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COLLEGE EDUCATION AND THE MIDCENTURY GI BILLS*

MARCUS STANLEY

The midcentury GI bills were the largest direct scholarship program for higher education in American history. I use a comparison group created by the sharp cutoff date of the Korean War GI bill to evaluate the effects of the Korean War GI bill on postsecondary educational attainment and access to college by the disadvantaged. I then bound the likely effects of the World War II GI bill based on elasticities estimated for the Korean War GI bill and new estimates using older veterans as a comparison group for younger ones. I find that the combination of the Korean War and WWII GI bills probably increased total postsecondary attainment among all men born between 1921 and 1933 by about 15 to 20 percent, with smaller effects for surrounding cohorts. The impacts of both programs on college attainment were apparently concentrated among veterans from families in the upper half of the distribution of socioeconomic status.

I. INTRODUCTION

The World War II GI bill—and its significant but less celebrated cousin, the Korean War GI bill—have acquired the reputation of being one of the signal successes of twentieth century American domestic policy, a kind of domestic Marshall plan. Observers have credited the GI bill with playing a vital role in opening the doors of higher education to millions and helping to set the stage for the decades of widely shared prosperity that followed World War II. The reputation of this legislation is justified by its scale. Almost 70 percent of all men who turned 21 between 1940 and 1955 were guaranteed an essentially free college education plus a substantial stipend under one of the two GI bills. In 1960 some 18 percent of the *total* stock of college-educated males in the United States could claim that their college education had been financed by a GI bill subsidy.¹

Although numerous social historians have made strong

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1. The first (70 percent) figure is based on self-reported military service during the WWII or Korean War period among males in the 1970 Census; almost all veterans of these wars were eligible for GI benefits. The second (18 percent) figure uses administrative data on benefits granted during the first five years of each GI bill as a numerator [Committee on Veterans Affairs 1972] and the number of men reporting one or more years of college education in the 1960 Census as a denominator.

claims for the effect of the GI bills on higher education, there has been little quantitative examination of the impacts of the legislation.² Scholars have examined the impacts of veterans' benefits in other contexts, but their findings may not be directly transferable to these historically important pieces of legislation.³ This paper attempts to fill the gap in the literature by estimating the effects of the two GI bills on both the overall level of higher educational attainment and on the distribution of college attendance among various economic classes.

I begin by evaluating the impacts of the Korean War using a comparison group method. Veterans entering the military on or before January 31, 1955, were eligible for full benefits, but veterans entering after this date were ineligible for education assistance. To estimate the effects of the Korean War GI bill, I compare college attendance after military exit among veterans who entered the military during the year prior to the cutoff date to college attendance among veterans entering the military in the year after it. I also provide evidence that the January 1955 cutoff date for eligibility probably did not coincide with major independent shifts in military selection.

I then examine the effects of the WWII GI bill. In this case there is no comparison group of veterans available who are ineligible for GI bill benefits. Thus, my methods here are of necessity somewhat more speculative than the methods used to estimate the effects of the Korean War GI bill.

But I am able to put broad bounds on the likely impact of the WWII GI bill subsidy. I first compare the postsecondary educational attainment of veterans and similar civilians, after adjusting for a very extensive set of covariates available in my data sources. Because of the selection process for the military in WWII (which picked out the ablest candidates), I use this comparison as an upper bound for the effect of the subsidy on higher education.

Based on this upper bound, I present considerable evidence that college attendance decisions among older veterans were

2. Frederickson and Schrader [1951] and Olson [1974] present some limited quantitative evidence on the potential effects of the WWII GI bill. The only paper that attempts a comprehensive study of the quantitative effects of the WWII GI bill on education is Bound and Turner [2002]. Their work uses a different methodology than this paper, but results are compatible. The only quantitative work on the Korean War GI bill I am aware of is a limited examination in the President's Commission on Veterans' Pensions [1956].

3. O'Neill [1977] and Angrist [1993] examine the effects of the post-Korean GI bills on educational attainment. Lemieux and Card [1998] examine the Canadian GI bill's impacts.

much less likely to be affected by the GI bill subsidy than college attendance decisions among younger veterans were. I take advantage of this finding to generate a lower bound for the impact of the WWII GI bill among the most affected cohorts of younger veterans. I use a group of veterans born in 1921–1922 (who averaged approximately 21 years old when they entered the military) as a comparison group for younger veterans born in 1923–1926 (who mostly entered the military directly out of high school). These older veterans were certainly not completely unaffected by the subsidy, but the impact of the GI bill appears to have been markedly lower among them than it was among the slightly younger cohort. However, they are similar to younger veterans in other ways and faced very similar selection procedures for the draft. They are thus an appropriate comparison group to determine a lower bound for the GI bill's effects on veterans.

Finally, as a robustness check I present some administrative data on the time pattern in degree attainment around the WWII period. I find that the effects calculated using these data are compatible with the estimated bounds determined using the method described above. I also find that my estimated elasticities of higher education attainment to the price reduction created by the subsidies are broadly similar for the two GI bills.

I find that the GI bills did have substantial effects, probably increasing total years of postsecondary attainment among men born between 1921 and 1933 by about 15 percent to 20 percent. There was little effect for men born before 1921, probably because they were older at the time of military entry. Most of the effects of the legislation on higher education seem to have been concentrated among men from families in the upper half of the distribution of socioeconomic status. This suggests that the perceived ability to benefit from college was a more important determinant of college attendance during the period examined than credit constraints were.

Contrary to the "legend" of the GI bill, the effects of the legislation are best conceived of as evolutionary rather than revolutionary. Because of the independent negative impact of WWII on education, much of the effect of the WWII GI bill was probably compensatory; it maintained the prewar trend of rapid growth in higher education and moderately accelerated it. Although the effects of the GI bills were substantial, they do not appear strikingly large compared with the consistently rapid growth that has characterized U. S. higher education throughout this century.

II. HISTORICAL BACKGROUND

II.A. The GI Bill Legislation

The 1941 to 1955 period was marked by two major wars, World War II and the Korean War. Both of these wars resulted in major educational assistance programs aimed at returning veterans. The first, the WWII GI bill, was passed in 1944. The education portion of the bill was originally envisaged as a limited program to allow veterans whose education had been interrupted by the war to continue their education. The eventual legislation that passed was much broader, and the response to it was strong. Out of about 15.3 million WWII veterans, some 7.8 million eventually drew on educational benefits [President's Commission 1956]. However, only a minority of them used their benefits for higher education.⁴

The Korean War GI bill was passed in July 1952 and was consciously modeled after the WWII GI bill. As discussed below, the generosity of the bill was similar to but somewhat less than that of the WWII GI bill. Again, response was strong: out of around 5.3 million Korean conflict veterans, about 2 million drew on educational benefits under the bill within five years of passage, and more than a million used it for college [Committee on Veterans Affairs 1972].

The eligibility rules for the use of these bills were quite generous [President's Commission 1956]. For the WWII bill, all individuals who had served in the U. S. armed forces during the World War II period (September 1940 through July 1947) were covered for a minimum of one year of training plus one additional month for each month of active duty, up to a maximum of 48 months.⁵

The Korean War bill also offered benefits to every veteran of the war. The duration of benefits for the Korean War GI bill was defined as one and one-half times any active duty term that included any service during the officially defined Korean War

4. According to a contemporary survey of veterans, only 35 percent of those in training in November 1949 were enrolled at the university level, with the remainder enrolled in proprietary or vocational schools below the university level or some form of on-the-job training [Department of Veterans Affairs 1950]. The fraction of students enrolled at the university level went down even further among post-1949 users of the legislation [President's Commission 1956].

5. The major exception to this was veterans receiving a dishonorable discharge. Note also that for higher education students' summers would generally not be counted as supported periods, so nine months of GI bill eligibility would suffice to cover one year of full-time college.

period (June 1950 to January 31, 1955). That is, any veteran who had even one day of service during this period qualified for benefits based on his entire term of military duty, even if most of it was not during the Korean War period. Benefits were limited to 36 months of eligibility (four academic years).

The vast majority of veterans in both wars had enough GI bill eligibility to qualify for substantial postsecondary education. According to information from the 1978 Survey of Veterans, over 97 percent of veterans in both wars qualified for at least three full academic years of financial support and over 80 percent qualified for the four years of support necessary to earn a bachelor's degree.⁶ As a practical matter I assume that GI bill eligibility is effectively identical to veterans' status during the relevant war.

The financial provisions of the bills were generous. The WWII bill provided full payment for tuition, books, and supplies at essentially any higher education institution in the country, as well as a substantial living stipend that varied based on the family size of the veteran. The Korean legislation offered a substantial flat fee (that varied based on family size) from which the veteran was expected to pay both tuition and living expenses.

Table I summarizes the payment provisions of the two GI bills, and the reductions they created in the total cost (tuition plus opportunity cost) of college attendance for the typical veteran. Both the tuition benefit and the living stipend are included. The GI bill subsidies reduced total college costs substantially, with the WWII GI bill being somewhat more generous than the Korean War bill. Cost reductions for veterans receiving the benefit were at least 40 percent and generally more (especially since two-thirds of Korean veterans attended public universities, and a substantial minority of veterans of both wars had children). In the rest of this paper I will be using the rough figure of 60 percent for the cut in total college costs created by the WWII GI bill and 50 percent for the Korean War GI bill.

