casualties from local areas in the U.S. is as-good-as random and that it does not impact the military's local demand for soldiers, which is instead set at the national level. Although the risk of military service at any point in time is set at the national level, local-level casualties may have a particularly salient effect on marginal recruits.[4]

Using internal military data, we first verify the relationship between local casualties and enlistment decisions. The results suggest that an increase in the monthly number of casualties in a county decreases the overall number of enlistments, consistent with the findings of Christensen (2015). More importantly, we find that the decrease in the number of enlistments is larger among young, white individuals, and those in the middle of the ability distribution, suggesting that wartime conditions impact the composition of new recruits, at least in the short run. We also find that an increase in the number of county-level casualties increases the likelihood that a newly signed recruit from that county will choose to discharge from service prior to shipping off to basic training.[5] This relationship is also stronger for young recruits with medium to high Armed Forces Qualification Test (AFQT) scores.

Next, we study whether increasing the cost of military service changed the educational investments of marginal recruits in the long run. We use data drawn from the 2002-2013

[4] This could occur through personal knowledge of deceased soldiers, exposure to more-in-depth media coverage, or a change in the sentiment towards the war.

[5] Applicants who sign an enlistment contract but never access into the military are labeled as discharged. See section 2.2 for more details.

American Community Survey (ACS) and combine it with the annual number of state-level casualties individuals were exposed to at a young age, when educational investments are being made. Confirming our results on enlistments, we find that exposure to casualties decreases the likelihood of ever serving in the military. Our main results indicate that an increase of 100 casualties at ages 17-18 increases the probability of dropping out from high school by about 3 percent. This is a novel finding, suggesting that increasing access to post-secondary education and training options positively impacts the high school graduation outcomes of marginal recruits. Interestingly, this effect is primarily driven by Hispanic men. As expected, exposure to casualties at ages 15-16 or 19-20 has no effect on high school graduation. The results also suggest that an increase of 100 casualties at ages 17-18 decreases the probability of obtaining any college education, graduating with an associate degree, or graduating with a bachelor's degree (BA) degree by about 1-3 percent. Exposure to casualties at ages 15-16 has no impact on college outcomes. In contrast to the high school results, the results on college outcomes are driven primarily by white men, suggesting that the marginal person for each of these choices is different. These effects are economically important especially considering that the overall (national) impact of wartime conditions on military service are likely to be significantly higher.

Our natural experiment offers an answer to an important policy question: How does improving access to obtaining human capital impact schooling choices for marginal students?[6] The results suggest that increasing the cost of access to post-secondary education or training has detrimental effects on human capital investments for both individuals at the high school graduation margin and for those who are at the margin of attending college. Moreover, although

[6] For example, the answer to this policy question is important to inform recent debates about national free community colleges proposed by President Obama.

the military is one of the largest employers of young men in the U.S., this is the first study to examine the relationship between a change in the cost of military service and schooling outcomes both prior to and subsequent to any potential military service. In contrast, previous studies have primarily focused on the educational and labor market effects of military service (Angrist 1990; Angrist 1993; Angrist and Krueger 1994; Card and Lemieux 2001; Angrist and Chen 2011), but it remains unclear how the availability of voluntary military service is related to the educational outcomes of potential recruits.[7] More broadly, the study also contributes to the literature on the effects of college aid. Previous studies have shown that increasing college aid leads to an increase in the probability of college attendance (Dynarski 2003; Dynarski 2005). Consistent with these results, we find that limiting access to subsidized higher education (by increasing the cost of joining the military) decreases the probability of obtaining college education.

The rest of the paper proceeds as follows. Section 2 provides a background about the Military's recruitment process and national enlistments trends. Section 3 verifies the relationship between local U.S. combat causalities and the number and characteristics of new enlistees using internal military data. Our main analysis is in Section 4, where we estimate the effect of local casualties on educational outcomes, and perform robustness checks. We conclude in section 5.

[7] Bound and Turner (2002) and Stanley (2003) estimate the effects of the GI Bill for World War II and the Korean veterans and find that it increased the schooling of veterans. Lemieux and Card (2001) found that part of the increase in schooling during the Vietnam War is due to draft avoidance behavior.

2. Background

2.1 Recruitment Process

The U.S. military plays a sizeable role in the U.S. labor market for young Americans. During 1997 to 2013, the five armed service branches of the U.S. military recruited approximately 166,875 active duty recruits per year.[8] This amounts to about 1.9 percent of qualified youth aged 17 to 24 who possess the necessary physical, educational, and aptitude levels required to join the military.[9]

Recruiting qualified youth is conducted by military production recruiters. Recruiters are assigned to thousands of recruiting units stationed across every state and can be found in malls and around high-traffic areas. For example, in 2011 the Army, Air Force, Navy, and Marine Corps had about 12,444 recruiters working for them nationwide.[10] The recruiting process is typically viewed as having three main stages: application, contract, and accession. The application process occurs when potential recruits show interest by contacting a local recruiting station at which stage they are recorded by the military as an *applicant*. Recruiters conduct initial entry standards reviews by checking an applicant's educational background, height and weight, completing fingerprint scans and conducting background checks.

The military's educational standards for enlisting are classified into two main tiers. Applicants in tier 1 have a high school diploma or at least 15 college credits. This group includes

[8] These include the Army, the Marine Corps, the Air Force, the Navy, and the Coast Guard.

[9] This estimate was obtained from the U.S. Department of Defense Joint Advertising Marketing Research System (JAMRS) Recruit Management Information System (RMIS). Reasons for not meeting entry standards include: alcohol or drug abuse, medical or physical disqualification, dependents, or not meeting minimum education requirements or AFQT scores.

[10] This figure is obtained from the JAMRS RMIS.

over 90 percent of applicants. Tier 2 includes applicants with a general education degree (GED) and other forms of high school education.[11] Thus, graduating from a high school or obtaining a GED is an important stepping stone for the vast majority of candidates who are considering military service.[12] In addition to a high school diploma, applicants take the Armed Services Vocational Aptitude Battery (ASVAB) test at a Military Entrance Processing Station (MEPS).[13] The ASVAB measures applicants' developed abilities and helps predict future occupational success and military job eligibility. Four of the 11 ASVAB sub-tests are used to determine an applicant's AFQT score.[14] AFQT scores are reported as percentiles ranging from 1 to 99 and indicate the percentage of examinees in a reference group that scored at or below that particular score.[15]

Stage two occurs when applicants attend local MEPS to complete the enlistment process. MEPS are located in 65 locations across the U.S. and their sole purpose is to put applicants through final tests and examinations to ensure they meet all the entry standards to enlist. The tests and examinations include: physical and background examinations, drug and alcohol tests, as well as the ASVAB test. If applicants are deemed qualified for military service, they meet

[11] These include home study, Certificate of Attendance, Alternative/Continuation High School, Correspondence School Diplomas, and Occupational Program Certificate.

[12] The share of Army recruits in tier 1 decreased from 91 percent in 2000 to about 82 percent in 2006 and the share of recruits from tier 2 increased accordingly (Congressional budget office 2006, p. 6). We consider high school completion measures both including and excluding those with a GED degree.

[13] See http://usmilitary.about.com/od/joiningthemilitary/a/enleducation.htm for more information on the military's enlistment standards.

[14] These include arithmetic reasoning, mathematics knowledge, paragraph comprehension, and word knowledge.

[15] The reference group is a sample of 18 to 23-year-old youth who took the ASVAB as part of a national norming study conducted in both 1980 and again in 1997. An AFQT score of 50 indicates that the examinee scored as well as or better than 50 percent of the nationally-representative sample.

with a service counselor to determine a best fit military job.[16] Finally, applicants sign a contract and swear or affirm an oath of military service. It is only after these steps have been completed that an applicant is recorded as a *contract*.

Stage three occurs when a contract recruit is shipped to basic training and is recorded as an *accession*. However, there are normally two paths to accession. The first are "Direct Ship" recruits who report to basic training between two days and two months after completing MEPS testing requirements. The second, and more common path to accession into military service is the "Delayed Entry Program" (DEP). Recruits who enter DEP commit to ship to basic training at an agreed upon date within one year, typically after completing high school.

2.2 National Trends in Casualties, Enlistments, and Guaranteed Training Contracts

The enlistments data is from the DMDC from October 1, 1997 to September 30, 2013. The initial enlistment sample is limited to 2,355,524 applicants with no prior military service, a U.S. home state, who signed an enlistment contract from October 1, 1997 to October 31, 2012, and who accessed into military service (i.e., shipped to basic training) on or prior to September 30, 2013.[17] In addition to information on contract accession dates, the data includes home of record ZIP code, city, and state, along with a host of demographic characteristics such as age and

[16] In 2006-2007, about 20-30 percent of Army recruits were able to enlist under some type of waiver (Baldor 2012). Waivers were given for certain medical issues, low aptitude scores, past substance use and criminal history (Balder 2012; Anderson and Rees 2015).

[17] The October 31, 2012 end date allows time for applicants who signed an enlistment contract at the end of the sample period to access into military service. A small percentage of enlistments are excluded from the sample if (a) the date of accession is before the enlistment was signed [n=14,741]; (b) the applicant does not have a U.S. home state [n=22,047], (c) the applicants home county could not be matched to a U.S. county [n=12,036], the applicant's AFQT score is missing [n=3,213], or the applicant's education is missing [n=204]. The regression samples that include lagged accessions from the county begin on October 1, 1998.

race.[18] Importantly, the data includes the AFQT score for each recruit who accessed into the military.

The data on combat casualties were drawn from the DMDC's Defense Casualty Analysis System (DCAS) for the same time period as the enlistments data. It contains the exact date of death, home of record city, county, and state, along with basic demographic variables such as gender, race, age, and service branch.

