The G.I. Bill and Vocational School *

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Abstract

This paper examines the impact of subsidies for vocational training on take-up rates and long-term labor market outcomes by studying the first large-scale public subsidy programs in the United States——the World War II and Korean War G.I. Bills. Previous research emphasizes that these programs expanded college and high school attainment. I show that they also substantially increased vocational training, a key but overlooked channel through which the G.I. Bill affected human capital formation. Using variation in military service across birth cohorts as an exogenous source of eligibility, I estimate that G.I. Bill benefits increased vocational school completion by 4–9% for World War II veterans and 3–7% for Korean War veterans, with stronger effects in the South and among older beneficiaries. The results suggest that federal subsidies for education not only expanded traditional higher education but also directed many veterans toward trade school——broadening access to job-specific skills and reshaping the composition of postwar training and employment.

1 Introduction

Trade school enrollment in the United States has risen notably in recent years. Between 2020 and 2023, attendance grew by 5%, including a 16% increase between 2022 and 2023 alone (National Student Clearinghouse (2025)). In 2023 Congress expanded the Pell Grant program to include short-term certification and workforce development courses[1], and in

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[1] https://www.congress.gov/bill/118th-congress/house-bill/6585

2025 both California[2] and Maryland[3] directed millions of dollars towards funding apprenticeship positions. Yet much of the economic research on education focuses on college attainment, reflecting the long-run expansion of higher education during the twentieth century——what Goldin (2001) calls the "human capital century". Despite high college enrollment rates, completion remains low: among students who began four-year degree programs in 2013, 38% failed to graduate within eight years (National Center for Education Statistics (NCES)).[4] Meanwhile, industries such as construction and manufacturing continue to face persistent skill shortages, with labor demand nearly double the supply of new construction apprentices (AlFakhri et al. (2024)), and industry reports indicate a growing hiring crunch for skilled carpenters, electricians, and welders as incoming workers fail to outcpace outgoing retirees.[5] These trends suggest a growing mismatch between educational choices and labor market needs. Vocational programs offer a lower-cost, job-focused alternative to college, yet their role in shaping workers' opportunities——and the policies that encourage their take-up——remains understudied.

This paper examines the impact of subsidies for vocational training on take-up rates and long-term labor market outcomes by studying the first large-scale public training subsidy programs in the United States——the World War II and Korean War G.I. Bills.[6] These landmark laws offered returning veterans funding for education and training at nearly every level, from elementary school through college. While prior research emphasizes how these programs expanded college and high school attainment, I show that they also substantially increased vocational training——a major but overlooked channel through which the G.I. Bill affected human capital formation. Aggregate benefit reports indicate that more than half of veterans used the education provision, and a large share of that spending went toward non-college training.

I measure the vocational school effects by exploiting differences in military service across birth cohorts as an exogenous source of variation in G.I. Bill eligibility. This approach compares men born too late to serve in WWII or Korea with those who served with a very

[2] https://www.gov.ca.gov/2025/10/08/governor-newsom-announces-30-million-in-apprenticeship-funding-to-fill-high-demand-jobs-in-health-care-education-and-technology/

[3] https://labor.maryland.gov/whatsnews/govmooresignsraiseactintolaw.shtml

[4] These figures do not include students who transferred to another program.

[5] https://www.mckinsey.com/capabilities/people-and-organizational-performance/our-insights/tradespeople-wanted-the-need-for-critical-trade-skills-in-the-us

[6] The 1917 Smith-Hughes Act created the first federal program allocating funds towards developing state vocational school systems but did not provide subsidies directly to individual workers.

high probability and thus qualified for subsidies. The younger cohorts provide a natural control group, representing the educational paths veterans might have pursued without the policy intervention. Given the paucity of disaggregated G.I. Bill data, this cross-cohort comparison, first proposed by Bound and Turner (2002), has become the de facto approach to measuring causal impacts of the benefits.

My estimates show that G.I. Bill benefits increased vocational school completion by 4–9 percent for World War II veterans and 3–7 percent for Korean War veterans, with larger effects in the South and in regions with high concentrations of manufacturing and construction employment. The analysis also reveals meaningful demographic heterogeneity. The take-up effects are strongest among older veterans and in groups that faced persistent barriers to education, particularly black workers. These results suggest that the G.I. Bill not only reduced the disruption to schooling caused by wartime service but also opened new opportunities for training among workers who otherwise might not have pursued additional education. Although I cannot fully separate the impact of education subsidies from that of military service itself, I conduct robustness and placebo tests that bolster my claims of positive subsidy effects.

This paper contributes to a broad literature on the socioeconomic effects of the G.I. Bill, which has documented impacts on college and high school attainment (Bound and Turner (2002); Thomas (2017)), home ownership rates (Fetter (2013)), and marital sorting (Larsen et al. (2015)). By focusing on vocational education, I highlight an understudied mechanism through which the program shaped postwar labor markets. The findings offer new historical evidence on how education subsidies influence the allocation of human capital across training types. They also provide a benchmark for assessing modern efforts to expand access to trade and technical programs as policymakers confront contemporary skill shortages and declining college enrollment.

Using an instrumental variable approach I also measure small positive returns to vocational training on wages and employment. The majority of studies on the returns to trade shool tend to focus on labor markets outside the U.S. (Zilic (2018), Aguirre (2021), Bertrand et al. (2021), Carruthers and Jepsen (2021), Brunello and Rocco (2017), Hanushek et al. (2017)), and only estimate short-term effects with a focus on high school level training programs (LaForest (2023), Meer (2007)). My estimates address both of these gaps in the literature on non-college training.

This paper is organized as follows: Section 2 details the policy setting and provisions of the G.I. Bill; Section 3 describes the empirical strategy for estimating vocational school take-up and returns; Section 4 outlines the sample construction and descriptive statistics; Section 5 presents my main results; Section 6 provides a discussion of the estimates and their policy relevance; and Section 7 concludes.

2 Policy Background

The architects of the G.I. Bill aimed to reduce the frictions faced by veterans reintegrating in civilian life and the post-war workforce. In a statement to Congress in November 1943 President Roosevelt proclaimed:

> "What our servicemen and women want, more than anything else, is the assurance of satisfactory employment upon their return to civil life. The first task after the war is to provide employment for them and for our demobilized workers [...] The goal after the war should be the maximum utilization of our human and material resources."[7]

With the backing of the Executive branch the Servicemen's Readjustment Act passed into law on June 22, 1944, while the war still continued. The legislation provided a range of benefits including tuition and training assistance, home loan guarantees, and vocational rehabilitation for those with disabilities. By the time the benefit window lapsed, the Federal government had spent over $14 billion on education subsidies and assisted over 4 million home loans worth $33 billion.[8] The scope of the G.I. Bill was unparalleled during its time and the high rate of benefit utilization demonstrates how popular it was among veterans. Similar legislation was passed on July 16, 1952 towards the end of the Korean War.

The education subsidy provisions of the G.I. Bill—the focus of this paper—varied in size and duration for veterans of both wars and each applied to a rich set of schooling choices. To be eligible for the 1944 benefits, one had to serve in the armed forces for at least 90 days between September 1940 and July 1947. Education and training benefits comprised up to $500 for tuition and fees, paid directly to the institution, plus a monthly stipend ranging from $50 to $120 depending on the veteran's number of children. Veterans were covered

[7] Franklin D. Roosevelt's "Message to Congress on the Return of Service Personnel to Civilian Life". https://www.presidency.ucsb.edu/node/209700.

[8] https://www.archives.gov/milestone-documents/servicemens-readjustment-act

for between one and four years of education or training depending on their total years of service and were required to begin their training within four years of discharge, or by July 25, 1951, whichever date was later. Thus, most eligible veterans needed to have completed any training under the WWII G.I. Bill by 1955.[9] The Korean War G.I. Bill provided lump sum monthly subsidies of between $110 and $160 based on the number of dependents. An additional stipulation was that programs were required to have at least 15% non-veteran enrollment, which was a response to cases of fraudulent schools exploiting WWII veterans. Beneficiaries could receive "one and one-half days of schooling at government expense for each day they served, up to 36 months of training" (Congress (1953)). The benefits window for Korean War training subsidies closed in January 1965.

Beneficiaries could receive support for programs encompassing all levels of education, including elementary and secondary, college, vocational school, and on-the-job apprenticeships.[10] Table 1 provides aggregate utilization data for education and training subsidies among veterans of each conflict collected by Bound and Turner (2002). There were about 15.5 million G.I. Bill eligible veterans who served in WWII, 7.8 million of whom received some form of training subsidies. Of the 5.5 million eligible Korean War veterans about 2.4 million received the benefits. Most veterans sought training other than college—71% for WWII and 49% for Korea——making pathways such as vocational school worthy of closer analysis. Among WWII beneficiaries about 28% used the subsidies for college education, 45% used them for training below the college level, 18% for on-the-job training programs, and 9% for farm training. Under the Korean War bill 50% obtained college education, 36% obtained education less than college, 10% received on-the-job training, and 4% received farm training. It is clear from the aggregate data that most veterans used the G.I. Bill for training outside the scope of higher education, though the proportion of college-goers did increase after the Korean War.

National vocational school enrollment data reflects the high take-up of G.I. Bill subsidies. Figure 1 plots enrollment between 1918 and 1962 using digitized annual reports from the the U.S. Office of Education's Division of Vocational Education. The data does not distin-

[9]Veterans who enlisted between October 1945 and October 1946 had until July 25, 1956 to complete their training (President's Commission on Veterans' Pensions (U.S.)).