II.B. Military Service during the Period

Because essentially all war veterans were eligible for the GI bill, the selection process for military service is also the selection

6. Author's analysis of data from the 1978 Survey of Veterans [Hammond 1980]. The major group of veterans receiving less than three academic years of support were men who were dishonorably discharged.

TABLE I
COLLEGE COST REDUCTION DUE TO THE WORLD WAR II AND KOREAN WAR GI BILLS

<i>Cost per academic year</i>	World War II (1948)		Korea (1956)	
	<i>Private university</i>	<i>Public university</i>	<i>Private university</i>	<i>Public university</i>
Tuition and fees (dollars)	402	102	626	148
Opportunity cost (dollars)	1390	1390	1890	1890
Total cost (dollars)	1792	1492	2516	2038
<i>GI bill subsidy per academic year, by family composition</i>				
	<i>Subsidy in dollars</i>			
No children	1077	777	990	990
1 child	1347	1047	1210	1210
≥2 children	1482	1182	1440	1440
	<i>Subsidy as a percentage of total cost</i>			
No children	60	52	39	49
1 child	75	70	48	59
≥2 children	83	80	57	71

Sources: Program rules are based on President's Commission [1956]. Tuition data from author's calculations based on tuition and fee data drawn from American Council on Education [1948, 1956]. Tuition/fee data are weighted by the male enrollment at each campus to produce overall mean. (Tuition information from other sources may differ slightly based on different treatment of fees.) Income data for opportunity cost calculation are from the Census Bureau web site: www.census.gov/hhes/income/histinc/p07.html.

All figures are in nominal dollars (1948 for WWII, 1956 for Korea). WWII GI bill stipends are based on stipend levels for February 1948 and after; 1945–1947 levels were somewhat lower. All figures are based on an academic year of nine full-time months of education. The opportunity cost is calculated as 75 percent of the median income of all males between 20 and 24 years old having income in the relevant year. According to the 1950 Census, about 35 percent of WWII veterans in their twenties had children.

process for GI bill benefits. The Appendix provides a detailed description of military selection procedures during both wars.

Mental and physical tests were required for induction, so men who served in the military were a highly select group who differed from civilians in numerous ways. Self-selection through volunteering also occurred during some periods, but the bulk of inductees in both WWII and Korea entered the military through the draft (volunteering was actually forbidden during much of WWII).

Especially during the WWII period, the great majority of men under age 26 who could pass the mental and physical tests necessary for induction were drafted and served in the military. Over 75 percent of males born during the 1921 to 1926 period served in WWII. Men in these birth cohorts who did not serve

were almost universally classed as deficient in some mental or physical manner that made them unsuited for military service.

During Korea manpower demands were lower, with only about 60 percent of young men serving in the military. Deferments or exemptions for young men were somewhat easier to obtain at this time. The Korean War was the first time considerable numbers of men received deferments for college attendance.

II.C. Education during the Period

Educational growth was rapid after World War II. According to Department of Education statistics college enrollments nearly doubled between the fall of 1945 and the fall of 1946, and by 1947 enrollment was 70 percent higher than its prewar level. This growth has often been assumed to be caused by the GI bill. But large numbers of returning male veterans would have caused an enrollment surge in any case. Furthermore, there was very rapid preexisting growth in higher education before WWII. We know from contemporary administrative data that college enrollment increased threefold from 1910 to 1940 [Goldin and Katz 1999], and that growth was especially rapid just prior to the outbreak of WWII. Although growth in higher education slowed greatly during the early years of the Depression, there was a sharp recovery in the years immediately prior to WWII. Bachelor's degrees granted to males as a fraction of the relevant population increased 5.1 percent annually during the years 1936 to 1940.⁷

Second, it is likely that WWII had a strong independent negative effect on postsecondary education. The war drew existing students out of universities and led prospective ones to delay their education. It also had a very strong negative effect on high school graduation rates by drawing young men away from high school to work in war industries or volunteer for the military [Goldin 1998]. With the close of WWII, these factors lessened in importance, and returning veterans surged back into the colleges. As I demonstrate in subsection IV.C below, the question of whether this postwar educational growth reflects unusually rapid growth due to the GI bill depends almost entirely on what one estimates as the negative effect of WWII on education.

7. College degrees granted to males is drawn from the Department of Commerce [1975], and the male population aged 21 is estimated using the 1940 and 1950 Census IPUMS.

III. THE KOREAN WAR GI BILL AND COLLEGE EDUCATION

III.A. *Estimation Methods*

To evaluate the effects of the Korean War GI bill, I use the sharp cutoff in eligibility for the bill to generate a comparison group. The original 1952 legislation simply stated that veterans qualified for education benefits based on active duty service during an (undefined) Korean War period. Combat on the Korean peninsula ended when a cease-fire was signed in June 1953. However, the official eligibility period for Korean War GI bill educational benefits did not end until January 1955. On this date an amendment to the original 1952 legislation was passed stating that all veterans serving in the military at any point from June 1950 to January 1955 were eligible for Korean War GI bill benefits based on their *full* term of active duty service (even that period after January 1955). Thus, a veteran joining January 30, 1955, would be eligible for Korean War GI bill benefits based on their entire term of service, while a veteran joining February 1, 1955, was not eligible for any benefits at all.

Finally, some ten years after these events, the post-Korean War GI bill was passed in June 1966. This bill retroactively made all post-Korean veterans eligible for new education benefits. But during the period of January 1955 through June 1966, veterans who entered the military after January 1955 were not eligible for any postservice benefits.

My identification strategy is based on comparing postsecondary education among veterans who joined up to a year before the January 31, 1955, cutoff date to postsecondary education among veterans who joined in the year following the cutoff. I control for education prior to military entry, among other background variables available in my major data source, the 1973 Survey of Occupational Change in a Generation (OCG).⁸

Slightly more formally, I can represent an individual's level of postsecondary schooling in the absence of the Korean War GI bill subsidy as S_{0i} , and their education given eligibility for the Korean War GI bill subsidy as S_{1i} . The average impact of subsidy

8. See Blau et al. [1994]. The OCG was administered in 1962 and 1973 as a supplement to the March CPS. Each male between 18 and 65 selected for the CPS sample was given a supplemental questionnaire concerning family background and their personal work and marital history. The 1973 questionnaire includes a range of questions on military background, such as dates of entry and exit, and years of education prior to military entry. The 1962 OCG questionnaire does not have detailed questions on military service.

eligibility on postsecondary education can be represented as $E[S_{1i} - S_{0i}]$. I cannot observe this statistic in a population of veterans who joined at exactly the same time, but the sharp benefits cutoff allows me to observe the following statistic for veterans entering the military between February 1, 1954, and January 31, 1956:

$$(1) \quad E[S_{1i}|V_i = 1, K_i = 1, X_i] - E[S_{0i}|V_i = 1, K_i = 0, X_i].$$

Here, $V_i = 1$ indicates veteran status, $K_i = 1$ indicates service during the year prior to the January 31, 1955, cutoff date which marked the end of Korean War educational benefits, and X_i is a vector of covariates. The fact that both groups were veterans allows me to hold constant the effects of military service on education, although the exact dates of service differ slightly.

A potential problem with this method is that changes in military selection could lead veterans entering during the post-Korean War period to differ from veterans entering during the Korean War period in unobservable ways that affect schooling. This could result from changes in military selection, or perhaps entry into the military during the Korean War period by persons who were particularly interested in taking advantage of education benefits.

I address this potential selection issue in several ways. First, I searched military documents that discussed manpower and recruitment issues during the 1950s for any evidence that the January 1955 cutoff date corresponded to an independent change in military recruitment or selection procedures. My findings are discussed in detail in the Appendix. I found no evidence of such a change. Second, I am able to control for a large set of background controls available in the OCG, including education and age prior to military entry and a full set of family background variables. Finally, I also examine differences in education received after military discharge for a wide variety of years both before and after the January 1955 cutoff date. I find that there is a consistent pattern of greater educational enrollment after military discharge for all of the years in which the Korean War GI bill was in effect.

A second issue is that even post-Korean War veterans eventually became eligible for education benefits. Veterans joining after the January 1955 cutoff date were retroactively made eligible for the post-Korean War GI bill, which was passed in June 1966. The post-Korean War GI bill was quite similar to the

Korean War GI bill, but slightly less generous.⁹ Thus, the simple difference in (1) estimates the effect of becoming eligible for veterans' benefits immediately upon military release compared with the effect of becoming eligible in 1966, creating a downward bias in my estimate of the total effects of GI bill benefits. One way I address this problem is by limiting my sample to veterans who exited well before 1966. I also use data on the months of post-Korean War GI bill funding received by veterans who were not eligible for the Korean War GI bill to estimate a rough correction for the effects of the post-Korean War GI bill on my impact estimate.