During October 1, 1997 to September 30, 2013 there were a total of 6,823 combat casualties, 6,697 of which we are able to match to their respective U.S. home counties. Figure 1 depicts the monthly U.S. casualties for all services and by service branch, where the red vertical line identifies the start of the war in Afghanistan and the grey area identifies the months spent in Iraq. As can be seen, the majority of the casualties were from service members of the Army (72%), the Marine Corps (22%), and the Navy (3%). Figure 1 also depicts the monthly average AFQT score of new enlistees who accessed into the military and the trend in the AFQT score during the same time period (green line). The figures provide evidence suggesting that an increase in the number of casualties corresponds to a decline in the average AFQT score, particularly in the Army, indicating a change in the composition of recruits during worse overall war conditions. Figure A1 in the appendix depicts the overall number of new enlistments along with their trend. Overall, the trends do not suggest that there is a strong correlation between total enlistments and the number of war casualties at the national level. This, together with Figure 1, suggests that events in the Iraq and Afghanistan wars did not prevent the U.S. military from meeting its national recruiting goals, but did change the composition of new recruits.

[18] Over the entire period the data allows us to identify white and non-white applicants but we are unable to split the non-white category into more detailed racial and ethnic groups.

Table 1 reports descriptive statistics for the enlistment sample, by service. The AFQT scores are divided into 5 categories, where category I (93-99) is the highest AFQT category while category IV-V (1-30) is the lowest. Individuals aged 17-19 years old constitute about 62 percent of all new enlistees. About 30 percent of the sample is still in high school when they sign a contract, and 56 percent have a high school degree. As for the racial and gender composition of the sample, about 35 percent of enlistees are non-white and 17 percent are women.

Not all new enlistees access into the military immediately after signing a contract. Many enlistees, particularly those recruited while in high school, enter the DEP and access into military service up to one year after signing their enlistment contract. The DMDC data does not contain direct information on applicants who entered the military through the DEP or who discharged from DEP. To construct the DEP sample, the enlistment sample is first limited to applicants who signed their enlistment contract at least two months prior to being accessed into military service (i.e., those who entered the military through DEP). This sample is then expanded to include applicants who signed an enlistment contract prior to October 31, 2012, but were not accessed into military service as of September 30, 2013 (i.e., those discharged from DEP).

The share of discharged applicants in the sample is about 18% (Table 1) with some variation in this share by service. Figure 2 depicts the national percent of discharged enlistees, by the enlistment contract month. Interestingly, the total proportion of enlistees discharged from DEP declines over time, but the trends reveal some heterogeneity by service. Although the overall trend of discharged enlistees is declining in the Army, there is some evidence of a deviation from this trend during years with high numbers of casualties. Other services show a slightly declining or flat trends in the proportion of discharged enlistees with no indication of deviations from the trend when the number of casualties was high.

Obtaining training in a specific skill is one of the military's main recruiting tools, highlighting the fact that military service is viewed as an investment in human capital by the military and many potential recruits. The Army and Navy, for instance, use guaranteed training as a major selling point in their recruiting efforts while emphasizing the opportunity for acquiring skills without any prior experience.[19] The DMDC data records whether a contract includes training guarantees when an enlistee accesses into military service. This information is not available for applicants who discharged from DEP. According to Table 1, about 56% of Army enlistees and 83% of Navy enlistees are offered training guarantees during our sample period. The share of training guarantees in the remaining service branches is much smaller.

Figure 3 depicts the proportion of contracts with guaranteed training, by the enlistment contract month. It is worth noting that while guaranteed training contracts were offered to only about 25 percent of Army recruits in 1999, they became essentially universal by 2012. It is possible that the military adjusts its recruitment efforts to the increase in the number of casualties by offering new enlistees better contracts. The trends in Figure 3, however, do not seem to consistently co-vary with the number of overall casualties or to the casualties within a service.

3. Local Casualties and Selection into the Military

3.1 Empirical Framework

An increase in the number of U.S. combat casualties could deter some young individuals from service, yet inspire others to join. Analyzing the impact of changes in national level casualties on selection into the military would be problematic because we cannot rule out the

[19] The Army, for example, offers trainings in more than 150 specialties such as computers, aviation, the medical and veterinary fields, combat arms and communications. Depending on the specialty, training could last from one month to more than one year. See https://www.youtube.com/watch?v=q1mmehRoaV8.

possibility that other time-varying factors are deriving the relationship between the number of casualties and enlistments. Instead, we take advantage of county- and state-level exposure to casualties to analyze its impact on total enlistments, discharges, and quality of enlistees. Table 2 shows the probability of experiencing a U.S. combat casualty at the county-month level and the average number of casualties at the state-year levels for 2001-2012. Table 2 also lists the average number of enlistments at the county-month and state-year levels. On average, there was a 1.41 percent chance that a given county experienced a casualty in a month and an average of 9.25 casualties in a state in a given year.[20]

The identifying assumption is that controlling for county (or state) and time fixed effects, the assignment of casualties to counties (or states) in the U.S. is as-good-as random. Exposure to local casualties could have a separate effect on the decision to enlist from exposure to the nation-wide number of casualties for a number of reasons. For example, local communities may develop different sentiments towards the war specifically, or towards military service in general, if they experience a high number of casualties. Moreover, local newspapers or other media outlets likely give a more extensive exposure to local casualties by covering the funeral of diseased soldiers and by providing more detailed biographies. Because of this and other factors, casualties among the local population may be particularly salient to young individuals weighing the military option.

[20] Our results are robust to using either the county-month or state-year variation in the number or likelihood of casualties.

To investigate this, we start by estimating the effect of experiencing a U.S. combat casualty from a county on the overall number of enlistments, and on the number of enlistments by demographic and ability characteristics from that county[21]:

$$\begin{aligned} Enlistments_{cm} = {} & \pi_1\, CasualtiesBefore_{cm} + \pi_2\, Casualties_{cm} \\ & + \pi_3\, CasualtiesAfter_{cm} + UR_{cm}\delta + \phi \ln\left(pop_{c[year]}\right) \\ & + PastAccessions_{cm}\beta + \mu_c + \tau_m + \theta_{[state]}m + \varepsilon_{cm}, \end{aligned} \tag{1}$$

where $Enlistments_{cm}$ is the number of applicants (overall or with a specific characteristic) in county *c* who accessed into military service after signing their enlistment contract in sample month *m*. $CasualtiesBefore_{cm}$, $Casualties_{cm}$, and $CasualtiesAfter_{cm}$ are indicator variables equal to 1 if a county experienced a combat casualty in the six months before month *m*, in month *m*, and in the six months after month *m*, respectively and zero otherwise. We include the likelihood of a casualty in the six months after a contract is signed because recruits who enter DEP can change their decision to access into service between the contract and accession dates. The vector UR_{cm} includes controls for the unemployment rate at the county month level, and $\ln\left(pop_{c[year]}\right)$ is the log of the annual county population. $PastAccessions_{cm}$ is number of accessions from the county seven to nine and ten to twelve months prior to the sample month.[22] The regression also includes controls for county fixed effects (μ_c) sample month fixed effects (τ_m), and state specific linear month trends ($\theta_{[state]}m$). Standard errors are clustered at the county level.

[21] We estimate equation (1) using ordinary least squares (OLS). Estimates from Poisson models produce smaller estimates, but remain statistically significant at conventional levels. More importantly, the pattern of the Poisson incidence rate ratios are consistent with the OLS coefficients presented in Section 3.2.

[22] These variables capture potential trends in county enlistments. The regression coefficients are statistically significant, but the casualty coefficients are not sensitive to their inclusion.

Local combat casualties could cause potential recruits to change their minds about signing an enlistment contract or, for those who have already signed a contract but have not yet accessed into military service, to discharge from DEP. To estimate the latter effect more directly, we estimate the following equation using the DEP sample:

$$\begin{aligned} Discharge_{icm} = {} & \pi_1\, CasualtiesBefore_{cm} + \pi_2\, Casualties_{cm} \\ & + \pi_3\, CasualtiesAfter_{cm} + \ (CasualtiesBefore_{cm} \times X_{icm})\pi_4 \\ & + \ (Casualties_{cm} \times X_{icm})\pi_5 + \ (CasualtiesAfter_{cm} \times X_{icm})\pi_6 \\ & + X_{icm}\beta + Z_{icm}\delta + UR_{cm}\delta + \phi \ln(pop_{c[year]}) \\ & + PastAccessions_{cm}\beta + \mu_c + \tau_m + \theta_{[state]}m + \varepsilon_{icm}, \end{aligned} \tag{2}$$

where $Discharge_{icm}$ is an indicator variable for whether applicant *i* in county *c* who signed a contract in month *m* was discharged from DEP. As before, $CasualtiesBefore_{cm}$, $Casualties_{cm}$, and $CasualtiesAfter_{cm}$ are indicator variables equal to 1 if a county experienced a combat casualty in the six months before month *m*, in month *m*, and in the six months after month *m*, respectively and zero otherwise. The vector X_{icm} includes controls for four AFQT categories, five age categories, race, and gender. We also include a full set of interaction terms between the three casualty indicator variables and the variables in X_{icm} in order to estimate whether the effects vary by observable characteristics. The vector Z_{icm} includes additional controls for marital status and service (in the regressions that include all services). All other variables in Eq. (2) are defined as they are in Eq. (1).[23]

[23] Another mechanism through which casualties could impact enlistments is local military recruiting efforts. To investigate this channel, we obtained information on the number of military recruiters by state from JAMRS RMIS for the fiscal years 2004-2013 and estimated the relationship between exposure to state-level casualties (and its lag) and the number of recruiters. The results show no evidence that the military adjusts its recruiting efforts in response to a state's exposure to casualties. These results can be provided by the authors upon request.