[10]"All public or private elementary, secondary, and other schools furnishing education for adults, business schools and colleges, scientific and technical institutions, colleges, vocational schools, junior colleges, teachers colleges, normal schools, professional schools, universities, and other educational institutions, and [...] other establishments providing apprentice or other training on the job [...]" (1944 Servicemen's Readjustment Act, Chapter 4, Education of Veterans)

guish between veterans and non-veterans, but there are noticeable drops in enrollment in trade, agricultural, and distributive occupation classes during both WWII and the Korean War.[11] After hostilities ceased, attendance grew again, dramatically in the case of the post-WWII period. Home economics enrollment does not fluctuate as dramatically, likely because women made up most of these classes and were far less likely to have served in the military at this time. These patterns combined with the G.I. Bill utilization data in Table 1 suggest that vocational school was a popular choice among soldiers returning to the civilian workforce.

3 Estimating the G.I. Bill's effects

I estimate the effects of G.I. Bill subsidies on vocational training in two stages: first, I measure take-up using quasi-random variation in eligibility by birth cohort; second, I use the G.I. Bill as policy instrument to measure wage and employment returns to training. My baseline framework is a linear probability model in which vocational school completion is the outcome of interest. I turn to a multinomial logit model estimate separate margins of the G.I. Bill's effect on different educational outcomes: high school, college, or vocational school. I use a simple instrumental variables approach to estimate the long run effects of training on employment, poverty, and wages. Each model leverages the same source of cross-cohort variation in military service as a measure of G.I. Bill exposure.

3.1 Source of randomization

Birth cohort variation in military service provides the core source of randomization in G.I. Bill eligibility in my design. In an ideal natural experiment, I would observe a truly random dispersal of benefits among the veteran population, but virtually all who served for even a few months in either WWII or the Korean War would have been entitled to some level of assistance. Comparing veterans with non-veterans would be a viable alternative given careful consideration of selection bias.[12] However, I do not observe vocational school completion and veteran status on the same Census forms, meaning that I cannot directly link veterans to their training decisions in my sample (see Appendix B for details). A

[11] Distributive occupations are those concerned with the distribution and marketing of goods, separate from the production process.

[12] Previous research has found positive selection into the military on wages (Greenberg et al. (2022); Collins and Zimran (2024)).

further data limitation is the lack of individual-level G.I. Bill utilization records. To recover causal policy effects I use between-cohort variation in WWII and Korean War veteran status at the birth quarter level as a proxy for benefit eligibility. This empirical strategy follows that of many papers estimating effects of the G.I. Bill, the first of which was Bound and Turner (2002). Other examples include Thomas (2017), Larsen et al. (2015), and Fetter (2013).

Identification of my estimates relies on two empirical facts: most men of age during wartime were drafted and served in the military, and service rates dropped sharply when after conflicts ended. Figures 2 and 3 plot the shares of WWII and Korean War veteran status by quarter of birth, shown as solid black lines. In both cases there are birth cohorts with very high levels of service (up to 70% for WWII and 60% for the Korean War) as well as cohorts with virtually no service. Since all veterans of these conflicts could have received G.I. Bill benefits, a high cohort share of military service is commensurate with high benefit eligibility. The sharp drop-offs in veteran status around 1929 and 1935 coincide with the end of hostilities and provides exogenous variation in G.I. Bill treatment. Assuming a minimum enlistment age of 18, those born roughly after 1929, in the case of WWII, and after 1935, in the case of the Korean War, were too young to have served, but might not be observationally different from those born prior.[13]

In each of my regression models the main predictor variable of interest is one's birth cohort share of WWII or Korean War veteran status, which serve as my measures of treatment exposure. I identify the effects of post-war benefits on vocational training take-up by restricting the analysis to two main samples: one consisting of men born between 1923 and 1932, and another between 1929 and 1939. The sample coverage is represented by the shaded regions in Figures 2 and 3. Since each sample window contains both treated and untreated workers, model coefficients will measure the marginal effect of the policy treatment on vocational training take-up when going from ineligible to eligible. The figures also plot the residualized means of vocational school completion by birth cohort.[14] The variation in training take-up largely matches veteran status, particularly among the older

[13]Combat effectively ended on May 8, 1945 in Europe and on September 2, 1945 in the Pacific in the case of WWII, although President Truman did not officially declare and end to hostilities until December 31, 1946, and benefit eligibility extended to those serving through July 25, 1947. In the case of the Korean War hostilities ended on July 27, 1953, but Congress extended the benefit eligibility window through January 31, 1955.

[14]I regress vocational school completion on linear time trend and state fixed effects and average the residuals by quarter of birth. I plot the raw means in Figures A1 and A2.

cohorts in each sample.

Quarter of birth provides a powerful source of exogenous variation, however, the resulting estimates necessarily combine the effects of both military service and a wider bundle of G.I. Bill programs. Veterans not only received education subsidies but also home loan guarantees, unemployment insurance, and disability rehabilitation. My design cannot disentangle these channels, which is a well-known caveat in the empirical G.I. Bill literature. A conservative interpretation of my estimates is that they measure the joint effect of military service and overall access to G.I. Bill benefits on one's likelihood of completing vocational school. If a veteran's military training and wartime experience influenced their likelihood of completing vocational school, that effect will be included in my coefficients. The extent to which each additional G.I. Bill program increased vocational school completion is also unidentified in my analysis, since I do not directly observe benefit utilization at the individual level.

3.2 Linear probability model

The baseline framework of my analysis is a linear probability regression that models vocational training as a function of G.I. Bill eligibility. The main regression for both the WWII and Korean War samples is presented below by Equation 1:

$$Y_{ics} = \beta_1 * WWII_c + \beta_2 * Korea_c + \mathbf{Z'}_{ics} * \delta + \varepsilon_{ics} \tag{1}$$

The outcome of interest Y_{ics} is a binary variable equal to 1 if person i, in cohort c and born in state s, ever completed vocational school, where a cohort is defined as one's year and quarter of birth. The main explanatory variables of interest are $WWII_c$ and $Korea_c$, which are a cohort's fraction of WWII and Korean War veterans, respectively. These continuous shares represent one's probability of military service, and thus benefit eligibility. In each of my samples these probabilities range from 0% to 70%. Since the main samples overlap, I include both $WWII_c$ and $Korea_c$ in all the regressions. For example, in the WWII sample (1923-1932), there are veterans who were too young to have served in WWII but were later drafted in the Korean War.[15] Additional regression controls $\mathbf{Z_{ics}}$ include race, foreign-

[15]When computing $WWII_c$ and $Korea_c$ I do not include veterans of both conflicts. See Appendix B for more details on variable construction.

born status, linear and quadratic time trends, as well as state of birth fixed effects.[16] In robustness checks I replace fixed effects with several controls at the state level, including manufacturing and agricultural industry shares, investment in high school and trade school, and rural and urban population shares.

The estimated coefficients β_1 and β_2 measure the net effect on vocational training attainment of a 100-percentage point increase in the probability of serving in either WWII or the Korean War. Positive coefficients would suggest that shifting from a birth cohort with no wartime service to one with very a high level of service increases one's likelihood of completing vocational training in the ensuing decades. As discussed in Section 3.1, these coefficients measure the joint effect of military service and the full bundle of G.I. Bill benefits.

3.3 Multinomial logit

The linear probability model only permits a binary outcome variable and cannot account for the full set of education choices available to veterans. A natural modeling alternative in this case is the multinomial logit regression, which allows me to estimate the individual probabilities of choosing high school, college, and vocational school. The advantage of using a multinomial specification over an ordered logit is that I do not need to make any assumptions about the ranking of different education decisions. As detailed in Section 2, veterans could receive support for any level of education through the G.I. Bill and there is no evidence to suggest that college was strictly preferred trade school or job training programs in all cases. Factors such as socioeconomic status (SES), family background, military experience, and local labor market conditions could make college alternatives more attractive for some workers.

The multinomial logit model permits the dependent variable to take on two or more unordered categories. It is derived from the framework of random utility maximization in which individual i faces a choice among K alternatives. The utility that individual i obtains from choosing alternative k is given by

$$U_{ik} = X'_{ik}\beta_k + \varepsilon_{ik}$$

[16]The time trend is constructed as: Trend = birth year - 1929 + birth quarter/4. This definition follows that in Bound and Turner (2002)

The individual chooses the alternative that provides the highest utility:

$$Y_i = \arg\max_k U_{ik}$$

The unobserved error terms ε_{ik} are assumed to be i.i.d. from a Type I Extreme Value (Gumbel) distribution. Under this assumption, the probability that individual i chooses alternative k takes the closed-form multinomial logit expression, which in my setting is represented by Equation 2 below:

$$Pr(Y_{ics} = k) = \frac{\exp(Z_{icsk})}{1 + \sum_{j=2}^{K} \exp(Z_{icsj})} \tag{2}$$

Here Z_{icsk} represents the log-odds ratio of choosing training alternative k over a base alternative. The alternatives in this case are the education choices available to G.I. Bill beneficiaries. The ratio Z_{icsk} is estimated using the linear predictor function similar to the linear probability model described in Section 3.2:

$$Z_{icsk} = \beta_{1k} * WWII_c + \beta_{2k} * Korea_c + \mathbf{Z}'_{ics} * \delta_k + e_{icsk}$$

The parameters of the model are alternative-specific and computed using maximum likelihood estimation. I identify this model using the same source of variation as in the linear probability model, namely the share of veteran status by birth quarter as a proxy for G.I. Bill eligibility. The main coefficients of interest are β_{1k} and β_{2k}, which are the effects of G.I. Bill eligibility on the relative probability of choosing training type k, such as trade school, over the base option. Since all effects are relative to the same base alternative, this model produces a set of $k - 1$ estimates. As with the linear probability model, β_{1k} and β_{2k} necessarily measure the joint effect of all G.I. Bill benefits and military service experience on training decisions.