The availability of family background information in the OCG also allows me to directly examine the effects of the GI bill subsidy on equalizing educational attainment across social classes. My measure of social class is family socioeconomic status (SES), a measure of income, prestige and social standing that is used often in sociological research [Duncan 1961]. I define SES using the occupation of each veteran's father. In this section I use two broad family SES groups. The low group includes all veterans whose father had an SES equal to or below the median SES for the veteran's year of birth, and the high group includes all others.¹⁰

Using the simple notation from equation (1) and subscripts of H and L to represent high and low-SES families, the difference between the effects for the two SES groups is then

$$(2) \quad \{E[S_{1H}|V_i = 1, K_i = 1, X_i] - E[S_{0H}|V_i = 1, K_i = 0, X_i]\} \\ - \{E[S_{1L}|V_i = 1, K_i = 1, X_i] - E[S_{0L}|V_i = 1, K_i = 0, X_i]\}.$$

The sharp benefits cutoff allows me to observe an estimate of this difference for each SES subgroup by simply comparing Korean War and post-Korean War veterans within the subgroup. The estimates for each income group are obtained by interacting a

9. The typical veteran qualified for about 24 months of funding under the post-Korean War GI bill, as opposed to about 36 under the Korean War GI bill. Real benefit levels under the 1966 legislation were about 90–95 percent of benefit levels under the Korean War GI bill [Udell 1968; author's inflation adjustments using CPI-U].

10. The low SES group generally represents about 55 percent of the population and the high SES group about 45 percent due to mass points in the SES distribution. Percentile rankings are defined by comparing the veteran's father's SES to the SES of fathers of all other persons (veteran and civilian) born in the same two-year period. Low sample sizes prevent a finer division of SES groups here. Veterans with no information on the father's SES are dropped.

categorical variable for veteran's status with categorical variables for high and low parental SES (the main effects of high and low SES are also controlled for). The difference in (2) is just the difference between these coefficients.

III.B. Results

Tables II and III show descriptive statistics and results from estimating the difference in equation (1), using two different data sources and three different samples. The first sample is from the 1973 OCG, and consists of veterans who joined the military between February 1954 and January 1956 serving one to five years on active duty. The five-year limit ensures that veterans in this sample were released from the military no later than January 1961.

As a robustness check I also present results from two other samples, both drawn from the 1978 Survey of Veterans (SOV).¹¹ Because this survey contains only the date of military release, and not the date of entry, I cannot re-create the 1973 OCG sample. I have instead selected all veterans discharged between February 1955 and January 1961 and eliminated those with service prior to the beginning of the Korean War in 1950 or with less than one year of completed service before discharge.¹²

Unlike the OCG, the SOV data also contain information on whether veterans entered the military through the draft or through volunteering. I thus also present information on a SOV subsample who entered the military through the draft. Since these men did not enlist willingly, it seems that they would be less likely to reflect voluntary selection into the military based on the desire to take advantage of benefits. Possible bias due to selection is likely to be a less significant issue with this subsample.

The point estimates of the Korean War GI bill's impact in Table III are consistently significant, and also fairly consistent

11. See Hammond [1980] and Department of Veterans Affairs [1994]. The SOV was undertaken in 1978 and in 1987 as an adjunct to the March CPS and in 1992 as a stand-alone survey. The SOV does not include family background data, but it does include a question on education at the time of military entry. For veterans serving after 1955 the SOV surveys also include useful background information on the military service record. I present results only from the 1978 SOV here, but 1987 SOV results are consistent with those presented here.

12. The SOV sample obviously has a greater variance in time of entry to the military and cohort of birth, with an average age difference between the treatment and comparison groups of 2 ½ years. For these reasons, I consider it less reliable than the OCG sample, even though the results are quite similar.

TABLE II
DESCRIPTIVE STATISTICS FOR TREATMENT (KOREAN SERVICE) AND COMPARISON GROUPS

Korean service	1973 OCG Sample		1978 SOV sample		1978 SOV draftee sample	
	Yes	No	Yes	No	Yes	No
Dates of military entry	2/54 to 1/55	2/55 to 1/56	6/50 to 1/55	2/55 to 1/60	6/50 to 1/55	2/55 to 1/60
Dates of military release	2/55 to 1/60	2/56 to 1/61	2/55 to 1/61	2/56 to 1/61	2/55 to 1/61	2/56 to 1/61
Education, military entry ^a	12.1 (0.13)	12.0 (0.17)	12.0 (0.10)	12.2 (0.11)	12.04 (.23)	12.28 (.21)
Education, survey year	13.2 (0.15)	12.84 (0.19)	13.1 (0.13)	13.1 (0.14)	13.02 (.29)	13.02 (.29)
Years of college, military entry	.79 (0.08)	.92 (0.11)	0.66 (0.07)	0.76 (0.08)	0.84 (.15)	0.93 (.14)
Years of college, survey year	1.59 (0.12)	1.40 (0.13)	1.64 (0.10)	1.49 (0.11)	1.69 (.21)	1.51 (.19)
HS graduation rate at military entry	.72 (.03)	.64 (.03)	.77 (.02)	.79 (.02)	.74 (.04)	.77 (.04)
Age at military release	23 (0.13)	22.9 (0.15)	23.3 (0.11)	22.8 (0.12)	23.7 (.25)	24 (.17)
Age, survey year	38.2 (0.15)	37.1 (0.17)	45.1 (0.12)	42.5 (0.13)	46.2 (.24)	44.1 (.18)
Sample size	305	227	437	365	112	128

Sources: 1978 Survey of Veterans; 1973 Survey of Occupational Change in a Generation.
Standard errors are in parentheses.

TABLE III
ESTIMATED IMPACT OF KOREAN WAR GI BILL ELIGIBILITY ON HIGHER EDUCATION

Dependent variable	OCG sample		SOV sample		SOV draftee sample	
	Years of college	Years of college grad. (1/0)	Years of college	College grad. (1/0)	Years of college	College grad. (1/0)
Korean service (GI bill eligible)	.202 (.107)	.243 (.112)	.241 (.106)	.051 (.023)	.334 (.188)	.063 (.040)
Black	—	-.05 (.20)	-.18 (.18)	-.076 (.041)	-.12 (.25)	-.08 (.06)
Preservice education, individual years	15 Classes (<i>P</i> = .000)	15 Classes (<i>P</i> = .000)	16 Classes (<i>P</i> = .000)	16 Classes (<i>P</i> = .000)	14 Classes (<i>P</i> = .000)	14 Classes (<i>P</i> = .000)
Age at induction, individual years	—	16 Classes (<i>P</i> = .13)	—	—	—	—
Ethnicity	—	4 Classes (<i>P</i> = .02)	—	—	—	—
Family background variables*	—	Yes (<i>P</i> = .04)	—	—	—	—
Drafted (1 = Yes)	—	—	-.14 (.12)	-.04 (.028)	—	—
Rank	—	—	4 Classes (<i>P</i> = .22)	4 Classes (<i>P</i> = .71)	4 Classes (<i>P</i> = .13)	4 Classes (<i>P</i> = .15)
<i>R</i> ²	.64	.69	.53	.46	.64	.58

Sources: 1973 Survey of Occupational Change in a Generation, 1978 Survey of Veterans.
 All models are linear models with robust (Huber/White) standard errors. Standard errors are in parentheses; *F*-tests are in parentheses in the case of multiple classes. Postsecondary education top coded at five years in OCG, six years in SOV.
 * Family background variables include five categories for father's education, five categories for mother's education, nine categories for father's occupation, five categories for father's socioeconomic status, and ten categories for Census division of birth.

across the three samples. The regressions include categorical controls for individual years of education upon military entry, and the OCG sample includes an extensive set of family background covariates as well. The various point estimates from Table III cluster around an impact of about a quarter of a year of higher education and a 5 to 6 percentage point increase in the likelihood of college graduation. This is a roughly 20 percent increase in higher education levels (calculated from the base levels of educational attainment in Table II). Based on the approximate reduction of 50 percent in higher education costs calculated for the Korean War GI bill in Table I, this implies an elasticity of postsecondary educational attainment to the GI bill subsidy of around .4.

As Table II shows, in the OCG sample there do appear to be a few differences between the Korean War and post-Korean War samples in education prior to military entry. Although mean education is the same in the two groups, the post-Korean War sample is significantly less likely to have a high school degree at military entry. This difference does not exist in the SOV samples and may be due partially to random variation.¹³

As a final check on the robustness of these results, Figure I presents data from the OCG on postsecondary education obtained after military exit for military entrants in all years from 1951 to 1958 serving between one and five years in the military.¹⁴ The bottom line in the figure shows the unadjusted mean increase in postsecondary education after military exit for all entrants in that year. The top line shows regression-adjusted increases for the modal entrant in each year generated in the following manner:

$$(3) \quad S_i = \gamma_{51} + \gamma_{52} + \gamma_{53} + \gamma_{54} + \dots + \gamma_{58} + \beta X_i + e_i,$$

where S_i is years of postsecondary education, γ_{51} through γ_{58} are a set of year effects, and X_i is a vector of covariates including all the control variables used in Table III. The individual year effects

13. According to the 1973 OCG, military entrants in 1956 and 1957 show an educational pattern that is quite similar to 1954 entrants. In addition, based on data from the Selective Service, manpower demands and standards appear to be reasonably similar in 1954 and 1955 [U. S. GPO 1956, pp. 35–40]. Finally, there are no significant differences in education at military entry between Korean War and post-Korean War veterans in the 1978 SOV sample, although this may be due to the fact that the OCG and SOV samples do not represent exactly the same population.

14. Data are from the 1973 OCG. A year of entry is defined as entry between February of that year and January of the next, so that samples for 1954 and 1955 correspond exactly to the sample used in the Table III model.