3.2 Results

We start by presenting the results from estimating Eq. (1) in Table 3. The results suggest that exposure to at least one casualty in a given county-month decreases the number of new enlistments by about 1.2, significant at the 1 percent level. Exposure to casualties in the 6 months before or after a contract was signed also decreases the number of new enlistments but to a lesser degree.[24] Evaluated at the mean number of enlistments, these effects are large suggesting a decrease of about 16-28 percent. Exposure to casualties in the 6 months after a contract is signed impact enlistments because, as we will show later, they impact the number of applicants who initially sign a contract, but then decide to discharge from DEP.[25] Importantly, the effects decrease (in absolute value) monotonically with age (Panel A) and are largest for individuals in the middle part of the ability distribution (Panel C), consistent with the idea that the decision to not enlist at these ages could impact educational choices. In contrast, the recruitment of non-whites seems to increase during periods of worse war conditions (Panel B).[26]

As we discussed earlier, exposure to casualties after signing a contract could change a recruit's decision to access into military service. Similarly, exposure to casualties in the 6 months before or in the same month the contract is signed could also motivate some individuals to enlist

[24] Table Appendix A1 estimates the effects on overall enlistments by service. The results suggest that the Army and the Navy experience the largest decreases in new enlistments. We also experiment by using service-specific casualties in Table Appendix A2. The results are qualitatively similar for the Army but vary in magnitude and significance for the other services where the number of service specific casualties is more limited. Results for the Coast Guard are not presented because there are no Coast Guard-specific casualties.

[25] The results also suggest that the decision to enlist is countercyclical with relation to the economic conditions at the county level, consistent with the findings of Borgschulte and Martorell (2015) and Christensen (2015).

[26] Because we conduct the education analysis at the state-year level, we also estimated equation 1 using variation in the number of casualties (in 100s) at the state-year level while including state and year fixed effects and state-specific linear trends. The results are reported in Table Appendix 3. They suggest that an increase of 100 casualties in a state decreases the number of yearly enlistments in that state by about 1,778 recruits, a decrease of about 5 percent. The results suggest that the results observed at the county-month level are not temporary and the smaller magnitude highlights the importance of proximity to a local casualty.

but who eventually decide not to access. In Table 4, we present results on the effects of exposure to local casualties on the probability of discharging from service and how the effects vary by AFQT categories (Eq. 2). For the sake of brevity, we present the coefficients on the interaction terms with age, and race from this regression in Tables Appendix A4 and A5. The results using the entire sample suggest that exposure to a casualty in the 6 months prior or after signing a contract increases the probability of discharging for 17-year-old white men in the highest AFQT category (the reference group) by about 7 percent (0.131/0.178 = 0.074). This effect monotonically decreases with AFQT scores. Similar patterns appear in the Army, Navy, and Marines where most of the casualties occurred. Table Appendix A4 shows a similarly monotonically decreasing pattern with age, suggesting that 17- and 18-year-old men were the most likely to discharge in response to worsening war conditions.[27]

4. Local Casualties and Investments in Human Capital

4.1 Empirical Framework

We now turn to analyze the effect of exposure to combat casualties at young ages on educational outcomes. For this analysis, we draw data from the 2002-2013 American Community Survey and limit the sample to men who turned 17 during the period 1999-2010.[28] In addition, we retain individuals aged 20 and above to ensure that we can observe their high school and college outcomes. As a result, the sample contains men aged 20-31.[29] The ACS data

[27] We also estimated a version of equation (2) where the dependent variable is an indicator for whether a contract included guaranteed training. The results suggest that exposure to local casualties decreases the likelihood of receiving a contract with guaranteed training. Conditional on observable characteristics, these results suggest that local casualties also impact the unobservable quality of new enlistees.

[28] We limit the sample to men because the majority of individuals who join the military are men (about 83% in our sample period).

[29] We exclude observations with allocated values.

identifies a person's state of birth, but not county of birth, and only identifies county of residence for large counties. As a result, the ACS analysis is conducted at the state level.[30] For each state of birth, we aggregate the yearly number of combat casualties and merge them into the ACS data based on the year an individual turned 17 years old. We also merge state-level unemployment rates when a person turned 17. Table 5 contains descriptive statistics for the analysis sample.

We estimate the following regression with OLS:

$$Y_{ist} = \sum_{a=15}^{20} \beta\, Casualties_{is}^{a} + \boldsymbol{X_{ist}\pi_1} + \boldsymbol{Z_{s[a=17]}\pi_2} + \delta_a + \mu_s + \tau_t + \theta_a t + \varepsilon_{ist}, \qquad (4)$$

where Y_{ist} is the outcome of individual *i*, living in state *s* when we observe him in survey year *t*. $Casualties_{is}^{a}$ is the number of U.S. casualties in state *s*, measured in hundreds, that an individual was exposed to when he was 15-16, 17-18, and 19-20 years old.[31] The vector X_{ist} includes unrestricted dummy variables for black, Hispanic, and other race/ethnicity (omitted category is white). The vector $Z_{s[a=17]}$ includes two indicators for state unemployment rates (4%-6% and above 6%) when a person turned 17 and the vector δ_a includes unrestricted age dummy variables. Since we take advantage of the temporal and geographic variation in combat casualties, the regression includes census year fixed effects τ_t and state fixed effects μ_s. $\theta_a t$ are a set of state-specific birth cohort linear time trends and ϵ_{ist} is the error term. We cluster the standard errors at the state level.

[30] Analysis using current state of residence provides qualitatively similar results.

[31] Although the average number of state casualties by year is about 10, we measure the number of state-level casualties in hundreds for ease of presentation.

4.2 Results

Before presenting the effects of local casualties on schooling outcomes, it is useful to examine whether exposure to casualties impact the probability of ever serving in the military.[32] Thus, the first outcome we examine using Eq. (4) takes a value of 1 if an individual reported to have ever served in the military and zero otherwise. The results are presented in column 1 of Table 6 and suggest that an increase of 100 casualties at ages 17-18 is associated with a reduction of about 0.3 percentage points in the probability of ever serving in the military, significant at the 5 percent level. Evaluated at the mean service rate of 6 percent, the results suggest that exposure to casualties reduces the probability of ever serving in the military by about 5 percent. The magnitude of this effect is remarkably similar to the effect we report in Table Appendix A3 and is consistent with the findings reported in Tables 3 and 4 using internal military data. The coefficients on exposure to casualties at ages 15-16 and 19-20 are small and statistically insignificant.

Because a high school diploma, or its equivalent, is required for enlisting for the vast majority of candidates, the decision not to enlist in the military could change the incentive of marginal candidates to graduate high school. Consequently, we can think about high school completion and military service as complementary choices such that a decrease in the probability of service is likely to be accompanied by a decrease in the probability of high school graduation or its equivalent (GED). We estimate the effects of exposure to casualties on the probability of dropping out from high school and report the results in column 2 of Table 6. The results indicate that an increase of 100 casualties at age 17-18 is associated with an increase of about 0.3 percentage points in the probability of dropping out from high school. Evaluated at the mean,

[32] It is possible that casualties at the county-month level change the timing of a potential recruit's enlistment decision, without changing his or her long-run probability of ever serving.

this corresponds to an increase of about 3 percent in the probability of not graduating from high school. The coefficient on ages 15-16 is small and statistically insignificant. Importantly, the coefficient on ages 19-20 is also small and statistically insignificant. This adds to our confidence in the research design since we should not expect casualties at ages 19-20 to influence an outcome that is typically determined at a younger age.

Next, we estimate the effect on college education and report the results in column 3 of Table 6. The outcome is an indicator variable that takes 1 for attaining any post-secondary education and zero otherwise. The military, through the government issue (GI) Bill, can be an important vehicle through which disadvantaged groups can access post-secondary education. Thus, conditional on high school graduation, exposure to casualties can limit access to college education by raising its cost.

The results suggest that an increase of 100 casualties at ages 17-18 decreases the probability of college education by about 0.69 percentage points or a decline of about 1 percent, significant at the 1 percent level. Exposure to casualties at ages 19-20 also reduces the probability of attaining college education but, as we would expect, the magnitude of the coefficient is reduced by about half. We find small, negative, but statistically insignificant effects of exposure at ages 15-16 on college education.[33]

In Table 7 we refine the educational outcomes and re-estimate the results. In columns 1 and 2 we limit the sample to survey years 2008-2013 in which we are able to identify a GED degree separately from a high school degree. Column 1 repeats the results reported in column 2 of Table 6 for this subsample of years. The results indicate that exposure to 100 more casualties

[33] The results on college education are similar if the sample is limited to men aged 23 or above. Similar estimates on college education are also obtained if we limit the sample to men with a high school degree or higher. These results can be provided by the authors upon request.

at ages 17-18 increases the probability of dropping out from high school by 0.4 percentage points (or about a 4 percent increase). In column 2 we consider individuals with a GED degree to be high school dropouts. The results suggest that an increase of 100 casualties at ages 17-18 increases the probability of dropping out from high school by 0.56 percentage points, which is an increase of about 3.4 percent. Taken together, these estimates suggest that the increase in probability of dropping out shown in column 2 of Table 6 is not being driven by a decrease in the probability of earning a GED. In columns 3 and 4 of Table 7 we explore the probability that exposure to casualties impacted the probability of obtaining at least an Associate degree or a BA degree. The results suggest that exposure to 100 more casualties at ages 17-18 decreases the probability of obtaining at least an Associate degree or a BA by about 0.7 and 0.6 percentage points, respectively (which is about a 3 percent decrease).

It is difficult to use the above estimates to gauge the overall magnitude of the military option in shaping human capital investments. However, local combat casualties seem to have a significant effect on the desirability of military service and are associated with detectable and significant impacts on educational outcomes. The results using local casualties should be interpreted as lower bound effects, since the overall (national) risk of military service during wartime on enlistment decisions and educational outcomes is likely to be significantly larger.

4.3 Heterogeneous Effects

Table 8 reports the effects of exposure to casualties by race and ethnic groups. The results in columns 1-3 suggest that the effect of casualties on high school completion at ages 17-18 is driven primarily by Hispanic men. The coefficient suggests that an increase of 100 casualties at ages 17-18 increases the probability of dropping out from high school by 0.65 percentage points.

Consistent with the results in Table 7, this corresponds to a 3 percent increase in the probability of dropping out from high school.