The full set of alternatives includes "less than high school", "high school without vocational school", "vocational school", and "college". While I cannot directly observe benefit utilization, I can classify workers according to their total years of education and whether they completed vocational training. In U.S. Census data, college attainment must be inferred from one's years of education. For example, any education beyond 12 years is

typically interpreted as "some college", though there is no additional context to distinguish one year of college from one year of some other type of schooling beyond high school, i.e., vocational school. Vocational school completion and college attainment also are not mutually exclusive outcomes in my sample—some respondents report both vocational training and 16 or more years of school. Since I observe both outcomes in 1970, well after G.I. Bill benefits would have lapsed for WWII and Korean War veterans, it is possible that Census respondents received some subsidized vocational training before continuing to complete some college, or vice versa. Another possibility is that certain vocational programs, e.g., business and clerical work, were completed at colleges rather than dedicated trade schools. Without additional utilization data it is impossible to determine exactly how tuition subsidies were used.

My baseline specification classifies the K training alternatives as outlined in Table 2. To estimate Equation 2 these alternatives must be mutually exclusive, which is why "college" is defined as any education above high school conditional on not completing vocational school. I make an exception for those with 15 or more years of school, who I classify as college attendees even if they went to trade school. For example, a worker who reported 15 years of school with vocational training is classified as a college attendee, while someone with 14 years of school with vocational training is classified as a trade school attendee. I make this distinction because I am interested in estimating training take-up for the marginal veteran deciding between college and vocational education.[17] As I discuss in Section 4.1, most vocational school completers in my sample have 12 or fewer years of school and likely faced different incentives than their more educated counterparts. The goal of this empirical framework is thus to separately estimate the G.I. Bill effect for the vocational and tertiary education tracks, which requires a stark distinction between the two.

A final well-known consideration when estimating multinomial logit models is the independence of irrelevant alternatives (IIA) assumption, which states that the relative probabilities of two alternative choices does not depend on the introduction or omission of other choices. In my setting, the IIA assumption requires that the likelihood of attending trade school relative to college should not change if the high school option is removed. This is a strong, but testable assumption that I address in Section 5.2.

[17] For robustness I experiment with different restrictions on college status, such as limiting vocational school attendees to 13 or 14 total years of school.

3.4 Instrumental variables

Measuring the long-run returns to vocational training in my empirical setting requires an instrumental variables approach to overcome the endogeneity inherent in human capital decisions. Since workers may select into vocational schools or college based on unobservable factors, I use G.I. Bill eligibility as an instrument to predict training, before then estimating the effects on labor market outcomes later in life. I use a standard two-stage least squares (2SLS) approach with the following equations:

$$\text{Voc. Train.}_{ics} = \alpha_1 * WWII_c + \alpha_2 * Korea_c + \mathbf{Z'}_{ics} * \gamma + \nu_{ics} \tag{3}$$

$$Y_{ics} = \beta_1 * \widehat{\text{Voc. Train.}}_{ics} + \mathbf{Z'}_{ics} * \delta + e_{ics} \tag{4}$$

Equation 3, which I refer to hence as the first stage regression, is simply the linear probability model described in Section 3.2, where the WWII and Korean War shares of veteran status by birth cohort serve as instrumental variables for vocational training. Equation 4 uses the predicted values from the first stage to then estimate the effects of training on Y_{ics}, which is either employment, poverty status, or hourly wages. The controls $\mathbf{Z_i cs}$ include race, linear and quadratic time trends, and state of birth fixed effects.

To reliably identify β_1 I require the instruments $WWII_c$ and $Korea_c$ to satisfy four fundamental requirements. First, the instruments must be exogenous, meaning that they are uncorrelated with the unobserved term e_{ics} in Equation 4. Second, they should be "relevant" in that they are strong predictors of vocational training. Third, the instruments should only affect labor market outcomes Y_{ics} indirectly through vocational training, which is often referred to as the "exclusion restriction". The final assumption, known as monotonicity or "no defiers", states that the instruments may only shift agents in one direction, either into or out of treatment.

4 Data

4.1 Veteran status and vocational training

My main working samples are constructed using three separate 1% samples of the 1970 U.S. Population Census made available from IPUMS USA.[18] These samples come from surveys at the state, metropolitan, and neighborhood level, which I combine into one large dataset (see Appendix B for further details on the sampling procedure). To date, 1970 is the only year in which the U.S. Census Bureau explicitly asked people whether they completed vocational school. If a respondent did complete such a program, they were then asked to specify the main field of training, either business, nursing and health fields, trades and crafts, engineering or drafting, agriculture and home economics, or "other". Responses to this question form the key outcome variable of interest in my analysis. Using this survey has the obvious advantage of providing direct information on vocational school attainment, but it also took place well after both the WWII and Korean War G.I. Bill benefits lapsed (1956 for WWII and 1965 for the Korean War). The 1970 Census observations thus should not include cases of veterans who still had not applied for subsidies, because that opportunity would have passed.

Table 3 summarizes the overall rates of vocational school completion for black and white men in the main working samples used in my analysis—birth years 1923-1932 for WWII and 1929-1939 for Korea. In the sample of 304,067 men born between 1923 and 1932, the window around WWII G.I. Bill eligibility, about 31.5% reported completing some type of vocational training by 1970. The rate among black men, 23%, is about 10 percentage points lower than for white men, 32%. The patterns are virtually the same for the Korean War sample. Of the 321,460 men born 1929-1939, 30.8% completed vocational school with the same gap between black and white men as in the earlier sample.

Table 4 presents the shares of vocational school completion broken down by field of study, revealing wide variation in the types of training received. By far the most popular programs are concentrated in trades and crafts with a share of about 56%. The next most frequently completed programs are business/office work and engineering/drafting, each with a share of about 13%. Agriculture and health related fields have much lower completion rates of between 2.5% and 3.5%, with unreported fields taking up around 11%. There are no significant differences between the WWII and Korean War samples, however

[18] Integrated Public Use Microdata Series. See Ruggles et al. (2024).

some racial disparities are worth noting. In both samples black men complete programs in business and clerical work at a lower rate than their white counterparts. The gap is even more pronounced in engineering and mechanical drafting, while in nursing and health programs the pattern is slightly reversed. There could be several social and geographic factors underlying these differences, which I explore further in robustness exercises.

Table 5 decomposes the field-specific vocational training rates by years of schooling. As detailed in Section 3.3, vocational school completion and years of post-secondary education are not mutually exclusive in this data setting. In both the WWII and Korean War samples, those with less than a college degree are much more likely to have received training in trades and crafts than any other field, with nearly 70% of non-high school graduates and 62% of high school graduates in this category.[19] Conversely, those with at least one year of post-secondary education are more likely to have received training in business and engineering related fields, which suggests either that these programs tend to last longer or that they were administered at institutions of higher learning such as traditional or community colleges. Understanding how vocational school completion varies by field and years of education will help guide the interpretation of my G.I. Bill effect estimates in Section 5.

I also use the 1970 Census to compute the share of veterans in each birth quarter. Observations only include veterans who were still alive at the time of enumeration, so the samples will likely over-represent younger cohorts. I also do not observe individuals' veteran status in the same samples in which I observe vocation school completion. In 1970 two separate forms were sent to households, each asking a different set of questions. Information on vocational school was collected on Form 1, while military background appeared on Form 2 (see Appendix B for details). Without more information to identify respondents there is no way to link these two forms, so I can only compute the share of WWII and Korean War veterans at the birth cohort level.

Given the relatively small sample size available for 1970, I construct alternate versions of these shares using the 5% sample of the 1960 Census. Figure 4 compares the cohort veteran shares as observed in the different Census samples. The 1960 data produce slightly lower shares for each conflict with larger discrepancies for the Korean War. Though the

[19] Respondents with fewer than 12 years of schooling are classified has having less than a high school education. It is possible that some of these men obtained a GED or high school equivalency while simultaneously reporting their years of education as less than 12.

series are largely the same, note that the share of veterans drops more sharply in the 1960 data, which would bias my estimates if younger cohorts are classified with a 0% share of G.I. Bill eligibility when in fact a small percentage did serve. The differences between 1960 and 1970 could be due to sampling or data collection errors at the time of the 1960 enumeration. The available 1960 and 1970 samples are also not directly comparable, as the latter is constructed from surveys given to a smaller share of the U.S. population. Ultimately theses facts indicate that using the 1970 Census for all calculations is a suitable approach and ensures greater consistency across the constructed variables.