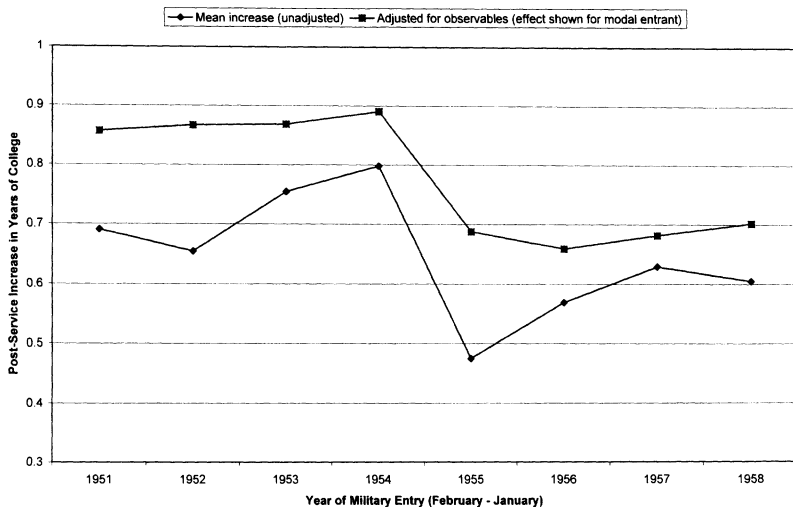


FIGURE I
Increase in Years of Postsecondary Education After Military Exit

are shown as the top line in Figure I. Each year effect can be interpreted as the growth in postsecondary education for a typical (modal) military entrant in that year.¹⁵

The regression-adjusted effects show that veterans entering in years where education benefits were available consistently show more postsecondary schooling after military release than similar veterans who did not have Korean War educational benefits available. The difference (about a fifth to a quarter of a year) is quite consistent from year to year. It does not seem to be driven by a sudden rush of enlistments by men who wished to take advantage of educational benefits before the 1955 deadline. It is present even for military entrants in 1951, who could not have known the Korean War GI bill would pass and make them eligible for benefits.

Table IV addresses the question of differences in the GI bill subsidy impact across social classes. The table presents the educational differences between the control and comparison group broken out by parental socioeconomic status (SES), as explained

15. "Typical" is defined over the entire 1951–1958 period. The modal veteran in the sample had a high school degree but no college on military entry, was about twenty years of age at military entry, had parents with socioeconomic status around the median and with less than a high school education, and was born in the Middle Atlantic states.

TABLE IV
DIFFERENTIAL EFFECTS OF KOREAN WAR GI BILL BY SOCIOECONOMIC STATUS,
1973 OCG SAMPLE

<i>Dependent variable</i>	<i>Years of college</i>		<i>College grad (1/0)</i>		<i>College attend (1/0)</i>
High SES Effect (SES > median)	.428 (.167)	.463 (.168)	.079 (.039)	.074 (.04)	.093 (.047)
Low SES Effect (SES ≤ median)	.064 (.137)	-.018 (.159)	.042 (.03)	.040 (.032)	-.045 (.049)
<i>F-test for difference</i>	3.27 (<i>P</i> = .07)	4.29 (<i>P</i> = .04)	.6 (<i>P</i> = .44)	.46 (<i>P</i> = .5)	4.77 (<i>P</i> = .03)
Black	—	-.05 (.23)	—	-.07 (.048)	.02 (.076)
Father's SES	5 Classes (<i>P</i> = .25)	5 Classes (<i>P</i> = .11)	5 Classes (<i>P</i> = .30)	5 Classes (<i>P</i> = .32)	5 Classes (<i>P</i> = .47)
Preservice education, individual years	15 Classes (<i>P</i> = 0.0)	15 Classes (<i>P</i> = 0.0)	15 Classes (<i>P</i> = 0.0)	15 Classes (<i>P</i> = 0.0)	15 Classes (<i>P</i> = 0.0)
Age at entry	—	17 Classes (<i>P</i> = .32)	—	17 Classes (<i>P</i> = .55)	17 Classes (<i>P</i> = .32)
Ethnicity	—	3 Classes (<i>P</i> = .02)	—	3 Classes (<i>P</i> = .25)	3 Classes (<i>P</i> = .27)
Census division of birth	—	10 Classes (<i>P</i> = .14)	—	10 Classes (<i>P</i> = .08)	10 Classes (<i>P</i> = .10)
Father's education	—	5 Classes (<i>P</i> = .21)	—	5 Classes (<i>P</i> = .12)	5 Classes (<i>P</i> = .45)
Mother's education	—	5 Classes (<i>P</i> = .22)	—	5 Classes (<i>P</i> = .17)	5 Classes (<i>P</i> = .40)
Family income	—	6 Classes (<i>P</i> = .98)	—	6 Classes (<i>P</i> = .80)	6 Classes (<i>P</i> = .95)
Father's occupation	—	8 Classes (<i>P</i> = .31)	—	8 Classes (<i>P</i> = .54)	8 Classes (<i>P</i> = .09)
<i>R</i> ²	.66	.69	.63	.66	.58

Source: 1973 OCG.

All models are linear models with robust (Huber/White) standard errors. Socioeconomic status (SES) is defined using the Duncan measure of occupational status based on the father's occupation [Duncan 1961]. High SES effect interacts Korean GI Bill eligibility with a dummy for father's SES greater than the median; low SES effect interacts GI bill eligibility with a dummy for father's SES less than or equal to the median. High SES corresponds to top 45 percent of SES distribution in each two-year period of birth, due to a mass point at the median. Sample size is 498 for all models.

in equation (2). The table uses the same OCG treatment and comparison group used in Tables II and III, and controls for the same set of background variables.

The Korean War GI bill appears to have had considerably higher causal effects on postsecondary education among higher SES veterans. The differences are especially striking for years of postsecondary education, where they are statistically significant and large in magnitude. The difference in college graduation rates is not as large and is statistically insignificant. In fact, due to the lower base levels of college graduation among low SES veterans, the point estimates of responses for college graduation rates imply similar elasticities of college graduation for high and low SES veterans (although absolute effects are still significantly higher for high-SES vets).

The difference in findings for years of college and college graduation rates suggests that eligibility for funding had a particularly large effect on those low SES veterans who did enroll in college, but had little impact on college attendance for low SES veterans. The final column in Table IV provides more evidence for this hypothesis, as do models (not shown) demonstrating that low-SES veterans were more likely to graduate college conditional on entry if they were in the GI bill eligible subgroup.

As a check on potential selection bias, I added a full set of interactions between parental SES and education at military entry to the models in Table IV. The results were not greatly affected, and the differential between high and low SES impacts actually increased slightly.

The results in Table IV are also supported by Figure III, which shows SES of college attendees and graduates of all males born from 1910 to 1940 by birth year from the merged 1962/73 OCGs. This figure shows no unusual decline in the mean SES of college attendees for males born in 1930–1933, the peak Korean War years.

Clearly, there is no evidence in the OCG that veterans from families in the bottom half of the SES distribution experienced a greater causal effect on postsecondary education from the Korean War GI bill than higher SES veterans did. If anything, the reverse seems to be the case. There are several possible reasons for this. The first is the availability of proprietary school vocational education under the Korean War GI bill. To the extent that veterans from lower income families were already invested in skills that were a complement to proprietary school education, the vocational school option may have drawn them away from college.

A second (and related) potential explanation is that the distribution of the perceived ability to benefit from college was a more important factor than credit constraints in determining postmilitary college entry among lower income veterans. If the ability to benefit from college is also correlated with family income, then the distribution of causal effects from a subsidy that loosens credit constraints is indeterminate.¹⁶ The population most affected by the subsidy will be those with perceived levels of ability to benefit from college "just below" the ability level that justified college attendance for their presubsidy wealth level. Lower income groups may not have enough persons near the college ability margin to see large effects from the subsidy.

III.C. Adjusting for Possible Later Use of the Post-Korean War GI Bill

While selection issues mean that the overall impact estimate in Table III could be an overestimate of the true impacts of the GI bill, possible contamination effects of later GI bill eligibility under the 1966 post-Korean War legislation may lead the Table III impacts to be an underestimate. Table V gives some estimates of later use of the 1966 post-Korean War GI bill. The figures are from the 1979 SOV, which asks directly about the use and timing of veterans' benefits to pay for education.

The results show that educational benefits were indeed far more available to veterans with Korean service than to veterans who entered in the period immediately after the Korean War.¹⁷ By 1973, well after the passage of the post-Korean War GI bill, the average number of months of postsecondary educational funding received by Korean War veterans is still over three and one-half times greater than the figure for post-Korean War veterans.

However, the fact that a small minority of veterans in my comparison group used the post-Korean War GI bill means that

16. See Willis and Rosen [1979], Becker [1994], and Cameron and Heckman [1998] for models in the same spirit. A model is available from the author on request.

17. Some 2 percent of non-Korean War veterans report GI bill use within four years of military release. Since all of the non-Korean War veterans in my sample report being released on or before January 1961, this should not be possible. It may be due to pure recall error, or to confusion between the start date of the educational spell and the start date of GI bill use among persons already in college in 1966 when the post-Korean War GI bill was passed.