In columns 4-6, we report the results for college education. The results indicate that exposure to 100 more combat casualties at ages 17-18 reduces to the probability of college education for white men by about 0.74 percentage points, significant at the 5 percent level. The results in this age range are small and statistically insignificant for Hispanic and black men. Exposure to 100 more casualties at ages 19-20, however, reduces the probability of college education for Hispanic men by about 0.81 percentage points, which is a decline of about 1.8 percent in the probability of having any college education.

Next, we analyze the outcomes by state population size in Table 9. We split the sample into 3 groups, each containing about one third of the overall U.S. population resulting in comparable sample sizes.[34] The results suggest that the effect of casualties on high school completion at ages 17-18 is largest in the most populous states (column 1), perhaps because they are also the states with the highest proportion of Hispanic men. In contrast, an increase of 100 casualties at ages 17-18 reduces the probability of college education by about 0.8-1 percentage point in large and medium size states and by about 3.6 percentage points in small states. These results suggest that conditional on high school graduation, removing the military option has a sizable effect on college access for young men.

Finally, we replace the number of combat casualties that a state experienced in equation (4) with the number of soldiers who were wounded in action (WIA), measured in thousands. The results of this exercise are reported in Table 10. As can be seen, the results using this

[34] The large states sample includes: California, Florida, New York, and Texas. The medium states sample includes: Arizona, Georgia, Illinois, Indiana, Massachusetts, Michigan, North Carolina, New Jersey, Ohio, Pennsylvania, Tennessee, Virginia, and Washington. The remaining states are included in the small states sample.

alternative measure are consistent with the results reported in Table 6. Specifically, an increase of 1,000 WIA soldiers at ages 17-18 decreases the probability of ever serving in the military by about 0.52 percentage points, increases the probability of dropping out from high school by 0.35 percentage points, and decreases the probability of college education by about 1 percentage point.

5. Conclusion

American youth face a variety of factors constraining them from obtaining post-secondary education and training. Understanding the impact of changes in these factors on accessing education and human capital investments is important in light of recent evidence showing that the returns to education are large even for academically marginal students (Zimmerman 2014), and can also shed light on recent policy debates concerning college affordability.

Enlisting in the U.S. military allows many individuals to overcome such barriers and invest in their human capital. In this paper, we show that increasing the (perceived) cost of military service has detrimental effects on the schooling outcomes of individuals at the margin of high school graduation and individuals at the margin of college education.

Using internal military data, we first show that exposure to combat casualties during the Afghanistan and Iraq Wars from a U.S. home county (and state) decreases the supply of new soldiers in that county and changes the characteristics of those who choose to enlist. In particular, an increase in the number of casualties discourages youth with medium to high AFQT scores, whites, 17-20 year olds, and both genders from enlisting. Our identification strategy relies on the assumption that the assignment of casualties to U.S. home of record counties is as-

good-as random and that it does not impact the demand for soldiers at the local level, which is instead set nationally.

The main results in the paper suggest that exposure to combat casualties at a young age (17-18) increases the probability of dropping out from high school, and decreases the probability of attaining any college education, obtaining an Associate, or a BA degree. This indicates that, at least for some youth, the military option is advantageous to them, motivates them to finish high school, and serves as an important vehicle through which they access post-secondary education and acquire marketable skills.

The results also suggest that improving access to post-secondary education for low-skilled and academically marginal students can have significant impacts on their human capital investments. This is a particularly relevant population that should inform local and national educational finance policies that are intended to increase the supply of higher skilled labor force.

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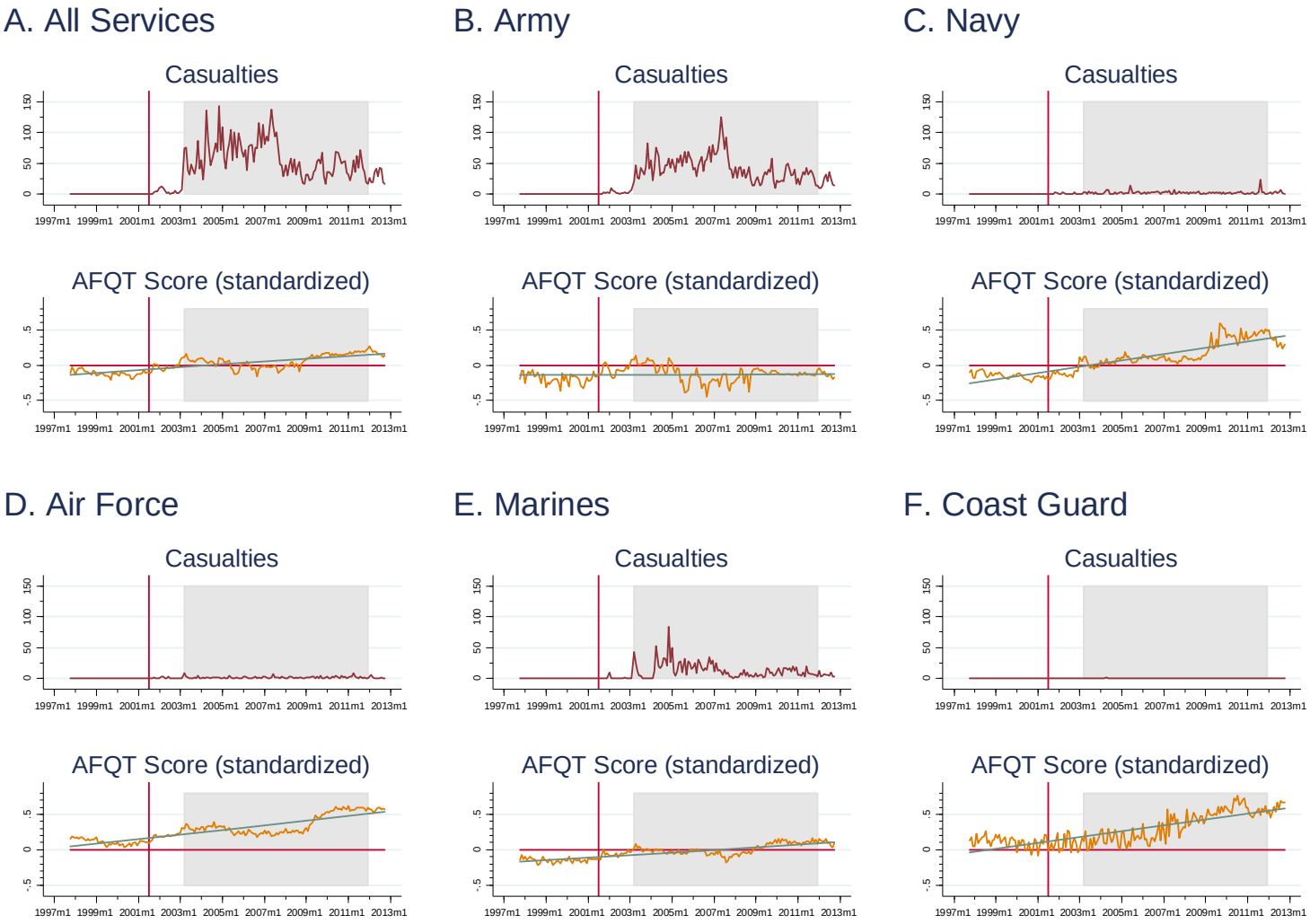
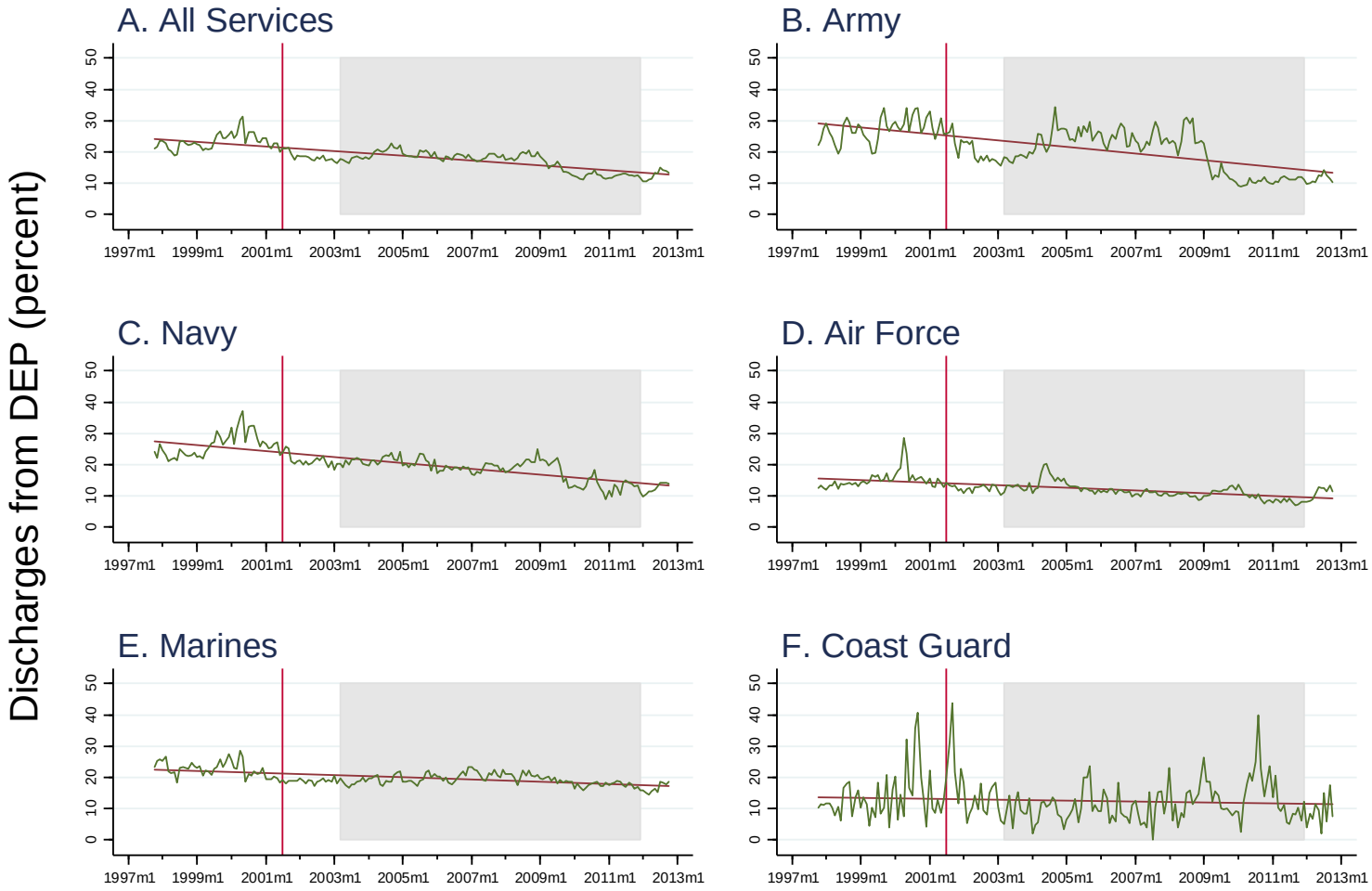
Figure 1: Monthly U.S. Combat Casualties and AFQT Scores (standardized) for New U.S. Military Enlisted Recruits, by Service