4.2 State and individual controls

I include a range of state- and individual-level variables as additional controls when estimating G.I. Bill effects on vocational school take-up. The individual controls available in the 1970 Census include race, sex, marital status, and place of birth, including foreign countries. In my baseline regressions I include only black and white men, but as robustness exercises I use alternative samples of workers who are women, black, or live in southern states. The first state controls includes employment shares in manufacturing, agriculture, and construction, computed using the 1% sample of the 1940 U.S. Census (Ruggles et al. (2024)). These measures are informative about the industrial conditions in which vocational school demand may be higher on average. To control for heterogeneity in state education policy I also use data on education expenditures and the number of schools by state in 1939 from the *Biennial Survey of Education* and *Statistical Abstract of the United States*, originally compiled by Lleras-Muney (2002). To control for vocational school access I construct the ratio of trade school to high school enrollment in 1940 using newly digitized data from historical Federal Board of Vocational Education reports. Lastly, I can use state-level WWII mobilization data compiled by Acemoglu et al. (2004) to control for aggregate variation in G.I. Bill eligibility.

5 Main results

5.1 Linear probability model estimates

The linear probability model results provide strong evidence that cohorts with exposure to G.I. Bill benefits are more likely to have obtained vocational training relative to those too

young to have served in WWII or the Korean War.

5.1.1 Baseline estimates

The G.I. Bill significantly increased vocational school completion: by 3–9% for WWII veterans and 3–7% for Korean War veterans. I present estimates of Equation 1 in Tables 6 and 7. I use three variations of the vocational school outcome variable. The first, shown in column 1 of each table, is a binary variable equal to 1 if the respondent completed any vocational school. The second variable, shown in column 2, is equal to 1 if the respondent completed vocational school and has no more than 14 years of education. The final variable in column 3 restricts years of school to 12 years or fewer. The alternate definitions are designed to distinguish traditional college-goers from trade school attendees more clearly, a distinction that I explore further in Section 5.2. All regressions include state fixed effects, however the estimates are virtually unchanged without this inclusion (see Appendix Tables A1 and A2).

The effect of the G.I. bill on vocational school completion is strongest in the WWII sample, shown in Table 6. Higher exposure to both WWII and Korean War Service increases the likelihood of training take-up by about 9% and 14%, respectively. The magnitude of the effects attenuates by roughly half when using the more restrictive definitions of vocational school (to 4% and 7%, respectively), but estimates remain statistically significant except for the WWII effect in column 3. The results in Table 6 underscore the importance of accounting for the overlap in veteran status between the two conflicts. In the 1923-1932 sample, the Korean War G.I. Bill has larger effects on training than its WWII counterpart. Korean War veterans in this sample include the youngest enlistees of that conflict, who were therefore older at the end of hostilities when benefits were distributed. A possible explanation for the stronger effects is the education interruption effect of military service. If soldiers enlist close to their 18th birthday, they may be more likely to continue a college trajectory when returning to civilian life. Older enlistees without a college education had already made that human capital decision before war broke out, and while tuition subsidies may shift some into college, they appear to be more likely to enroll in job training programs relative to their younger peers.

The estimates presented in Table 7 cover the Korean War sample. Consistent with the effects of the WWII G.I. Bill, exposure to Korean War service increased the likelihood of vocational school completion by 7% under the baseline specification, and 3% under

the more restrictive definition of training, though the latter estimates are not statistically significant. Unlike in the WWII sample, the overlapping measures of veteran status do not affect training take-up in the same direction. For those born 1929-1939, higher eligibility for the WWII benefits decreases the likelihood of vocational school, which supports the hypothesis that younger veterans, i.e., those who enlisted in WWII close to the end of wartime, were more likely to have had their college trajectories interrupted compared to older veterans.

Black workers are generally less likely to have completed vocational training programs, which is supported by my baseline results. Table 6 shows that the effect of the race on vocational school completion ranges from -9% to -12%. However, by including interactions of race with military service probability, I find that these effects are partially offset by G.I. Bill eligibility. Though not statistically significant, there are large, positive estimates for this interaction term. Combining all coefficients on race, the total effect on vocational school completion after WWII for black workers is reduced to -4%. When restricting vocational school to 14 or 12 years of school, the G.I. Bill effect completely offsets the average racial effect. The same cannot be said for the Korean War sample, where coefficients involving race are negative. Despite the evidence of an offsetting effect of the G.I. Bill my results are consistent with research on the uneven benefits of the legislation for black vs. white veterans (Turner and Bound (2003); Eden (2023)).

In Tables 8 and 9 I restrict the samples to include only workers living in southern regions of the U.S. and find that the G.I. Bill effects varied with geography. The estimates mirror those for the baseline samples except that they are generally larger in magnitude, with vocational training take-up increasing by between 8% and 11% for the WWII G.I. Bill and between 5% and 9% for the Korean War bill, where the lower range of estimates corresponds to the more restrictive definitions of vocational training. There are also similar but smaller offsetting effects for black workers, which would be consistent with higher discrimination and/or lower access to trade school for black workers in the South compared to the other regions. The overall results suggest that there may have been higher demand for non-college training pathways in the South during the mid-20th century.

The positive G.I. Bill effects on trade school take-up complement similar effects on other educational outcomes, which I present in Table 10. The first two columns show the baseline vocational school results, while columns 3 through 5 show effects on total years of school, years of college, and the probability of college graduation. As should be expected, the

joint impact of the G.I. Bill and military service on all forms of educational attainment in positive. On average, eligible veterans received nearly an extra year of schooling and half a year of college as a result of the policy. Their likelihood of completing four years of college increased by 10%, which is very similar in magnitude to the vocational school effect. These results show that tuition subsidies after WWII increased human capital investment across all levels of education, and furthermore the effects on job-specific training appear just as strong as those on higher education. The offsetting of racial effects also does not manifest when using education measures other than trade school completion.

The final set of baseline estimates uses field-specific categories of vocational training as outcome variables and are shown in Tables 11 and 12. In the case of both G.I. Bills the positive vocational school effects are driven mainly by enrollment in trades and crafts courses, which increased by 4.5% and 3.6%, respectively for each policy. The WWII subsidies also had strong effects on courses in engineering and mechanical drafting, which increased by 3%, while the effect on agricultural and home economics programs was 1.6%. The Korean War subsidies seemed to have little effect on enrollment outside of the trades related fields according to estimates in Table 12, however there are G.I. Bill effects from Korean War exposure in Table 11, suggesting again that older veterans were more likely to choose trade school overall due to the smaller interruption of their education trajectories. Notably, the G.I. Bill had small, statistically insignificant effects on vocational programs related to business and health. In fact, the estimates suggest there may have been a negative impact on business training. These results likely reflect the overlap between college and vocational school in these particular fields. When deciding between the two alternatives, given a subsidy a veteran might strictly prefer the higher returns from a college program absent barriers to entry.

5.1.2 Alternate sample windows

To test the sensitivity of my baseline estimates to the 1923-1932 and 1929-1939 sample windows, I present a range of alternative birth cohort restrictions in Table 13. In panel A of the table I fix the lowest birth year at 1923 and incrementally extend the upper limit by one year from 1928 until 1936. This exercise has the effect of gradually expanding the size of the untreated control group for the WWII G.I. Bill beneficiaries. The first column stops the sample window at 1928 before eligibility drops off, meaning there is effectively no control group. As expected, the effects are neither statistically nor economically significant. As the

upper birth year increases to 1929 and beyond, positive and significant effects appear and are broadly in line with the baseline estimates presented in Section 5.1.1. The estimates peak for the 1923-1930 sample range, likely because the control group contains fewer Korean War veterans who could have used the subsequent G.I. Bill for training. None of the effects are lower than 7%, which is only marginally lower than the baseline estimate.

Panel B of the table fixes the the upper birth year at 1932 and gradually increases the lower year from 1919 through to 1923. Rather than extend the control group, this approach widens the treated group exposed to a high probability of WWII service. The further back I push the sample window, the larger the G.I. Bill effects on vocational school become. By including the oldest veterans in the analysis, I increase the baseline estimate of 8.6% by double and even triple—to 20% for 1920-1932 and 25% for 1919-1932. Given the higher rates of vocational training among older workers seen in Figure 2, these results are unsurprising. The estimates also point to similar conclusions about the heterogeneous effects of the G.I. Bill by age that I discussed in the previous section.

5.1.3 State controls

I examine the role of state-level characteristics in driving vocational school enrollment in Table 14. By excluding state of birth fixed effects from my baseline model, I can estimate the effects of individual industrial and educational measures as observed in 1940, before the U.S. mobilized for WWII. The first two columns do not include any state-level data on vocational school enrollment and the main effects appear largely the same as in the baseline model. A state's mobilization rate, defined at the share of men ages 18-44 who were drafted in WWII (Acemoglu et al. (2004)), is highly predictive of vocational school enrollment, either because it correlates strongly with G.I. Bill eligibility rates or, possibly, because states with higher rates of service trained more men for job-specific wartime skills. The industrial composition of one's state of birth is also a strong predictor of training take-up, particularly in states with high shares of manufacturing and construction employment. There are also small but less statistically significant effects for states with high proportions of agricultural workers. Given the descriptive data on vocational school enrollment by field and the causal estimates in Section 5.1.1 suggesting a higher take-up in trades/crafts training, these results are sensible. Public spending on education—mainly at the high school level—does not appear to effect trade school enrollment in this sample.