TABLE V
ESTIMATED USE OF KOREAN WAR AND POST-KOREAN WAR GI BILL
FUNDING BY 1973

	<i>Korean service</i>	<i>No Korean service</i>
Began GI-bill-funded college education within 4 years of military release	27.9%	2.7%
Began GI-bill-funded college education from 4 years after release to 1973	2.4%	6.9%
Average months of GI-bill-funded college education completed by 1973 that were part of spells . . .		
beginning 0 to 4 years after military release	7.45 (.63)	.67 (.23)
beginning more than 4 years after military release	.53 (.18)	1.49 (.32)
Estimated total months of GI-bill-funded college education by 1973	7.98 (.64)	2.16 (.42)
Difference in months of GI-bill-funded college education by 1973, adjusted for education at military release		5.9 (.73)
Adjusted Estimates Based on Later Use of Post-Korean War GI Bill*		
	Years of college	College graduation
1973 OCG results	.33 (.12)	.081 (.03)
1978 SOV results	.36 (.12)	.076 (.026)

Standard errors are in parentheses.

Source: Answers to survey questions on use, duration, and starting year of VA funding, 1978 Survey of Veterans.

GI-bill-funded college education was assumed for veterans who had attended college after military discharge and reported four or more months of GI bill educational funding.

* See equations (4) and (5) in the text for explanation of adjustment methods.

the straightforward treatment/comparison difference in Table III may be a slight understatement of the Korean War GI bill's effects. I estimate the rough magnitude of this understatement by assuming that the average causal effect on postsecondary education of each month of post-Korean War GI bill funding is equal to the average causal effect of a month of GI bill receipt received

from the Korean War GI bill.¹⁸ I first calculate an approximate Wald estimator of the treatment effect of a month of GI bill funding on education:

$$(4) \quad \beta_2 = \beta_1 / (M_{GI}^T - M_{GI}^C).$$

Here, β_2 is the Wald estimator of the impact of a month of GI bill funding, and β_1 is the regression-adjusted estimate of the difference in education between the treatment and comparison group (from Table III). M_{GI}^T is the mean months of GI bill funding received by the treatment (Korean service) group of veterans, while M_{GI}^C is the average number of months of GI bill funding received by the comparison group.¹⁹

I then add an adjustment for the comparison groups' use of GI funding to my impact estimate:

$$(5) \quad \text{Impact} = \beta_1 + \beta_2 M_{GI}^C.$$

The results of this technique are shown in the final rows of Table V. Adjusting for post-Korean War GI bill use raises the estimated impact of the Korean War GI bill from approximately one-quarter to approximately one-third of a year of higher education. Making this upward adjustment to the Korean War GI bill's impact increases my estimated elasticity of years of higher education to the subsidy price reduction from roughly .4 to approximately .5.

I also checked the reliability of my results by simply using the estimate of the post-Korean War GI bill's impacts calculated in Angrist [1993]. Using Angrist's estimated impact per month of funding received produces a result very similar to the adjustment method explained above.

18. Even though the take-up rate of the Korean War legislation was greater than that of the post-Korean War legislation among this population, the educational response *per month of funding received* was not necessarily different. However, the higher education response might differ if the funding was used for courses in vocational schools or other noncollege equivalent education; I cannot observe whether this is true.

19. This Wald estimator is mathematically equivalent to using the date of entry into the military as an instrument for months of GI bill funding received in a regression of completed education on GI bill funding received [Angrist and Krueger 1999].

IV. EVIDENCE ON THE WWII GI BILL AND POSTSECONDARY SCHOOLING

IV.A. Estimation Methods

It is useful to begin by putting the different effects of military service on education in the WWII period into a simple regression framework. Consider a simple regression comparing veterans and civilians:

$$(6) \quad S_i = a + X_i\beta_1 + C_i\beta_2 + V_i\beta_3 + e_i.$$

Each individual's years of postsecondary schooling S_i is modeled as the sum of an intercept, effects from a vector of background variables X_i , a cohort of birth effect β_2 that represents changes in educational availability and costs over time (including potential effects of the war period on education), and an effect β_3 that is directly associated with a military service dummy V_i .

The military service effect β_3 conflates three separate sources of difference in education between veterans and civilians:

- The first is a *selection effect* driven by the preexisting differences between veterans and civilians that are not sufficiently controlled for in the vector of covariates X .
- The second is a *direct effect* of military service on education. The interruption of civilian life and the experience of service in the war may have their own effect on education decisions.
- Finally, the third effect is the *subsidy impact* created at the education margin by eligibility for the GI bill education subsidy.

Since the selection effect is probably quite positive, and is almost certainly more than enough to counterbalance any negative direct effects of military service on education, the coefficient β_3 is likely an overestimate of the GI bill's impact.²⁰ So this regression coefficient can be seen as an upper bound on the true effect of the GI bill subsidy.

To get a more conservative estimate of the subsidy impact, I must somehow adjust the coefficient β_3 for the first two effects.

20. This assumption is supported by data in the 1973 OCG. The survey includes information on education prior to military entry for veterans. There are no similar data for civilians, but recalled education levels among veterans show that even prior to military entry they already had higher levels of education than nonveterans ever attained (this is true whether or not one conditions on family background). In addition, the military selection process was designed to exclude the least fit and intelligent draftees (see the Appendix).

Suppose that there was a comparison group of veterans that was not eligible for the GI bill, but was similar to eligible veterans in all other ways (including the selection and direct effects of their military service on education). Then I could run equation (6) on the comparison and treatment groups. Subtracting β_3 for the comparison group from β_3 for the treatment group would eliminate the selection and direct effects of military service and isolate the treatment effect of the GI bill subsidy on higher education.

Since all veterans in the WWII period and the Korean War period immediately afterwards were subsidy eligible, no perfect comparison group exists. However, I believe that WWII veterans born in the period from roughly 1921 to 1922 (who would have been in their early twenties when entering the military) do constitute a reasonable comparison group to use in estimating a lower bound for the subsidy's effects on younger veterans born from 1923 to 1926 (who entered the Army in their teens, or directly out of high school). I present evidence below that the effect of the GI bill subsidy on college decisions was markedly lower among older veterans than younger ones. Thus, this older group was in effect "less exposed" to the GI bill education subsidy than veterans born in 1923–1926, who mostly joined the military directly from high school. But they were similar to their younger counterparts in other ways.

As I detail in the Appendix, cohorts born between 1921 and early 1926 faced very similar selection processes in the draft throughout the war. Similar proportions of males born in these cohorts served in the military. It thus seems likely that the selection effect on education is very similar between the two groups. The pool of veterans born in 1921–1922 and veterans born in 1923–1926 probably had similar unobservable characteristics.

The direct effect of military service on education may differ somewhat between the two groups. The absolute difference in age between the groups is small, but the causal effect of military service for the two groups might have differed if men in one cohort were more likely to have their schooling interrupted. It is not possible to directly measure the causal effect of military service on education, but the 1973 OCG provides some circumstantial evidence on the matter. About 10.4 percent of veterans in the 1921–1922 cohort and 11.1 percent of veterans in the 1923–1924 cohort were "potentially" college students who did not continue college education after military service, and therefore may have

had their college education interrupted.²¹ These figures are quite close, which provides some evidence that any negative “interruption effect” of military service on higher education was not dramatically different between the two cohorts.

Finally, there is considerable evidence that men who were only a few years past the traditional college age when entering the military were less likely to use higher education benefits after the war. In a survey of undergraduate veterans at sixteen colleges and universities, the Educational Testing Service found that 85 percent were born after 1923 [Frederickson and Schrader 1951]. In the results section below I present new evidence that the impact of the higher education provisions of the GI bill was limited for older veterans.

Of course, at least some of the veterans born in 1921–1922 did have their college attendance decisions affected by GI bill eligibility. For this reason, using these veterans as a comparison group will lead to an underestimate of the true effects of the GI bill subsidy on younger veterans, since some of the true impact will be differenced out. I therefore use the 1921–1922 comparison group to generate a lower bound for the GI bill’s impacts on higher education. As explained above, I take the coefficient β_3 as an upper bound for the GI bill impact.

IV.B. Results

Table VI presents descriptive statistics on veterans and civilians among two-year birth cohorts of men born between 1909 and 1927, using a merged sample of the 1962 and 1973 OCGs.²²

Table VII runs the regression from equation (6) separately for each birth cohort. The first column reports the coefficient β_3 on veterans’ status after adjusting for family background and race as covariates. The second column reports the coefficient after adding additional controls for work history (occupation of first full-time job and age at which the first full-time job was obtained) as of 1940 or before, and marital history (age at first marriage) in 1940

21. The survey asks veterans their level of education prior to military entry and whether they had ever obtained a full-time, full-year job prior to military entry. I assume that men who recall at least a high school degree at military entry and had never had a full-time, full-year job prior to military entry represent the pool of men who were possibly enrolled in college at military entry. I then observe what fraction of these “potential” college students did not continue their postsecondary education after military exit.

22. The 1927 cohort is limited to one year because there is very limited WWII service among the 1928 cohort, who were essentially all volunteers. Most men born in the latter half of 1927 were also volunteers.