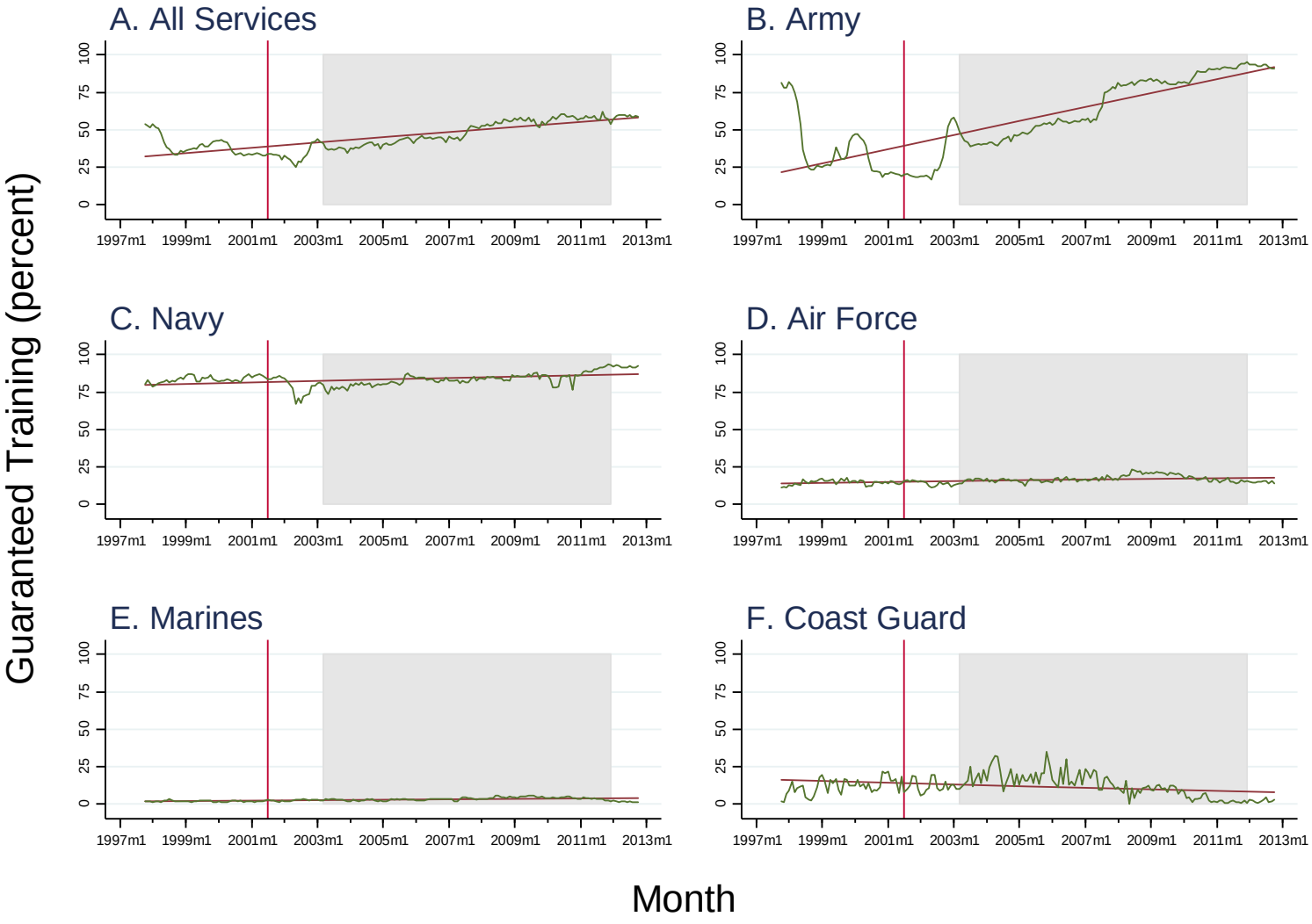
Source: Defense Manpower Data Center (DMDC) from October 1, 1997 to October 31, 2012.
Notes: Month refers to the month the enlistment contract was signed. The sample includes new enlistments with no prior military service, with a U.S. home state, and who accessed into military service after they signed their enlistment contract. The shaded area indicates the months when U.S. military forces were in Iraq. The vertical line indicates September 11, 2001. The solid regression lines in the AFQT figures highlights the overall trends in AFQT scores.

Figure 2: Discharges (percent) from the Delayed Entry Program (DEP), by Service



Source: Defense Manpower Data Center (DMDC) from October 1, 1997 to October 31, 2012.
Notes: Month refers to the month the enlistment contract was signed. The sample includes applicants who signed an enlistment contract with no prior military service and with a U.S. home state. An applicant is considered to have been in the delayed entry program (DEP) if the enlistment contract was signed at least two months prior to the date the applicant accessed into military service. An applicant is considered to have discharged from DEP if the application was not accessed into military service as of October 31, 2013. The shaded area indicates the months when U.S. military forces were in Iraq. The vertical line indicates September 11, 2001. The solid regression lines in the figures highlights the overall trends in DEP discharges.

Figure 3: Guaranteed Training (percent) for New U.S. Military Enlisted Recruits, by Service



Source: Defense Manpower Data Center (DMDC) from October 1, 1997 to October 31, 2012.
Notes: The sample includes new enlistments with no prior military service, with a U.S. home state, and who accessed into military service after they signed their enlistment contract. The shaded area indicates the months when U.S. military forces were in Iraq. The vertical line indicates September 11, 2001. Guaranteed training is a skill or training guarantee written in the enlistment contract. The solid regression lines in the figures highlights the overall trends in guaranteed training.

Table 1: Descriptive Statistics

	All Services	Army	Navy	Air Force	Marines	Coast Guard
Discharged from DEP	17.8%	18.5	20.1	12.2	19.5	11.6
DEP sample size	1,993,353	595,734	546,292	410,165	430,573	10,589
Skill or Training Guarantee	45.0%	56.0	83.4	16.3	3.0	10.2
AFQT Category (base: Cat. I):						
Cat I (93-99)	5.9%	5.7	6.5	6.9	4.5	7.6
Cat. II (65-92)	37.5%	33.3	38.4	45.9	36.4	50.5
Cat. IIIA (50-64)	27.7%	26.7	27.8	29.7	27.4	28.5
Cat. IIIB (31-49)	28.0%	32.5	27.2	17.5	30.8	13.4
Cat. IV-V (0-30)	0.9%	1.8	0.1	0.0	1.0	0.0
Age at contract:						
17 years old	19.0%	14.9	18.7	16.9	29.8	7.6
18 years old	26.0%	22.2	26.5	27.9	31.0	24.1
19 years old	17.0%	16.7	17.0	18.9	15.7	17.8
20 years old	11.0%	11.4	10.9	12.5	8.7	12.5
20+ years old	27.1%	34.9	26.9	23.9	14.8	38.0
Education at contract:						
No High School	8.9%	15.4	8.3	2.0	4.0	4.2
In High School	28.9%	21.2	29.0	25.7	47.1	12.3
High School	55.5%	54.2	57.6	63.2	47.2	70.7
Some College	3.9%	4.8	2.6	6.9	1.2	4.9
College	2.8%	4.4	2.5	2.2	0.5	7.9
Non-white	34.5%	34.1	42.6	30.2	29.2	23.2
Female	17.0%	17.8	19.3	22.5	7.4	19.3
Enlistment sample size	2,355,524	876,091	581,729	420,872	456,452	20,380

Source: Defense Manpower Data Center (DMDC) from October 1, 1998 to October 31, 2012.
Notes: Standard errors shown in parentheses.

Table 2: U.S. Combat Casualties and New Enlistments by Unit of Observation

	County-Month Level		State-Year Level	
Year	Probability of Casualty	Ave. Number of Enlistments	Ave. Number of Casualties	Ave. Number of Enlistments
2001	0.11%	4.55	0.19	837.7
2002	0.12	5.17	0.83	3,804.5
2003	1.26	4.52	8.86	3,328.8
2004	2.07	3.86	15.08	2,839.2
2005	2.18	3.96	15.80	2,911.1
2006	2.17	4.24	15.42	3,119.1
2007	2.34	4.22	17.12	3,106.9
2008	1.12	4.76	7.86	3,498.6
2009	1.12	4.71	7.69	3,462.0
2010	1.37	4.26	9.39	3,134.0
2011	1.16	4.02	7.90	2,959.6
2012	0.85	4.19	4.85	2,567.1
All	1.41	4.36	9.25	2,964.1

Source: Defense Manpower Data Center (DMDC) from October 1, 2001 to October 31, 2012.