In columns 3 and 4 of Table 14 I add the ratio of vocational to high school enrollment in

1940 as a new control, which has considerable implications for the model results. First, the G.I. Bill effects on vocational school completion completely disappear. The effects now operate through the coefficients on the vocational-high school ratio and its interaction with WWII and Korean War service. The marginal effect of becoming eligible for the WWII G.I. Bill is now increasing in 1940 relative trade school enrollment. As a back-of-envelope exercise, assume the vocational-high school ratio is 0.4 (the mean value across states in 1940). For a veteran in this representative state, the effect of G.I. Bill subsidy eligibility is about 8%, consistent with my baseline results.[20] Taking this ratio as a rough measure of vocational school access, it is reasonable to conclude that training subsidies were used more for trade schools in regions with a higher supply of such institutions.

5.1.4 Placebo regression – WWI

Disentangling the G.I. Bill subsidy effect from the effect of military service is empirically challenging with the available data, however I propose a placebo test using a sample containing World War I (WWI) veterans which I present in Table 15. The 1944 G.I. Bill was the first public support program of its kind in U.S. history. No such legislation existed 26 years prior at the end of WWI, a fact that caused a great deal of social unrest at the outset of the Great Depression. A simple test of my empirical strategy would be to compare workers born between 1896 and 1904 using a similar model to Equation 1, where I replace WWII and Korean War veteran shares with the WWI share. Figure 5 plots the fraction of WWI veterans by quarter of birth. As with the later conflicts, the probability of service is high early in the sample (40-50%) and drops to 0 where people are too young to have served in the war.

If military service alone had a strong effect on educational attainment after demobilization, we would expect to see positive, significant effects of WWI service on vocational training, years of school, or college. Instead, the estimates in Table 15 are small, insignificant, and if anything negative for all education outcomes. Of course there is likely a degree of survivorship bias since the men in my sample need to have returned from the war and lived through 1970. Nevertheless, this placebo check does provide evidence that the WWII and Korean War G.I. Bill effects are likely not begin driven only by military experience, but rather capture the impact of the policy itself.

[20] Calculation using estimates in Table 14, column 3: G.I. Bill Effect = -0.01 + (0.4)*(0.227) = 0.0808.

5.1.5 Effects for women

As final robustness check I estimate Equation 1 using a sample of women to verify that my baseline effects are measuring the impact of the G.I. Bill and not other confounding trends or birth cohort factors. While some women served in the military and received G.I. Bill benefits, this proportion was very small compared with men and there are no observed female veterans in my data sources to even measure the female rate of service. I present the estimates of the all-female regressions in Table 16. Overall, none of the effects are statistically significant and the magnitudes are much smaller than those from the male samples. There is about a 3% G.I. Bill effect on any vocational training completion, which appears to be driven by business fields as seen in column 4.[21] There is virtually no effect on college graduation and years of school increase by about 0.36. I also include an interaction term of WWII service with marital status, which suggests that married women may have benefited more from the policy. The results from this exercise do not imply that the G.I. Bill had no effect on women's educational outcomes, but it does suggest that any impact was small and likely an indirect spillover effect of the subsidies through marriage.

5.2 Multinomial logit estimates

5.2.1 Main results

The estimates in Section 5.1 provide strong evidence that the WWII and Korean War G.I. Bills shifted veterans into vocational school, college, and higher years of schooling overall, but they abstract away from the more complex set of choices that veterans actually faced. A natural extension of my analysis is to simultaneously measure the policy effects on each education choice using a categorical outcome variable in a multinomial logit framework, which I present in Tables 17 and 18. The estimates are shown as odds ratios, interpreted as the relative probabilities of choosing a given training path over no training at all. For example, an odds ratio of 1 implies that individuals are equally likely to that one alternative over the base alternative, which is defined here as "no training". A worker is defined as having "no training" if they had less than a high school education on the 1970 census (see Section 3.3 for details).

The coefficient for the effect of WWII service on vocational training is 1.5 and statistically

[21] In my sample about 20% of women completed vocational school by 1970, with most choosing business or health fields. See Appendix Tables A3, A4, and A5 for more detailed summary statistics.

significant, meaning that an increase in G.I. Bill eligibility made workers 1.5 times more likely to complete trade school than no training at all. Effects are similar for college completion at about 1.7, which is in line with the linear probability model results. The high school effect is statistically insignificant and equal to about 0.9, which would indicate that veterans were marginally less likely to finish high school than to forgo additional schooling and simply join the workforce. As discussed in Section 5.1, the effects of Korean War service are even stronger for all forms of education, possibly due to the age of veterans in this sample (1923-1932) at the time of benefit dispersal. Table 18 uses the Korean War sample and shows very similar effects from that G.I. Bill. G.I. Bill eligibility made Korean War veterans 1.4 and 1.5 times more likely to choose trade school and college, respectively. WWII veterans in this sample are considerably less likely to have completed any form of education, but again this has more to do with the age composition of the sample than actual policy effects. Overall, the strong, statistically significant estimated effects on vocational school corroborate all of the findings from my analysis thus far, while allowing for a much more flexible framework than the linear probability model.

The multinomial logit model allows me to estimate the marginal effect of G.I. Bill eligibility on each individual education choice, which I visualize in Figures 6 and 7. Since marginal effects are not constant in this model, I compute the predicted probabilities of each choice at different levels of the birth cohort military service. The red lines plot the probability of vocational school completion, which is clearly strictly increasing in one's likelihood of WWII and Korean War service, though in levels the WWII sample seems to yield higher probabilities. The college effect, the green dashed line, is also increasing though with a less steep slope and in lower levels. In contrast, the effect on high school, the blue dotted line, is decreasing in G.I. Bill eligibility. This result does not imply that the G.I. Bill reduced the chances of high school graduation, as both the college and vocational school groups contain high school graduates. On the contrary, it is likely that if the G.I. Bill helped veterans complete high school it also subsequently helped them continue their education. Furthermore, if a high school dropout returned from the war with no desire to attend college, he very well could have joined the workforce or a job training program without a high school diploma.

The linear probability model estimates in Section 5.1 suggest that age is important factor behind training decisions, as older veterans may have been less inclined to complete college than trade school. With the multinomial logit estimates I can compute each

worker's individual probabilities of choosing a given training pathway. Figures 8 and 7 plot the means of these probabilities by birth year for both the WWII and Korean War samples. It is immediately clear that age does affect benefit utilization. For example, someone born in 1923, who would have been about 18 in 1941, has more than a 33% chance of choosing trade school, while someone born in 1928, turning 18 well into WWII, has closer to a 30% chance. Interestingly there is increase in the probability of trade school as age decreases (birth year increases) in the Korean War sample. Overall workers have higher probabilities of trade school completion or no training than either college or high school.

Another advantage of the multinomial logit model is the ability to change the base alternative to recover different odds ratios. In my setting I can change the base case to college or high school and estimate the likelihood of choosing vocational training over one of these alternatives. Tables 19 and 20 present these estimates for the WWII and Korean War samples. For the former, the results suggest that when G.I. Bill eligibility increases, workers are somewhat less likely to attend trade school than college. The odds ratio between vocational school and college for WWII benefits is about 0.7 and statistically significant. For Korean War benefits (Table **??**) the ratio is about 0.83, though statistically insignificant. Effects are generally the same across both samples. The estimates do not imply that the G.I. Bill did not shift workers into vocational school, as the marginal effects are clearly positive and large. Rather, it appears that the benefits may have had a somewhat higher effect on college attainment given the higher cost barriers. These results are more nuanced than those from the linear probability model, but still suggest that trade school was a popular choice even when considering a larger set of options.

5.2.2 Testing for IIA

The credibility of the preceding estimates rests on the IIA assumption discussion in Section 3.3, which states that the relative probability of two alternative choices should not change if a third alternative is added or removed from the choice set. In Tables 17 through 20 I provide the test statistics from the well-known Hausman-McFadden specification test for multinomial models. The null hypothesis states that estimates are consistent between a base and restricted model, where the restricted model omits a choice alternative. Failure to reject the null suggests that IIA holds. Each chi-squared statistic presented in the tables is the result of a Hausman-McFadden test where the relevant variable is omitted from the

restricted model. For example, in Table 12 in the first column, high school is the alternative of interest. The test statistic is 123.32, which, though large, is not large enough to reject the null hypothesis at the 5% level. In most cases the test suggests that IIA may not be violated, however some test statistics are negative. The authors in Hausman and McFadden (1984) note that this is a common possibility indicating that the asymptotic properties of the test are not met. They suggest that such a negative result could be interpreted as supporting the null hypothesis.[22]

5.3 Two-stage least squares (2SLS) estimates

Instrumental variables estimates suggest vocational training raised wages and employment, though the effects are imprecisely estimated. Tables 21 and 22 show the estimated effects of vocational school on labor market outcomes using both OLS and the instrumental variables approach described by Equations 3 and 4. The outcome variables are hourly wages, poverty status, and employment.[23] The first three columns in each table show OLS estimates of Equation 5 below:

$$Y_{ics} = \beta_1 * \text{Voc. Train.}_{ics} + \mathbf{Z'}_{ics} * \delta + e_{ics} \tag{5}$$

This model yields strong, statistically significant vocational training effects across all three outcomes. All else equal, completing trade school increases hourly wages by 6%, reduces the chance of living below poverty by 2.4%, and increases the likelihood of employment by 2% in the WWII sample. The Korean War sample produces very similar results. None of these predictions are surprising considering that vocational training increases human capital, and by extension workers' productivity and employable skill sets. However, this model does not account for the potential endogeneity of the decision to complete trade school.