TABLE VI
 DESCRIPTIVE CHARACTERISTICS FOR VARIOUS COHORTS OF MALES AFFECTED
 BY WORLD WAR II

Cohort (years of birth)	% WWII vets	Civilians		WWII veterans			
		% College grads	Mean years college	Age at military . . .		% College grads	Mean years college
				Entry	Release		
1909-1910	28 (1.0)	7.4 (.7)	.48 (.03)	31.7	36.3	15 (1.9)	.81 (.07)
1911-1912	34 (1.1)	7.2 (.7)	.48 (.04)	30.1	34.3	16.6 (1.5)	.92 (.07)
1913-1914	40 (1.1)	8.7 (.8)	.56 (.04)	28	32.5	11.2 (1.1)	.70 (.06)
1915-1916	54 (1.1)	8.4 (.9)	.51 (.04)	26.4	30.8	12.3 (1.0)	.80 (.05)
1917-1918	64 (1.0)	9.3 (1.0)	.53 (.05)	24.2	29	15.4 (.9)	.89 (.04)
1919-1920	74 (.9)	9.5 (1.1)	.53 (.05)	22.2	27	11 (.8)	.72 (.04)
1921-1922	75 (.9)	8.1 (1.1)	.51 (.06)	20.7	25.1	15.4 (.8)	.93 (.04)
1923-1924	79 (.8)	8.1 (1.2)	.49 (.06)	19.3	23.4	19.7 (.9)	1.08 (.04)
1925-1926	73 (.9)	8.7 (1.1)	.51 (.05)	18.2	21.8	20.8 (1.0)	1.18 (.04)
1927	58 (1.4)	11.1 (1.4)	.62 (.07)	17.9	21.4	19.2 (1.5)	1.12 (.07)

Source: Merged 1962 and 1973 OCG.

Data on average age of military entry and release are from 1973 OCG. Year of birth determined as survey year minus age minus 1. Postsecondary education top-coded at five years.

or before for all cohorts aged 18 or over in 1940.²³ Since the United States did not enter WWII until December 1941, data from 1940 or before can safely be taken as exogenous to military service.

The assumption that the raw coefficient on veterans' status is an upper bound for the impact of the GI bill subsidy immediately yields some strong conclusions. For cohorts born in 1920 or before, the effect does not appear to be large. After adjusting for

23. Both the 1962 and 1973 OCGs include extensive questions on work and marital history for all respondents. The OCG also asks veterans about education prior to military entry.

TABLE VII
EFFECTS OF WORLD WAR II MILITARY SERVICE ON POSTSECONDARY EDUCATION,
BY COHORT

Cohort (birth years)	Sample size	Regression 1		Regression 2 (Includes pre-1941 work, marital history)	
		Dependent variable . . .		Dependent variable . . .	
		Years of college	College grad (1/0)	Years of college	College grad (1/0)
1909-1910	1837	.193 (.087)	.043 (.02)	.035 (.077)	.013 (.018)
1911-1912	1835	.332 (.078)	.075 (.018)	.20 (.07)	.049 (.016)
1913-1914	1978	.051 (.066)	.013 (.014)	.014 (.06)	.003 (.013)
1915-1916	2050	.146 (.063)	.014 (.014)	.017 (.06)	-.013 (.014)
1917-1918	2230	.189 (.071)	.026 (.015)	.107 (.065)	.012 (.014)
1919-1920	2365	.037 (.063)	-.009 (.014)	.02 (.06)	-.013 (.013)
1921-1922	2340	.171 (.070)	.027 (.015)	.136 (.069)	.021 (.015)
1923-1924	2392	.379 (.073)	.076 (.016)	NA	NA
1925-1926	2400	.36 (.069)	.067 (.016)	NA	NA
1927	1169	.30 (.10)	.04 (.022)	NA	NA
Mean effect, 1909-1920*	12295	.14 (0.29)	.021 (.007)	.065 (.028)	.004 (.006)
Mean effect, 1923-1926*	4792	.37 (.054)	.072 (.011)	NA	NA

Source: Merged 1962 and 1973 OCG.

The table shows veteran/civilian differential in each cohort after controlling for background variables.

Regression 1 controls for father's education (five categories), father's occupation (nine categories), father's SES (six categories), year of birth, and region of birth (ten categories). All categories are fully interacted with the OCG year and cohort of birth. Regression 2 controls for all the variables from regression 1, plus categorical variables for age at first FTFY job if obtained before 1941, SES of first FTFY job if obtained before 1941, age at first marriage if before 1941, and categorical variables for no marriage or job prior to 1941.

* Weighted by fraction of cohort serving in WWII.

available prewar covariates, the remaining effect on college graduation is very small and statistically insignificant. The effect on years of postsecondary education received is quite limited, under 10 percent with an implied elasticity of a bit under .15. Since

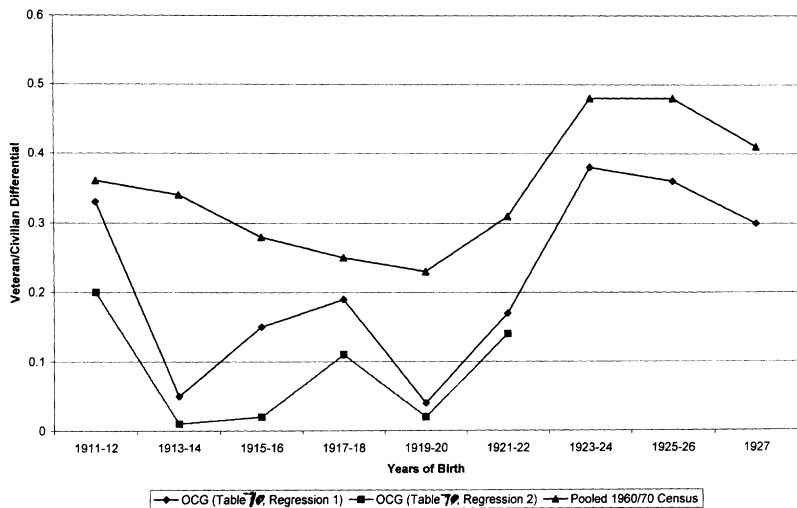


FIGURE II
Veterans-Civilian Differential in Years of College Education

some 50 percent of WWII veterans were born prior to 1921, this finding is important. These findings support the contention above that older veterans showed much smaller effects of the subsidy offer, and are consistent with the belief that commitment to a career and family sharply raised the opportunity costs of college entrance during this period.

In contrast to the findings for earlier cohorts, cohorts born in the mid-1920s (1923 to 1926) show very high effects from WWII service. These are upper bounds and include selection effects, which are likely to be particularly large for these groups, since they were too young at the start of the war to allow controls for prewar marital and work history. But note that even the first column coefficients that do not adjust for prewar information show a sharp increase for mid-1920s cohorts. Figure II uses Census data and shows that this sudden increase in the veteran/civilian education differential among mid-1920s cohorts is a robust result that can be found in simple Census regressions as well, where the magnitude is also similar to that shown in Table VII.²⁴ These younger cohorts, who entered the military immedi-

24. The Census results shown in Figure III are the coefficient on veterans status in a regression of postsecondary education on veterans status, a dummy for three-month cohort of birth, a race dummy, and a dummy for observations drawn

TABLE VIII
APPROXIMATE BOUNDS FOR EFFECTS OF WORLD WAR II GI BILL ELIGIBILITY

Cohort	Years of college		College grad (1/0)	
	Impact (SE)	Elasticity to GI bill subsidy (point estimate)	Impact (SE)	Elasticity to GI bill subsidy (point estimate)
1923–1926	.20	.36	.045	.29
Lower bound	(.07)		(.016)	
1923–1926	.37	.81	.072	.92
Upper bound	(.05)		(.011)	
1921–1922	.136	.30	.021	.27
Upper bound	(.07)		(.015)	
1909–1920	.065	.15	.004	.05
Upper bound	(.03)		(.006)	
1923–1926 Lower bound from pooled 1960/70 Censuses*	.17 (.02)	.33	.028 (.004)	.32

See text for full explanation of this table. Upper bounds come from the results in Table VII, while the lower bound for the 1923–1926 cohorts is calculated using the 1921–1922 birth cohorts as a comparison group. Elasticities are calculated using a rough price reduction of 60 percent for the WWII GI bill and the levels of education recorded for veterans in the various cohorts in Table VI. Upper bounds for 1909–1920 cohorts use Regression 2 results from Table VII; all the 1923–1926 results use Regression 1 results from Table VII.

* See Figure II and discussion in text. Elasticities are estimated using mean postsecondary education and college graduation rates in the pooled Census sample.

ately after high school, were in a sense the “most exposed” to the GI bill subsidy, since they had the lowest opportunity cost of taking advantage of it.

Table VIII summarizes the impact estimates and elasticities drawn from the Table VII results. The upper bound is simply drawn from the Table VII coefficient. The lower bound is produced by using the 1921–1922 cohorts as a comparison group for the 1923–1926 cohorts, as explained above. As a check on the OCG results, I also show the lower bound generated by using the 1921–1926 cohorts in the pooled 1960–1970 Censuses in the last row of the table.²⁵ Both lower bounds are generated by differencing the coefficient for veterans’ status in the pooled 1923–1926

on from the 1970 Census. Results are shown for two-year birth cohorts that match the OCG.

25. The Census results adjust only for three-month birth cohort, race, and which census the observation is drawn from.

cohorts from the coefficient for 1921–1922 cohorts. Essentially identical results come from comparing only the 1923–1924 cohorts with 1921–1922 cohorts. A noteworthy aspect of this table is the general consistency between the point estimates of the elasticities for the 1923–1926 cohorts in this table and those found for the Korean War GI bill above.

The lower bound estimate of the GI bill's effect from Table VIII implies about a 20 percent increase in postsecondary education among the peak cohorts of veterans born between 1923 and 1926 due to the GI bill. (The inclusion of statistical uncertainty would of course greatly widen this estimate, but it remains above zero.) The upper bound is about a 50 percent increase in education. Applying the Korean War GI bill range of roughly .4 to .5 elasticity for years of college to a subsidy offer would give an increase of about 25 percent to 30 percent in years of college among veterans due to the WWII GI bill. For veterans born between 1909 and 1920, increases in education are much smaller, less than 10 percent, and for the 1921–1922 cohorts the simple correlation from Regression 2 in Table VII implies an upper bound of about a 15 percent to 20 percent increase.