Table 3: Effect of a U.S. Combat Casualty from a County on the Number of New Enlistments from the County, by Age, Race, AFQT Category, and Gender

	Panel A: Age at Enlistment Contract					*Panel B*: Race	
Experienced a casualty in:	All	17	18	19	20+	White	Non-White
6 months before contract	-.831***	-.383***	-.301***	-.134***	-.042***	-1.108***	.277**
	(.120)	(.058)	(.039)	(.021)	(.012)	(.183)	(.125)
Month contract signed	-1.243***	-.528***	-.414***	-.185***	-.070*	-1.760***	.517**
	(.335)	(.155)	(.107)	(.045)	(.039)	(.499)	(.235)
6 months after contract	-.709***	-.336***	-.260***	-.123***	-.048***	-1.031***	.323**
	(.099)	(.051)	(.038)	(.019)	(.011)	(.186)	(.131)
Mean of dependent variable	4.45	.844	1.15	.754	.487	2.92	1.53
	Panel C: AFQT Category					*Panel D*: Gender	
Experienced a casualty in:	Cat. I (99-93)	Cat. II (92-65)	Cat. IIIA (64-50)	Cat. IIIB (49-31)	Cat. IV-V (30-0)	Male	Female
6 months before contract	.062***	-.124***	-.332***	-.460***	.028***	-.610***	-.221***
	(.011)	(.029)	(.038)	(.077)	(.005)	(.095)	(.028)
Month contract signed	.052***	-.266***	-.460***	-.617***	.063***	-.920***	-.323***
	(.019)	(.087)	(.116)	(.162)	(.013)	(.279)	(.065)
6 months after contract	.080***	-.097***	-.295***	-.410***	.019***	-.493***	-.216***
	(.012)	(.026)	(.034)	(.066)	(.004)	(.077)	(.026)
Mean of dependent variable	.262	1.67	1.23	1.24	.039	3.69	.754
Sample Size	528,463	528,463	528,463	528,463	528,463	528,463	528,463

*Statistically significant at 10% level; **at 5% level; ***at 1% level.

Source: Defense Manpower Data Center (DMDC) from October 1, 1998 to October 31, 2012.

Notes: Standard errors clustered at the county level are shown in parentheses. The sample includes new enlistments with no prior military service, with a U.S. home state, and who accessed into military service after they signed their enlistment contract. Data is aggregated to the county-month level. Casualties are indicator variables equal to one if there was a U.S. combat casualty from the county in the months before, during, and after the enlistment contracts were signed. All regressions include controls for the unemployment rate at the county-month level, log of annual county population, number of accessions from the county seven to nine and ten to twelve months prior to the sample month, as well as county fixed effects, sample-month fixed effects, and state specific linear sample-month trends.

Table 4: AFQT Coefficients from Discharged Delayed Entry Program (DEP) Regressions

Experienced a casualty in (reference group[1]):	All Services	Army	Navy	Air Force	Marines	Coast Guard
6 months before contract	.0211***	.0073	.0394***	.0006	.0248***	-.0221
	(.0031)	(.0057)	(.0052)	(.0054)	(.0078)	(.0349)
Month contract signed	.0071	-.0002	.0129	-.0106	.0136	-.0334
	(.0056)	(.0079)	(.0109)	(.0090)	(.0115)	(.0623)
6 months after contract	.0131***	.0234***	.0178***	.0022	.0034	.0328
	(.0033)	(.0064)	(.0057)	(.0054)	(.0077)	(.0343)
AFQT Cat. II (92-65) × casualty:						
6 months before contract	-.0045*	.0012	-.0094*	-.0008	-.0095	.0153
	(.0026)	(.0049)	(.0048)	(.0045)	(.0075)	(.0298)
Month contract signed	-.0010	-.0073	-.0059	.0151**	.0003	.0529
	(.0043)	(.0082)	(.0088)	(.0073)	(.0120)	(.0458)
6 months after contract	-.0044	-.0069	-.0059	-.0018	.0012	-.0357
	(.0027)	(.0054)	(.0050)	(.0047)	(.0075)	(.0264)
AFQT Cat. IIIA (64-50) × casualty:						
6 months before contract	-.0096***	-.0018	-.0157***	-.0042	-.0170**	.0312
	(.0029)	(.0052)	(.0050)	(.0050)	(.0078)	(.0315)
Month contract signed	-.0061	-.0108	-.0105	.0155**	-.0107	-.0200
	(.0045)	(.0083)	(.0090)	(.0078)	(.0104)	(.0483)
6 months after contract	-.0062**	-.0074	-.0119**	-.0031	.0021	-.0203
	(.0030)	(.0056)	(.0051)	(.0053)	(.0081)	(.0315)
AFQT Cat. IIIB (49-31) × casualty:						
6 months before contract	-.0080***	-.0045	-.0149***	.0036	-.0141*	-.0172
	(.0030)	(.0051)	(.0056)	(.0062)	(.0081)	(.0358)
Month contract signed	-.0031	-.0100	-.0108	.0112	-.0009	-.0039
	(.0049)	(.0084)	(.0096)	(.0089)	(.0117)	(.0657)
6 months after contract	-.0109***	-.0239***	-.0103*	.0081	-.0023	-.0104
	(.0029)	(.0054)	(.0054)	(.0057)	(.0079)	(.0343)
AFQT Cat. IV-V (30-0) × casualty:						
6 months before contract	-.0555***	-.0314*	.0170	.2349	-.0300	-.1477***
	(.0159)	(.0186)	(.0726)	(.1572)	(.0305)	(.0441)
Month contract signed	-.0149	-.0330	-.2140*	.3676**	.0377	
	(.0198)	(.0279)	(.1152)	(.1631)	(.0413)	
6 months after contract	-.0470***	-.0447**	-.0392	-.3425**	-.0081	.9066***
	(.0139)	(.0180)	(.0671)	(.1421)	(.0253)	(.0444)
Mean of dependent variable	.178	.185	.201	.122	.195	.116
Sample Size	1,993,353	595,734	546,292	410,165	430,573	10,589

*Statistically significant at 10% level; **at 5% level; ***at 1% level.

[1]The reference group are 17 year-old white men with a category I (99-93) AFQT score. Table 4 and Appendix Table A4 report additional coefficients from these regressions.

Source: Defense Manpower Data Center (DMDC) from October 1, 1998 to October 31, 2012.

Notes: Standard errors clustered county level are shown in parentheses. The sample includes applicants who signed an enlistment contract with no prior military service and with a U.S. home state. An applicant is considered to have been in the delayed entry program (DEP) if the enlistment contract was signed at least two months prior to the date the applicant accessed into military service. An applicant is considered to have discharged from DEP if the application was not accessed into military service as of October 31, 2013. Casualties are indicator variables equal to one if there was a U.S. combat casualty from the county in the months before, during, and after the enlistment contracts were signed. All regressions include controls for the unemployment rate at the county month level, log of annual county population, number of accessions from the county seven to nine and ten to twelve months prior to the sample month, five age categories, five AFQT categories, six education categories, marital status, gender, as well as county fixed effects, sample-month fixed effects, and state specific linear sample-month trends.

Table 5: Descriptive Statistics from American Community Survey

	All	White	Hispanic	Black
Ever served	6.3%	6.8%	5.3%	5.3%
High school dropout	11.2%	7.4%	22.2%	22.5%
Any college education	59.3%	63.8%	45.0%	43.3%
Associate degree	25.3%	29.2%	13.7%	11.6%
BA degree	18.2%	21.3%	8.0%	7.5%
Age	23.8	23.8	23.6	23.7
State unemployment rate	5.22	5.1	5.5	5.3
White	68.3%			
Black	10.6%			
Hispanic	13.9%			
Sample size	927,228	633,017	128,544	98,013

Source: American Community Survey 2002-2013.

Table 6: Effect of U.S. Combat Casualties on Military Service and Education

	(1) Ever Served	(2) High School Dropout	(3) College
Casualties at age:			
15-16	-.0011	.0013	-.0038
	(.002)	(.002)	(.006)
17-18	-.0030**	.0032**	-.0069***
	(.001)	(.001)	(.001)
19-20	-.0005	.00005	-.0039**
	(.002)	(.001)	(.002)
Sample Size	927,228	927,228	927,228

*Statistically significant at 10% level; **at 5% level; ***at 1% level.

Source: American Community Survey 2002-2013.

Notes: Standard errors clustered at the state of birth level are shown in parentheses. The sample includes men who turned 17 during 1999-2010. Casualties are the number of U.S. combat casualties, measured in hundreds, from an individual's state of birth experienced at ages 15-16, 17-18, and 19-20. All regressions include a black, Hispanic, and other race dummy variables and control for unrestricted indicators for age, log of state population aged 16-40, two unemployment categories (2-6% and above 6%), as well as state fixed effects, year date fixed effects, and state specific linear cohort date trends.

Table 7: Effect of U.S. Military Casualties on Education

	(1) HS Dropout	(2) HS Dropout including GED	(3) Associate Degree and Above	(4) BA Degree and Above
Casualties at age:				
15-16	-.0002	.0029	-.0003	-.0006
	(.002)	(.002)	(.002)	(.002)
17-18	.0041***	.0056***	-.0069***	-.0057**
	(.001)	(.002)	(.002)	(.002)
19-20	-.0001	-.0011	-.0018	-.0002
	(.002)	(.002)	(.002)	(.002)
Sample Size	722,143	722,143	927,228	927,228

*Statistically significant at 10% level; **at 5% level; ***at 1% level.

Notes: For list of controls and other details, see notes to Table 6. Columns 1 and 2 limit the sample to data for the period 2008-2013 in which a GED degree can be separately identified. The sample in column 1 defines individuals with a GED degree as high school graduates while the sample in column 2 defines individuals with a GED degree as high school dropouts.