Columns 4 through 6, therefore, present 2SLS estimates from using one's birth cohort shares of veteran status as an instrument for vocational school completion. All models

[22] As an additional check I estimate a multinomial probit model, which relaxes the IIA assumption. The multinomial probit does not produce odds ratios, however the estimated marginal effects are virtually the same as the multinomial logit.

[23] I compute hourly wages as total wage income divided by total annual hours worked. A worker is below poverty if their family's total annual income is below their poverty threshold. Employment is a variable equal to 1 if the worker is employed on the 1970 census. See Appendix B for details.

contain first stage F-statistics of 3,000 or greater in the WWII and Korean War samples, suggesting that the instruments are strong predictors of vocational training in this setting and meet the relevance requirement for identification. The resulting estimates are larger in magnitude but lose statistical significance. In the case of wages, for the WWII sample vocational training increases earnings by 19%, though standard errors are too large to support a conclusive effect. Similarly, employment probability increases by 23%, but again this effect is statistically insignificant. The poverty effect is significant at the 10% level, but the effect has reversed and now suggests that trade school completion increases one's chances of living below the poverty threshold. The Korean War sample effects are similar, with a 25% wage effect and a smaller 4% employment effect, both insignificant. The poverty effect is about -13%, which, while insignificant, is in line with economic intuition and consistent with the baseline OLS results. The large increase in magnitude in the IV setting would also suggest that the OLS estimates are biased downward, which implies that there are positive labor market returns to vocational training in the long-run.

6 Discussion of results and policy relevance

The set of results presented in Section 5 suggest positive effects of both the WWII and Korean War G.I. Bills on vocational school completion and long-term employment and wage outcomes. Regarding take-up, the main mechanism at play is a reduction in direct and opportunity costs of obtaining training. Stanley (2003) reports that annual college tuition costs ranged from $100 to $402 for WWII veterans and were as high as $626 for Korean War veterans depending on whether the college is public or private. Using census income data, the author also calculates the annual opportunity costs of forgone earnings for students to be $1400 and $1900 for WWII and Korean War veterans, respectively. Total costs thus range from $1500 to $2500. Given that trade school costs less to attend than college, I treat these as upper bounds on the financial constraints of workers opting for the vocational path.

A simple model of human capital investment would predict that training is an optimal decision if the returns exceed the total economic costs, which under the G.I. Bill are substantially reduced. As detailed in Section 2, the subsidy covered up to $500 of tuition plus a $50 monthly stipend for WWII veterans. A vocational program lasting one year or less would be fully covered by the tuition benefit, and workers would receive at least $600

in annual income, and more if they are married and/or with children. Using the forgone earnings computed by Stanley (2003) as a benchmark, there is still the possibility that the G.I. Bill stipend did not fully cover all costs of training. In this case it must be true that the expected returns to trade school outweighed these residual costs.

Existing empirical evidence on vocational school take-up and returns is limited, but my results are consistent with prior findings. Aguirre (2021) uses Chilean data to find that trade school take-up increases when subsidies are targeted at lower-performing students, and can even spill over into higher education attainment. Bertrand et al. (2021) similarly finds positive effects on sorting and wages from a Norwegian reform that lowered barriers to high quality trade school. Regarding lifetime returns to training, much research suggests that wage and employment benefits may be short-lived (Hanushek et al. (2017), Muehlemann and Wolter (2020)) but are heterogeneous by cohort and gender (Brunello and Rocco (2017)). The WWII and Korean War G.I. Bills represent unique, large scale U.S. policies that are difficult to compare directly to other programs around the world. However, my results show a clear positive impact on all levels of training take-up, which possibly spilled over into more desirable labor market outcomes. A reasonable takeaway is that workers will use benefits in a variety of different ways when given a wide set of choices. When considering trade school subsidization in the 21st century, policy makers should be mindful of the role that access can play, especially when workers are at the margin of choosing college or job training.

7 Conclusion

The G.I. Bill not only expanded college but also redirected thousands of veterans into vocational training, with lasting effects on labor markets. This paper provides new evidence on the role of the G.I. Bill in shaping vocational training decisions and long-run labor market outcomes. By exploiting birth cohort variation in military service during World War II and the Korean War, I show that access to G.I. Bill benefits increased vocational school completion and, in some specifications, improved employment and wage outcomes. These results highlight the importance of subsidies that lower both the direct and opportunity costs of training, while also expanding the set of education choices available to workers.

These historical results speak directly to today's policy debates about skill shortages and declining college enrollment. Today, U.S. policymakers confront persistent skill shortages

in construction, manufacturing, and health services, alongside declining rates of traditional college enrollment. The evidence presented here suggests that well-designed subsidies for vocational education can successfully redirect workers toward in-demand, occupation-specific training. At the same time, the heterogeneous effects across race, geography, and education level underscore the need for careful policy design when considering modern support for alternative training pathways. The mid-20th century G.I. Bills illustrate how education subsidies can be a powerful lever for workforce development but are also reminders that the structure of those subsidies, and the context in which they are offered, shapes who benefits and by how much.

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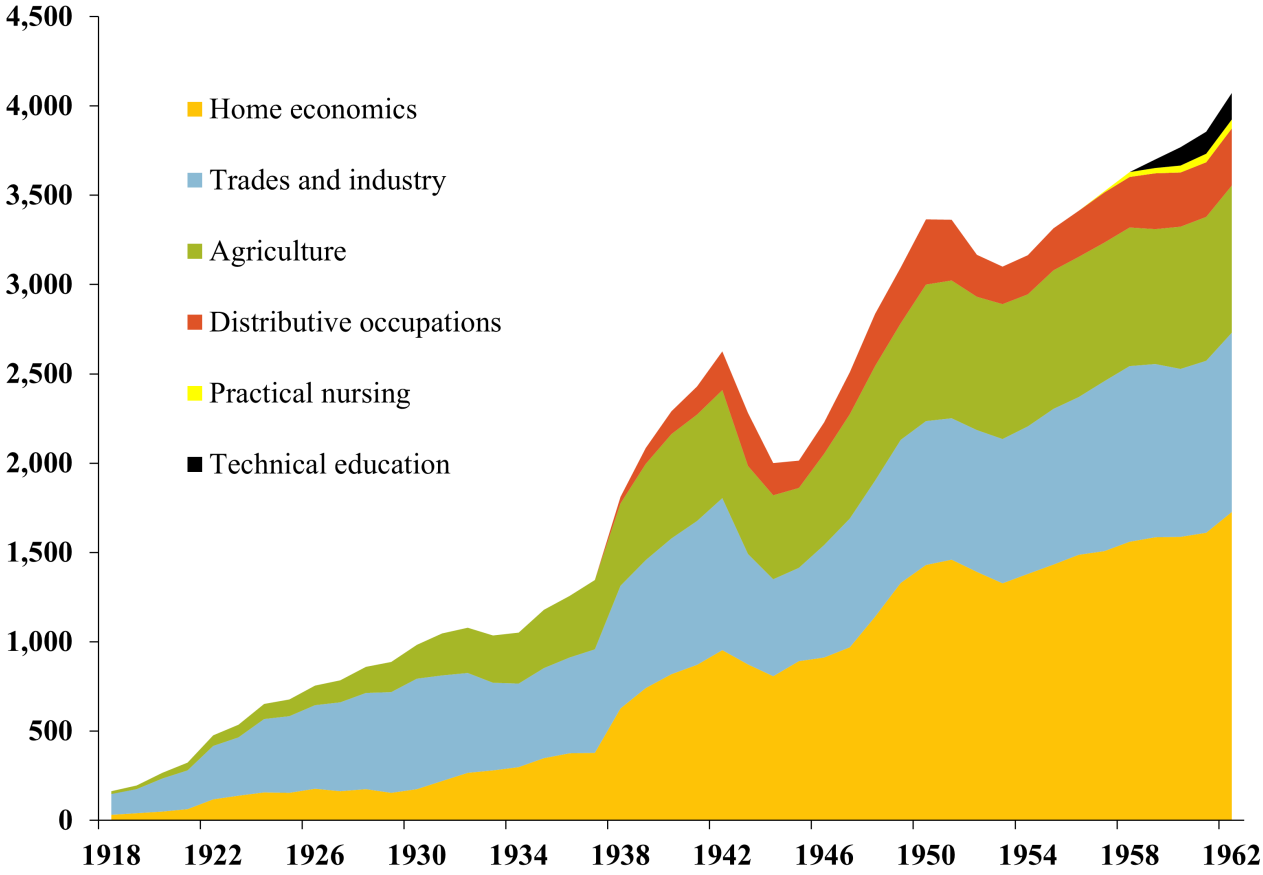
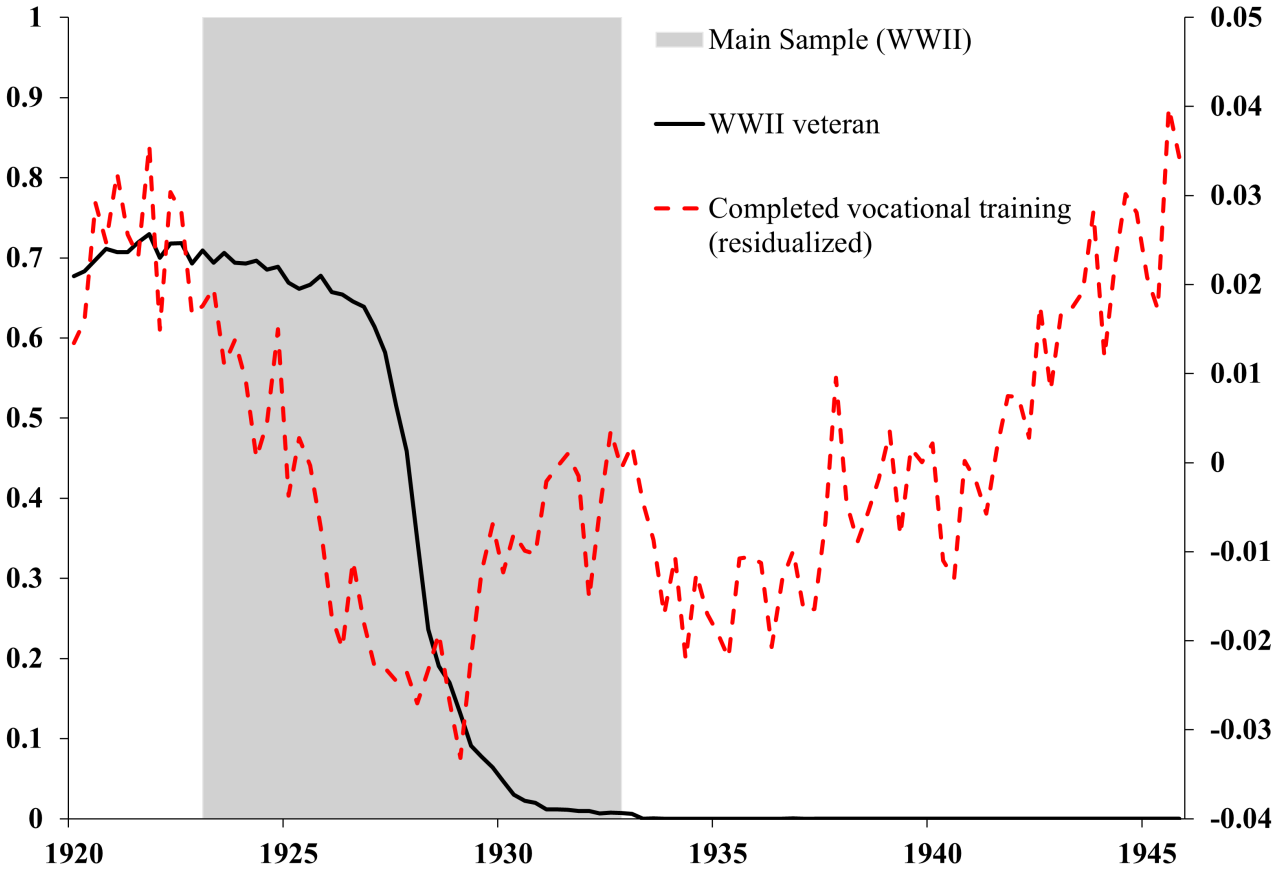
Figures and tables