IV.C. A Robustness Check Using Administrative Data

It is possible to check the plausibility of the upper and lower bounds in Table VIII using administrative data from the WWII period on college degrees granted. My approach here is inspired by Olson [1974].²⁶ For each year from 1930 to 1952, I calculated D_t , the number of four-year college degrees granted to males in year t divided by the male population aged 21 in year t .²⁷ The WWII period is defined to include the years 1940 to 1952; during 1940 to 1945 college graduation was negatively impacted by the war, while during 1946 to 1952 degrees granted were increased by the number of returning veterans who obtained their degrees late. For each year in the WWII period, I simulated alternative lower and upper bound values of D_t , D_{Lt} , and D_{Ut} , that represent

26. I adjust for sex and population and present alternative scenarios, which Olson does not do (he uses all degrees granted to both males and females, does not divide by population, and uses only the growth rate just prior to the war). This makes a substantial difference in the results. I also omit master's and doctoral degrees, since the appropriate population to use as a denominator for these degrees is unclear.

27. College degrees granted to males, the numerator of D_t , is drawn from the Department of Commerce [1975], and the male population aged 21 is estimated using the 1940 and 1950 Census IPUMS.

likely levels of undergraduate degree receipt among males in the absence of the GI bill and the presence of WWII:

$$(7) \quad \begin{aligned} D_{Lt} &= D_{40} * (1 + R_L)^t \\ D_{Ut} &= D_{40} * (1 + R_U)^t. \end{aligned}$$

The average annual growth rate in D_t over the 1930 to 1940 period is used as the lower bound growth rate R_L , and the 1936 to 1940 growth rate is used as the upper bound R_U . The 1930 to 1940 growth rate of 1.7 percent annually is low, as it includes the negative effects of the early part of the Depression on education. This growth rate corresponds to assuming that the negative effects of WWII on college degree receipt were similar to those of the Depression. The 1936 to 1940 annual growth rate of 5.1 percent is very rapid, probably partially as a “rebound effect” from the early part of the Depression and also due to rapid rises in high school education created by various factors during the Depression period [Goldin 1998]. This upper bound growth rate corresponds to the assumption that there were no negative effects of WWII on college degree receipt compared with trends that existed just prior to the war.

The “bottom line” of the simulation is easily summarized. The actual figures, the result of both WWII and the GI bill, show that an estimated 12.7 percent of men turning 21 during the 1940–1952 period received four-year undergraduate degrees. My “lower bound” estimate, based on a continuation of 1930–1940 trends over the WWII period, gives the result that 10.4 percent of men turning 21 over the 1940–1952 period would have received college degrees. My upper bound estimate results in 12.8 percent of men receiving college degrees. In other words, growth in college degrees continued at its most rapid prewar pace over the entire WWII period. Given the interruption in education created by the war (e.g., the slowdown in the growth rate of high school graduation levels), it seems highly unlikely that the rapid prewar growth rate in college graduation would have continued over the WWII period in the absence of the GI bill.

If the correct counterfactual growth rate in undergraduate degrees over the WWII period in the absence of the GI bill is the annual increase observed over 1930–1940, this implies a 22 percent increase in degrees granted among males due to the WWII GI bill, for a .37 elasticity of college graduation to the GI bill subsidy. This is approximately the lower bound previously esti-

mated above. In addition, the simulation results may be somewhat lower than those in the previous sections, as they are based on the effect of the WWII GI bill on all BA degrees earned over the entire 1940–1952 period.²⁸

IV.D. Differential Effects of the WWII GI Bill by Socioeconomic Status

There has been substantial anecdotal discussion of the impact of the WWII GI bill in opening up college education to veterans from working-class families (e.g., Kerr [1994]). However, there is little empirical information available.²⁹ Unlike the case of the Korean War, it is not possible to directly compare subsidy-eligible veterans to nonsubsidy-eligible veterans within particular socioeconomic groups. A simple but potentially enlightening approach is to look at trends in postsecondary education among different SES groups around the WWII period, and see whether the mid-1920s birth cohorts I have identified as most affected by the GI bill show a sudden change in education levels for some particular SES group relative to others.

Some results of this analysis are shown in Figure III, which in a sense summarizes my results on the equalizing effects of the midcentury GI bills. The figure shows a three-year moving average of the mean SES percentile of college attendees and graduates for men born 1910–1940. There is no evidence of any notable drop at all in the SES of college attendees over the mid-1920s birth cohorts most affected by the war, although there is perhaps some possibility of an equalizing effect among college graduates. Based on Figure III, there is little evidence within the OCG of an equalizing effect of the WWII GI bill.

In Table IX I do a detailed breakout of higher education attainment by SES quintile over the WWII period. I find that men born among the bottom 45 percent of the SES distribution show essentially no unusual growth in higher education associated

28. The effects inferred from the Korean War elasticities are relevant to veterans exiting the military at similar ages to the Korean War sample I used, which had an average age of 23 on military exit. Some fraction of men who would graduate during the 1940 to 1952 period were born before 1921 and older than 23 on military exit.

29. One paper [Behrman, Pollak, and Taubman 1989] has examined the equalization effects of the WWII GI bill by comparing intrafamily inequality in education among WWII veterans to intrafamily inequality in education for their children. Also, Cameron and Heckman [1998] briefly note the stability in the family income/schooling relationship over the WWII period in the OCG data in a more extensive paper on schooling opportunities throughout the century.

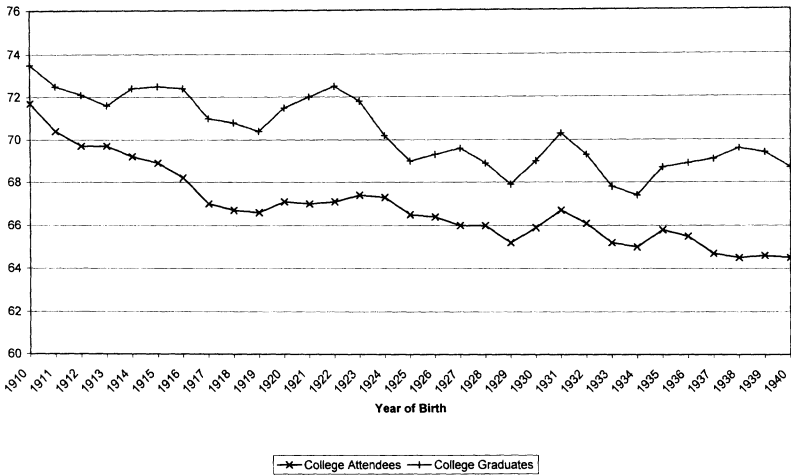


FIGURE III
SES Percentile of Male College Attendees (Three-Year Moving Average)
Source: Merged 1962 and 1973 OCG Surveys

with the peak WWII GI bill period. In fact, growth in postsecondary education for the bottom two quintiles is more or less stagnant over the 1921–1926 birth cohorts, after showing fairly marked growth before it. Almost all of the considerable growth in postsecondary education during 1921–1926 occurs in the top half of the SES distribution. The fourth quintile shows the greatest absolute and percentage growth in education. Once again, there is no evidence of an equalizing effect of the WWII GI bill on higher education across social classes.

V. SUMMARY AND CONCLUSIONS

It would be surprising indeed if a program of the magnitude of the midcentury GI bills did not have an effect on educational attainment. Midrange estimates calculated above imply that the GI bills probably increased total years of postsecondary educational attainment among all men born between 1921 and 1933 by about 15 percent to 20 percent, an effect that was concentrated among men in the upper half of the distribution of socioeconomic status. (This is of course an approximate estimate.) Effects seem to have been much smaller for men born before 1921.

For example, the results in Tables III and V correspond to an

TABLE IX
 EDUCATION BY BIRTH COHORT AND SOCIOECONOMIC STATUS (SES), ALL MALES COHORTS AFFECTED BY WWII ARE SHOWN;
 PEAK WWII EFFECTS AMONG MEN BORN 1921-1926