Table 8: Effect of U.S. Combat Casualties on Education, by Race and Ethnicity

	(1)	(2)	(3)	(4)	(5)	(6)
	High School Dropout			College		
	White	Hispanic	Black	White	Hispanic	Black
Casualties at age:						
15-16	-.0007	.0042	-.0105	-.0064	-.0022	-.0062
	(.003)	(.003)	(.008)	(.007)	(.004)	(.020)
17-18	-.0007	.0065**	.0010	-.0074***	-.0019	.0008
	(.001)	(.003)	(.006)	(.003)	(.003)	(.011)
19-20	-.0019	.0042	-.0128*	-.0019	-.0081***	.0123
	(.002)	(.003)	(.006)	(.002)	(.003)	(.011)
Sample Size	633,017	128,544	98,013	633,017	128,544	98,013

*Statistically significant at 10% level; **at 5% level; ***at 1% level.
Note: For list of controls and other details, see notes to Table 6.

Table 9: Effect of U.S. Combat Casualties on Military Service and Education, by State Size Population

	(1)	(2)	(3)	(4)	(5)	(6)
	Large States		Medium States		Small States	
	High School Dropout	College	High School Dropout	College	High School Dropout	College
Casualties at age:						
15-16	.006*	-.000	-.004	-.032***	.010	-.060***
	(.002)	(.003)	(.006)	(.006)	(.010)	(.021)
17-18	.007***	-.008***	-.001	-.010*	.006	-.036**
	(.001)	(.001)	(.003)	(.005)	(.013)	(.017)
19-20	.005	-.006***	.005	-.018*	-.011	-.020
	(.002)	(.001)	(.005)	(.009)	(.012)	(.028)
Sample Size	302,237	302,237	342,222	342,222	282,769	282,769

*Statistically significant at 10% level; **at 5% level; ***at 1% level.

Note: For list of controls and other details, see notes to Table 6. The large states sample includes: California, Florida, New York, and Texas. The medium states sample includes: Arizona, Georgia, Illinois, Indiana, Massachusetts, Michigan, North Carolina, New Jersey, Ohio, Pennsylvania, Tennessee, Virginia, and Washington. The remaining states are included in the small states sample.

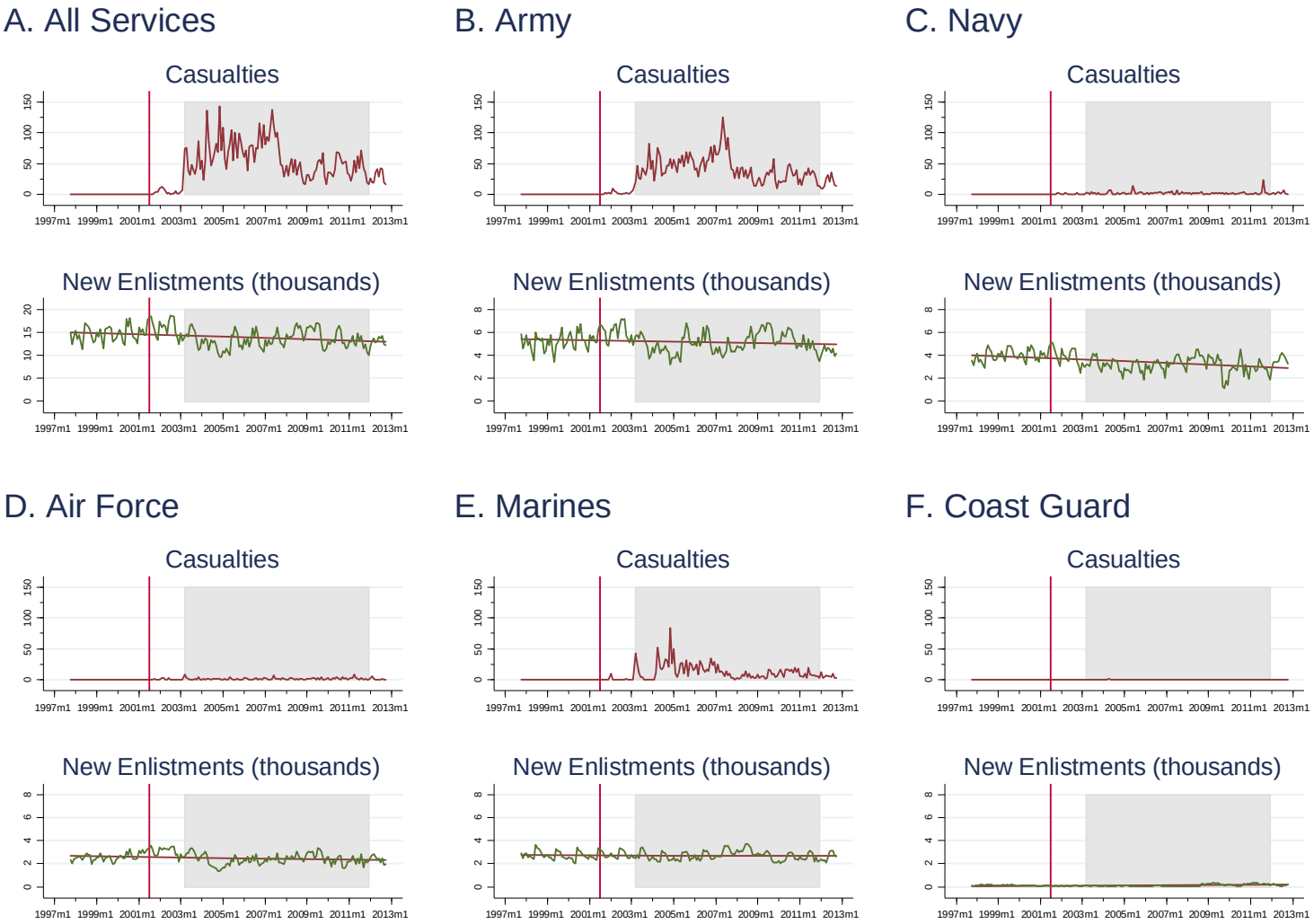
Table 10: Effect of U.S. Wounded in Action (WIA) Soldiers on Military Service and Education

WIA at age:	(1) Ever Served	(2) High School Dropout	(3) College
15-16	-.0001	.0024	-.0035
	(.002)	(.002)	(.007)
17-18	-.0052***	.0035**	-.0108***
	(.001)	(.001)	(.002)
19-20	.0010	-.0009	-.0019
	(.002)	(.002)	(.003)
Sample Size	927,228	927,228	927,228

*Statistically significant at 10% level; **at 5% level; ***at 1% level. WIA are the number of U.S. soldiers, who were wounded in action, measured in thousands, from an individual's state of birth experienced at ages 15-16 and 17-18, and 19-20. For list of controls and other details, see notes to Table 6.

Appendix

Figure A1: Monthly U.S. Combat Casualties and the Number of New U.S. Military Enlisted Recruits, by Service



Source: Defense Manpower Data Center (DMDC) from October 1, 1997 to October 31, 2012.
Notes: Month refers to the month the enlistment contract was signed. New enlistments include those with no prior military service, with a U.S. home state, and who accessed into military service after they signed their enlistment contract. The shaded area indicates the months when U.S. military forces were in Iraq. The vertical line indicates September 11, 2001. The solid regression lines in the enlistment figures highlights the overall trends in new enlistments.

Table A1: Effect of a U.S. Combat Casualty from a County on the Number of New Enlistments from the County, by Service

Experienced a casualty in:	All Services	Army	Navy	Air Force	Marines	Coast Guard
6 months before contract	-.831***	-.260***	-.343***	-.209***	-.015	-.005
	(.120)	(.042)	(.060)	(.027)	(.020)	(.005)
Month contract signed	-1.243***	-.368***	-.509***	-.341***	.008	-.033***
	(.335)	(.103)	(.152)	(.076)	(.040)	(.011)
6 months after contract	-.709***	-.135***	-.360***	-.183***	-.026	-.004
	(.099)	(.030)	(.060)	(.023)	(.018)	(.004)
ln(population)	2.022***	.916***	.064	.405***	.564***	.072***
	(.289)	(.147)	(.099)	(.081)	(.089)	(.023)
Unemployment rate (base: <4.0):						
4.0 to 6.0	.257***	.116***	.045***	.035***	.056***	.005**
	(.033)	(.017)	(.010)	(.008)	(.008)	(.002)
6.0+	.428***	.220***	.065***	.056***	.068***	.020***
	(.049)	(.026)	(.015)	(.011)	(.012)	(.003)
Mean of dependent variable	4.446	1.652	1.097	.797	.861	.0384
Sample Size	528,463	528,463	528,463	528,463	528,463	528,463

*Statistically significant at 10% level; **at 5% level; ***at 1% level.

Source: Defense Manpower Data Center (DMDC) from October 1, 1998 to October 31, 2012.

Notes: Standard errors clustered at the county level are shown in parentheses. The sample includes new enlistments with no prior military service, with a U.S. home state, and who accessed into military service after they signed their enlistment contract. Data is aggregated to the county-month level. Casualties are indicator variables equal to one if there was a U.S. combat casualty from the county in the months before, during, and after the enlistment contracts were signed. All regressions include controls for the unemployment rate at the county month level, log of annual county population, number of accessions from the county seven to nine and ten to twelve months prior to the sample month, as well as county fixed effects, sample-month fixed effects, and state specific linear sample-month trends.