Figure 1
Enrollment in federally aided vocational classes (thousands of students)



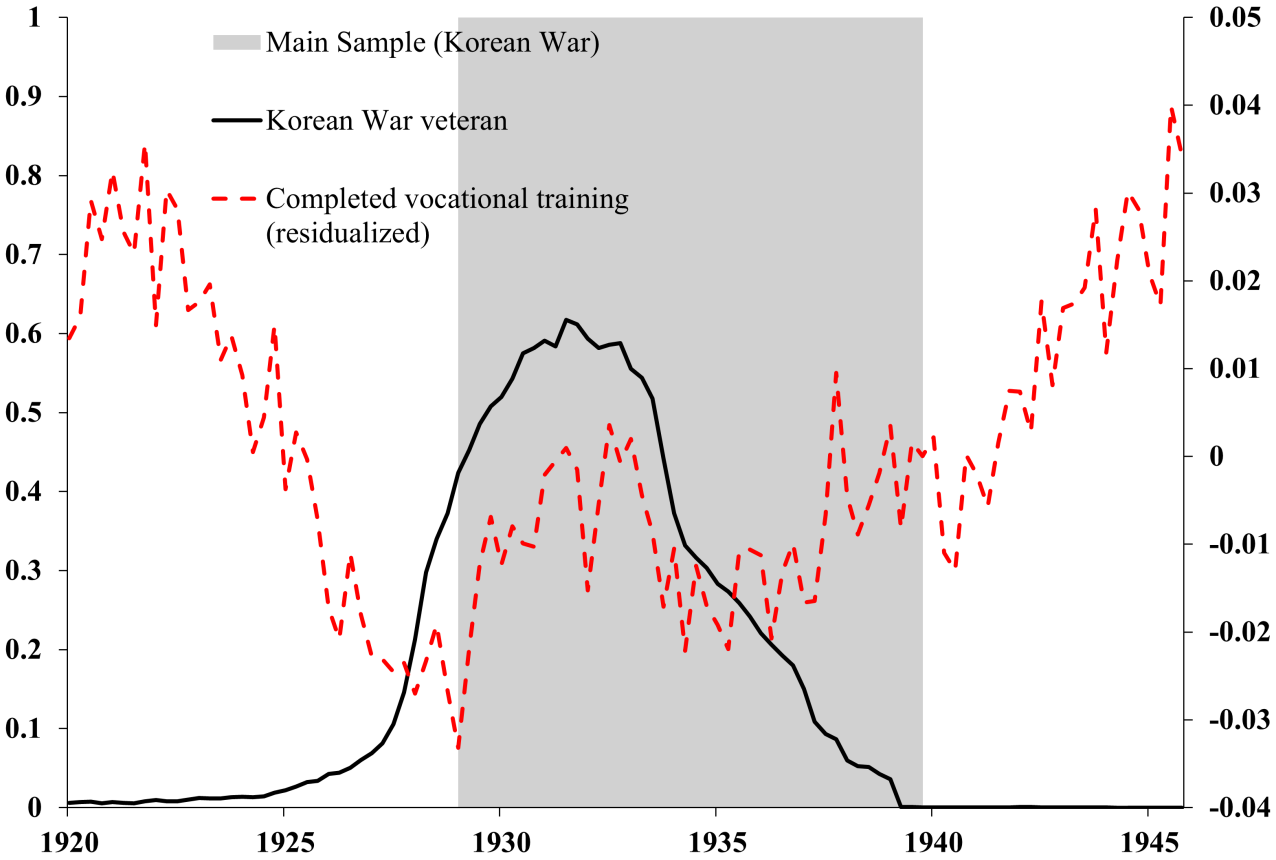
Total enrollment in federally aided vocational school classes from 1918 through 1962. Enrollment is shown in thousands of students and is broken down by subject.
Source: Digest of annual reports of state boards for vocational education to the Office of Education, Division of Vocational Education, 1918-1962.

Figure 2
Share of WWII veterans & vocational school completion by birth cohort



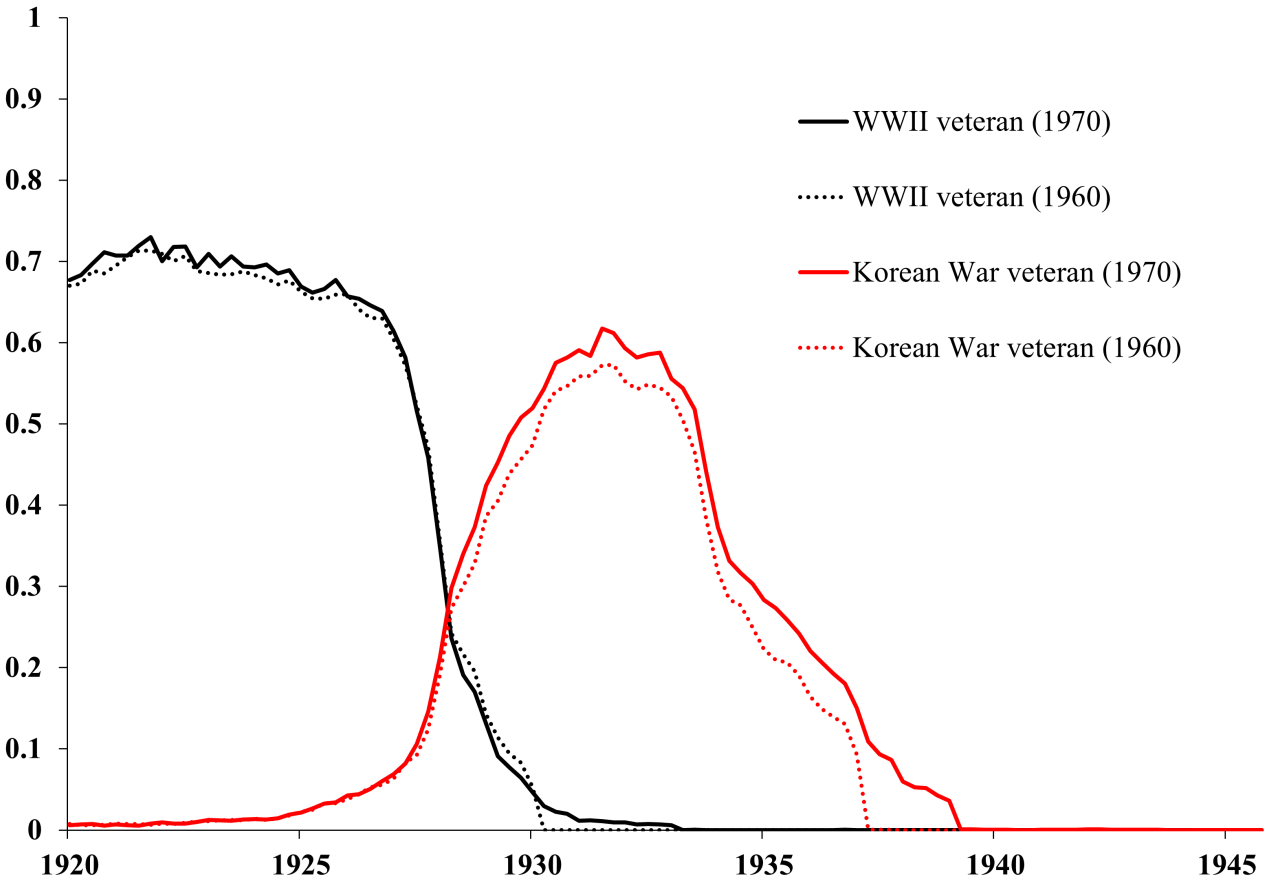
The solid black line (left axis) plots the share of black and white men identified as WWII veterans on the 1970 Census. Men who also served in the Korean War are excluded. The dashed red line (right axis) plots the share of residualized vocational school completion after controlling for state of birth fixed effects and a time trend. All shares are calculated at the birth quarter level. The gray shading extends from 1923 through 1932 and demarcates the main working sample used to estimate Equation 1 for the WWII G.I. Bill.
Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Figure 3
Share of Korean War veterans & vocational school completion by birth cohort