Cohort (years of birth)	Mean postsecondary education					% Graduating college					% Attending college				
	Quintiles of father's SES*					Quintiles of father's SES*					Quintiles of father's SES*				
	1	2	3	4	5	1	2	3	4	5	1	2	3	4	5
1912-1914	.19 (.04)	.26 (.03)	.47 (.07)	.75 (.07)	1.5 (.09)	3.0 (.8)	4.1 (.7)	7.6 (1.4)	11.6 (1.4)	24.5 (1.9)	6.6 (1.1)	8.6 (.9)	14.3 (1.8)	24.4 (1.9)	44.4 (2.2)
1915-1917	.25 (.04)	.37 (.04)	.42 (.06)	.75 (.06)	1.85 (.09)	3.8 (.8)	5.6 (.8)	6.1 (1.1)	11.4 (1.3)	33.5 (2.1)	8.8 (1.2)	13.3 (1.1)	13.9 (1.7)	23.8 (1.8)	51.5 (2.1)
1918-1920	.37 (.04)	.40 (.04)	.50 (.05)	.69 (.06)	1.72 (.08)	5.4 (.9)	6.7 (.8)	6.0 (1.1)	10.9 (1.3)	29.6 (1.8)	13.7 (1.3)	12.4 (1.0)	19.7 (1.8)	22.6 (1.8)	49.1 (2.0)
1921-1923	.38 (.04)	.38 (.04)	.61 (.06)	.91 (.07)	2.2 (.08)	4.9 (.9)	5.3 (.8)	10.0 (1.2)	14.4 (1.4)	40.9 (2.0)	13.1 (1.3)	13.8 (1.2)	20.2 (1.6)	29.0 (1.8)	59.1 (2.0)
1924-1926	.42 (.05)	.38 (.04)	.83 (.06)	1.32 (.07)	2.2 (.08)	7.6 (1.0)	6.5 (.9)	13.9 (1.3)	23.1 (1.6)	41.7 (2.0)	13.8 (1.4)	11.8 (1.1)	24.9 (1.6)	39.5 (1.8)	61.1 (1.9)
1927-1929	.46 (.05)	.49 (.05)	.71 (.05)	1.25 (.07)	2.2 (.09)	7.0 (1.0)	7.6 (1.1)	11.7 (1.1)	21.8 (1.6)	39.8 (2.1)	14.4 (1.4)	16.2 (1.5)	21.6 (1.4)	36.8 (1.9)	60.5 (2.1)

Weighted combination of 1962 and 1973 OCGs. Percentiles are based on percentile values of SES in two-year periods of birth for each individual. Socioeconomic status (SES) is defined using the Duncan measure of occupational status based on the father's occupation [Duncan 1961].
 * It is not possible to produce perfect quintiles due to modal points in the distribution. The average quintile values for percentiles of father's SES over the entire period (which approximate the quintile values for each period) are first quintile, 0-18 percent; second quintile, 18-44 percent; third quintile, 44-61 percent; fourth quintile, 61-81 percent, fifth quintile, 81-100 percent.

increase of roughly 20 to 25 percent in mean years of postsecondary education among eligible Korean War veterans. These point estimates, if they roughly hold for peak period Korean War veterans joining a few years earlier, imply that the Korean War GI bill raised average postsecondary attainment by about 13–15 percent among all men born in the peak Korean War service years of 1930 to 1933.³⁰ Estimates for the program's effects on college graduation rates are somewhat larger.

My estimates of the impacts of the WWII GI bill cover a broader range, from about a 20 percent to almost a 50 percent increase in postsecondary education among the mid-1920s cohorts. Using the Korean War GI bill estimates of a roughly .4 to .5 elasticity of years of college to the WWII subsidy offer would imply an increase of about 25 percent to 30 percent in years of college among veterans born in the middle 1920s due to the WWII GI bill. The upper bound for men born in the early 1920s seems to be about a 15 percent to 20 percent increase, and men born before 1921 seem to have seen little impact of the subsidies on their college attainment. Due to the disproportionately high level of education among WWII veterans and the high fractions of WWII veterans in the population, these results translate fairly directly into the increases created by the GI bill among all males born in the 1920s. Thus, the point estimates here are consistent with an increase in postsecondary education of approximately 20 to 25 percent created by the GI bill among all males born in the years 1921 to 1926.

These are substantial effects. The GI bill was more than enough to compensate for what was likely an independent negative effect of the WWII period on postsecondary education. The Korean War GI bill also probably contributed to the rapid growth in postsecondary education among men born in the early 1930s.

However, the GI bills were evolutionary and not revolutionary legislation. Educational growth was rapid before the war. My analysis shows that if the rapid growth in BA degrees granted

30. As an example of the method I used to calculate these increases, using the 1970 Census a 20 percent increase in years of postsecondary education for Korean War veterans born in 1931 gives roughly .2 additional years of education for these men. Assuming a zero GI bill effect for nonveterans, multiplying this educational increase by the fraction of men serving in Korea (62 percent) gives a roughly .12 increase in education when spread across the entire male population. Given the measured average postsecondary education among men in this cohort, this figure implies a 13 percent increase. I use similar calculations for the rest of the paper when giving percentage increases in overall education caused by the GI bill among an entire cohort of males.

that occurred in 1936–1940 had continued, its effects would likely have been quite similar to the combined effects of the GI bill and WWII. The way had been prepared for the legislation by the rapid growth in higher education during the early part of the century. The GI bills had a substantial impact, but they picked up an existing trend.

I also find that any equalizing effect of the GI bills on the distribution of postsecondary educational attainment occurred among veterans from families in the top half of the SES distribution. The GI bills may have made college more accessible for the children of the middle and upper middle class, but apparently they had little effect among those of the working class. In this area, too, the effects of the GI bills were not revolutionary.

Many observers have also hypothesized that the GI bill had major effects in opening higher quality colleges to less prosperous individuals. While that question is beyond the scope of this paper, I am examining it in ongoing work.

APPENDIX: SELECTION INTO MILITARY SERVICE DURING WORLD WAR II AND THE KOREAN WAR

There were two basic methods by which individuals entered military service during WWII: volunteering and induction through the draft. Volunteering was permitted on an unlimited basis through December 1942. From December 1942 through August 1945, volunteering was prohibited, but continued on a limited basis for seventeen-year old men. Beginning in September 1945, volunteering was again permitted and became common. During this period, the service had a policy of only recruiting men aged 18 to 25. Prior to December 1942, roughly one-third of inductions into the army came through voluntary enlistments. From January 1943 through August 1945, which was the period when overall inductions were highest, about 12 percent of inductions were voluntary enlistments. From the cessation of hostilities in September 1945 until the officially declared end of the war in 1947, voluntary enlistment became the major source of military manpower; some three-quarters of soldiers were supplied this way. Overall, about 70 percent of WWII veterans entered through the draft.

Liability for military induction was always limited by age (both formally and informally), but varied throughout the war. In the beginning of the war, men aged 45 or over were automatically

excused from service. As the war went on, strong preferences for younger men (especially those from 18 to 25 years of age) were put in place.

After men were called up, local draft boards decided whether to induct them or grant them a deferment or exemption from military service. Men over the age of 30 were granted deferments and exemptions of all sorts much more readily than younger men were. Deferments became much more difficult to obtain as the war went on and manpower needs increased. There was no general deferment for college students during WWII. The four most significant categories of deferments and exemptions were mental defects, physical defects, employment deferments, and agricultural deferments. For men in their midtwenties or below during 1943 or after, the last two deferments were very difficult to get unless there was evidence of mental or physical defects.

The system of induction and deferments during the Korean War was generally similar to that used in WWII, but there were several differences. Major differences were in the treatment of age, the existence of new deferments, and standards for occupational and agricultural deferment. Other standards remained as described above. In addition, volunteering was permitted throughout the Korean War; about half of all entries to the army during the period came through voluntary enlistment. However, many of these enlistments occurred after a man was informed of draft selection (volunteering permitted selection of service branch, which draftees could not do). So draft pressure probably played an important role for the majority of inductees.

Draft liability in the Korean War was limited to those between the ages of 18 ½ and 25. Younger men were permitted to volunteer.

There were several new deferments and exemptions added during the Korean War period. There was a deferment available for males with dependent children under certain circumstances. During the war, about 15–20 percent of all nonveteran males in militarily liable age groups were deferred due to dependency. The Korean War draft also introduced the concept of a general college student deferment. The deferment was not uncommon, but it was by no means automatic. In 1953 roughly one-seventh of male college students were classified as deferred from service due to college enrollment. In addition, college students could delay induction until the end of the current academic year of enrollment. Finally, the Korean War draft nearly eliminated deferments for

skilled industrial workers and greatly reduced them for agricultural workers.

My Korean War GI bill results could be affected by changes in military selection after the close of hostilities in the Korean War. After the June 1953 cease-fire, the military began a sharp personnel reduction that stabilized in 1956. There were some 560,000 total inductions into the military in 1953, but this dropped to 270,000 in 1954 and 214,000 in 1955. Draft calls continued, but only for the Army (which was the least desirable service). Throughout the Korean War and post-Korean War period, military enlistment was driven by Defense Department requirements, not demand for service by civilians.

There is little evidence that the college deferment changed significantly at this time. The annual peak number of deferred college students was 185,000 in 1953, 176,000 in 1954, and 169,000 in 1955 [Selective Service 1957]. After the cease-fire the military became more concerned about the quality of personnel sought and inductees with greater skill levels, as well as making greater efforts to retain skilled personnel [U. S. Department of Defense 1955–1957].

An important concern for my results is whether men entered specifically to gain education benefits, especially during the post-Korean War period just before the benefit cutoff. In this context, it is important to recognize that eligibility for education benefits was not a certainty after the June 1953 cease-fire. After this point, the close of the “official” Korean War period could have occurred at any date, and according to the original 1952 legislation no benefits at all would be provided for service after the close of the Korean War period.

A search of contemporary sources turned up conflicting results on this issue. On the one hand, the legislative sponsor of the bill to “grandfather” in current soldiers for full education benefits did claim that some of his constituents had written him claiming that they were promised full education benefits upon enlistment, and were now disappointed that they would receive virtually no benefits because they enlisted close to the cutoff date [Congressional Record 1955]. On the other hand, a search of numerous Selective Service and Defense Department documents regarding military manpower turned up no mention at all of the cutoff of the Korean War GI bill as a factor in recruiting. See, for example, Selective Service [1956a, 1957], Bureau of Labor Statistics [1954, 1959], and Department of Defense [1955, 1956, 1957].

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