Table A2: Effect of a Service Specific U.S. Combat Casualty from a County on the Number of New Enlistments from the County, by Service

Experienced a service specific casualty in:	Army	Navy	Air Force	Marines
6 months before contract	-.271***	-.284	-.055	-.113***
	(.051)	(.208)	(.161)	(.043)
Month contract signed	-.431***	-.005	-.264	-.130*
	(.161)	(.227)	(.296)	(.074)
6 months after contract	-.162***	-.800**	-.471**	-.132***
	(.039)	(.367)	(.225)	(.050)
ln(population)	.903***	-.073	.327***	.568***
	(.148)	(.103)	(.080)	(.091)
Unemployment rate (base: <4.0):				
4.0 to 6.0	.115***	.038***	.030***	.056***
	(.017)	(.010)	(.008)	(.008)
6.0+	.219***	.057***	.052***	.067***
	(.026)	(.015)	(.011)	(.012)
Mean of dependent variable	1.652	1.097	.797	.861
Sample Size	528,463	528,463	528,463	528,463

*Statistically significant at 10% level; **at 5% level; ***at 1% level.
Source: Defense Manpower Data Center (DMDC) from October 1, 1998 to October 31, 2012.
Notes: Standard errors clustered at the county level are shown in parentheses. The sample includes new enlistments with no prior military service, with a U.S. home state, and who accessed into military service after they signed their enlistment contract. Data is aggregated to the county-month level. Casualties are indicator variables equal to one if there was a U.S. combat casualty from the county in the months before, during, and after the enlistment contracts were signed. All regressions include controls for the unemployment rate at the county month level, log of annual county population, number of accessions from the county seven to nine and ten to twelve months prior to the sample month, as well as county fixed effects, sample-month fixed effects, and state specific linear sample-month trends.

Table A3: Effect of the Annual Number of U.S. Combat Casualties from State on the Annual Number of New Enlistments from State, by AFQT Category, Race, Age, and Gender

	Panel A: Age at Enlistment Contract					*Panel B*: Race	
	All	17	18	19	20+	White	Non-White
Number of casualties	-1,777.8***	-465.8***	-537.4***	-278.0**	-496.6	-2,950.4***	1,172.5*
	(620.6)	(75.1)	(64.5)	(109.9)	(391.0)	(679.3)	(687.7)
Mean of dependent variable	3,236	600	834	549	1,253	2,108	1,128
	Panel C: AFQT Category					*Panel D*: Gender	
	Cat. I (99-93)	Cat. II (92-65)	Cat. IIIA (64-50)	Cat. IIIB (49-31)	Cat. IV-V (30-0)	Male	Female
Number of casualties	-25.6	-781.1***	-840.5***	-317.4	200.7***	-1,330.6**	-447.2***
	(34.7)	(184.1)	(117.6)	(260.6)	(57.9)	(579.5)	(60.7)
Mean of dependent variable	196.9	1,226	891.5	889.9	27.39	2692	544.4
Sample Size	663	663	663	663	663	663	663

*Statistically significant at 10% level; **at 5% level; ***at 1% level.

Source: Defense Manpower Data Center (DMDC) from 2000 to 2012.

Notes: Standard errors clustered at the state level are shown in parentheses. The sample includes new enlistments with no prior military service, with a U.S. home state, and who accessed into military service after they signed their enlistment contract. Data is aggregated to the state-year level. Casualties are the number of U.S. combat casualties, measured in 100's, from the state in the year the enlistment contracts were signed. All regressions include controls for the state unemployment rate, log of annual state population, number of accessions from the prior year, as well as state fixed effects, year fixed effects, and state specific linear trends.

Table A4: Age Coefficients from Discharged Delayed Entry Program (DEP) Regressions

Experienced a casualty in (reference group[1]):	All Services	Army	Navy	Air Force	Marines	Coast Guard
6 months before contract	.0211***	.0073	.0394***	.0006	.0248***	-.0221
	(.0031)	(.0057)	(.0052)	(.0054)	(.0078)	(.0349)
Month contract signed	.0071	-.0002	.0129	-.0106	.0136	-.0334
	(.0056)	(.0079)	(.0109)	(.0090)	(.0115)	(.0623)
6 months after contract	.0131***	.0234***	.0178***	.0022	.0034	.0328
	(.0033)	(.0064)	(.0057)	(.0054)	(.0077)	(.0343)
18 years old × casualty:						
6 months before contract	-.0040*	.0036	-.0181***	.0068	.0008	-.0212
	(.0021)	(.0041)	(.0039)	(.0045)	(.0038)	(.0251)
Month contract signed	-.0065**	.0056	-.0083	-.0036	-.0103**	.0067
	(.0029)	(.0060)	(.0055)	(.0066)	(.0048)	(.0371)
6 months after contract	-.0033	-.0083*	-.0046	-.0043	.0019	-.0066
	(.0022)	(.0044)	(.0039)	(.0041)	(.0039)	(.0263)
19 years old × casualty:						
6 months before contract	-.0156***	-.0011	-.0357***	.0015	-.0129**	.0168
	(.0025)	(.0048)	(.0043)	(.0049)	(.0052)	(.0298)
Month contract signed	-.0034	.0092	-.0047	-.0013	-.0037	-.0311
	(.0038)	(.0074)	(.0068)	(.0070)	(.0082)	(.0374)
6 months after contract	-.0084***	-.0179***	-.0089**	-.0033	-.0022	-.0297
	(.0028)	(.0052)	(.0044)	(.0044)	(.0052)	(.0262)
20 years old × casualty:						
6 months before contract	-.0179***	-.0141***	-.0354***	.0035	-.0051	-.0008
	(.0026)	(.0050)	(.0050)	(.0051)	(.0069)	(.0322)
Month contract signed	-.0095**	.0128*	-.0136	-.0133*	-.0155	.0179
	(.0042)	(.0075)	(.0083)	(.0069)	(.0099)	(.0499)
6 months after contract	-.0101***	-.0157***	-.0132***	-.0047	-.0043	-.0287
	(.0029)	(.0057)	(.0050)	(.0048)	(.0065)	(.0336)
21+ years old × casualty:						
6 months before contract	-.0194***	-.0025	-.0403***	-.0005	-.0243***	.0301
	(.0022)	(.0041)	(.0040)	(.0045)	(.0056)	(.0250)
Month contract signed	-.0013	.0107**	-.0059	-.0016	.0037	.0202
	(.0033)	(.0052)	(.0071)	(.0066)	(.0091)	(.0406)
6 months after contract	-.0154***	-.0229***	-.0216***	.0003	-.0073	-.0202
	(.0024)	(.0043)	(.0038)	(.0040)	(.0050)	(.0261)
Mean of dependent variable	.178	.185	.201	.122	.195	.116
Sample Size	1,993,353	595,734	546,292	410,165	430,573	10,589

*Statistically significant at 10% level; **at 5% level; ***at 1% level.

[1]The reference group are 17 year-old white men with a category I AFQT score.

Source: Defense Manpower Data Center (DMDC) from October 1, 1998 to October 31, 2012.

Notes: Standard errors clustered county level are shown in parentheses. These are additional coefficients from the regressions shown in Table 4. See Table 4 notes for sample and regression details.

Table A5: Race and Gender Coefficients from Discharged Delayed Entry Program (DEP) Regressions

Experienced a casualty in (reference group[1]):	All Services	Army	Navy	Air Force	Marines	Coast Guard
6 months before contract	.0211***	.0073	.0394***	.0006	.0248***	-.0221
	(.0031)	(.0057)	(.0052)	(.0054)	(.0078)	(.0349)
Month contract signed	.0071	-.0002	.0129	-.0106	.0136	-.0334
	(.0056)	(.0079)	(.0109)	(.0090)	(.0115)	(.0623)
6 months after contract	.0131***	.0234***	.0178***	.0022	.0034	.0328
	(.0033)	(.0064)	(.0057)	(.0054)	(.0077)	(.0343)
Non-white × casualty:						
6 months before contract	.0018	.0038	.0002	.0012	.0062*	-.0110
	(.0017)	(.0030)	(.0031)	(.0027)	(.0035)	(.0197)
Month contract signed	.0040*	.0012	.0098***	.0001	.0015	-.0229
	(.0020)	(.0042)	(.0037)	(.0043)	(.0049)	(.0254)
6 months after contract	.0067***	.0097***	.0034	.0094***	.0066*	.0196
	(.0016)	(.0026)	(.0029)	(.0030)	(.0035)	(.0199)
Female × casualty:						
6 months before contract	-.0113***	-.0130***	-.0068*	-.0050	-.0259***	-.0115
	(.0021)	(.0038)	(.0037)	(.0036)	(.0063)	(.0218)
Month contract signed	-.0045	.0079	-.0094	-.0095	-.0067	-.0142
	(.0029)	(.0064)	(.0063)	(.0058)	(.0097)	(.0315)
6 months after contract	-.0065***	-.0099***	.0024	-.0106***	-.0096	.0300
	(.0023)	(.0038)	(.0043)	(.0038)	(.0065)	(.0228)
Non-white	-.0058***	-.0093***	.0001	-.0209***	.0001	.0348***
	(.0010)	(.0017)	(.0016)	(.0017)	(.0022)	(.0114)
Female	.1185***	.1204***	.1235***	.0993***	.1390***	.0290**
	(.0014)	(.0021)	(.0023)	(.0018)	(.0035)	(.0119)
ln(population)	.0054	-.0065	.0096	.0058	-.0201	.1370
	(.0092)	(.0146)	(.0175)	(.0149)	(.0195)	(.0921)
Unemployment rate (base: <4.0):						
4.0 to 6.0	-.0078***	-.0044*	-.0142***	-.0039*	-.0105***	-.0131
	(.0015)	(.0025)	(.0026)	(.0021)	(.0028)	(.0131)
6.0+	-.0137***	-.0103***	-.0195***	-.0084***	-.0186***	-.0567***
	(.0020)	(.0032)	(.0036)	(.0028)	(.0037)	(.0184)
Mean of dependent variable	.178	.185	.201	.122	.195	.116
Sample Size	1,993,353	595,734	546,292	410,165	430,573	10,589

*Statistically significant at 10% level; **at 5% level; ***at 1% level.

[1]The reference group are 17 year-old white men with a category I AFQT score.

Source: Defense Manpower Data Center (DMDC) from October 1, 1998 to October 31, 2012.

Notes: Standard errors clustered county level are shown in parentheses. These are additional coefficients from the regressions shown in Table 4. See Table 4 notes for sample and regression details.