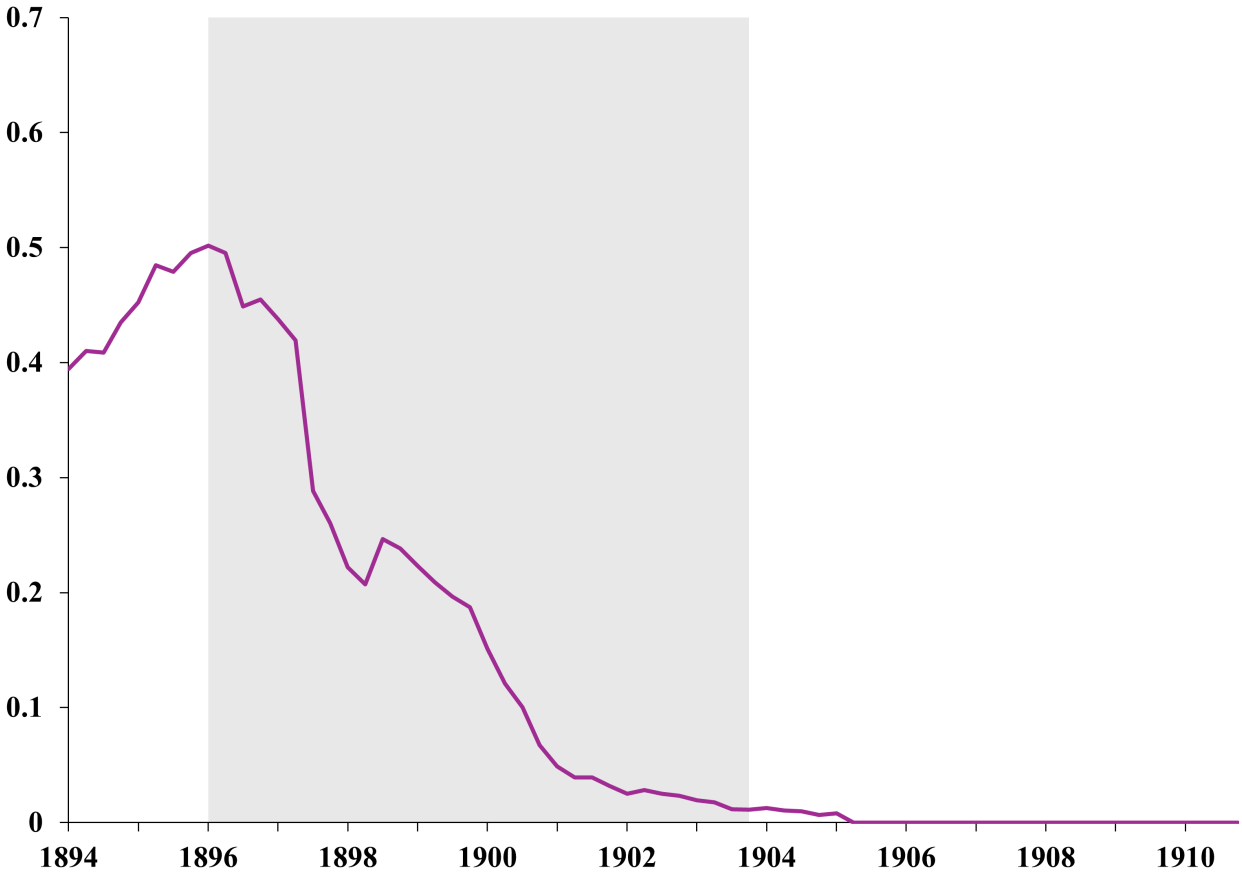
The solid black line (left axis) plots the share of black and white men identified as WWII veterans on the 1970 Census. Men who also served in the Korean War are excluded. The dashed red line (right axis) plots the share of residualized vocational school completion after controlling for state of birth fixed effects and a time trend. All shares are calculated at the birth quarter level. The gray shading extends from 1929 through 1939 and demarcates the main working sample used to estimate Equation 1 for the Korean War G.I. Bill.
Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Figure 4
Comparison of cohort veteran shares between 1960 and 1970 census



Fraction of black and white men identified as WWII and Korean War veterans on the 1960 and 1970 Censuses. Shares are calculated at the birth quarter level. Men who also served in both conflicts are excluded. Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

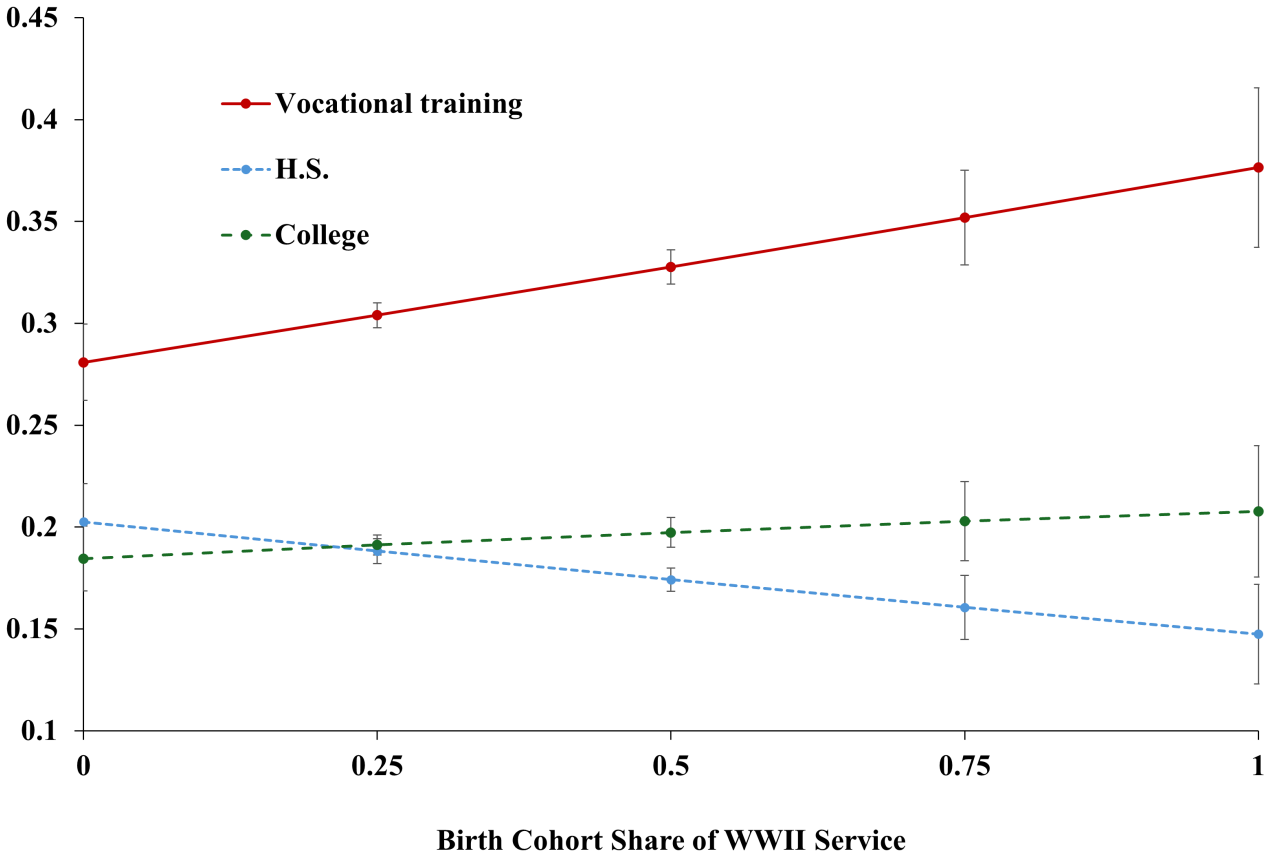
Figure 5
Share of WWI veterans by birth cohort



Share of black and white men identified as WWI veterans on the 1970 Census. The gray shading extends from 1896 through 1903.

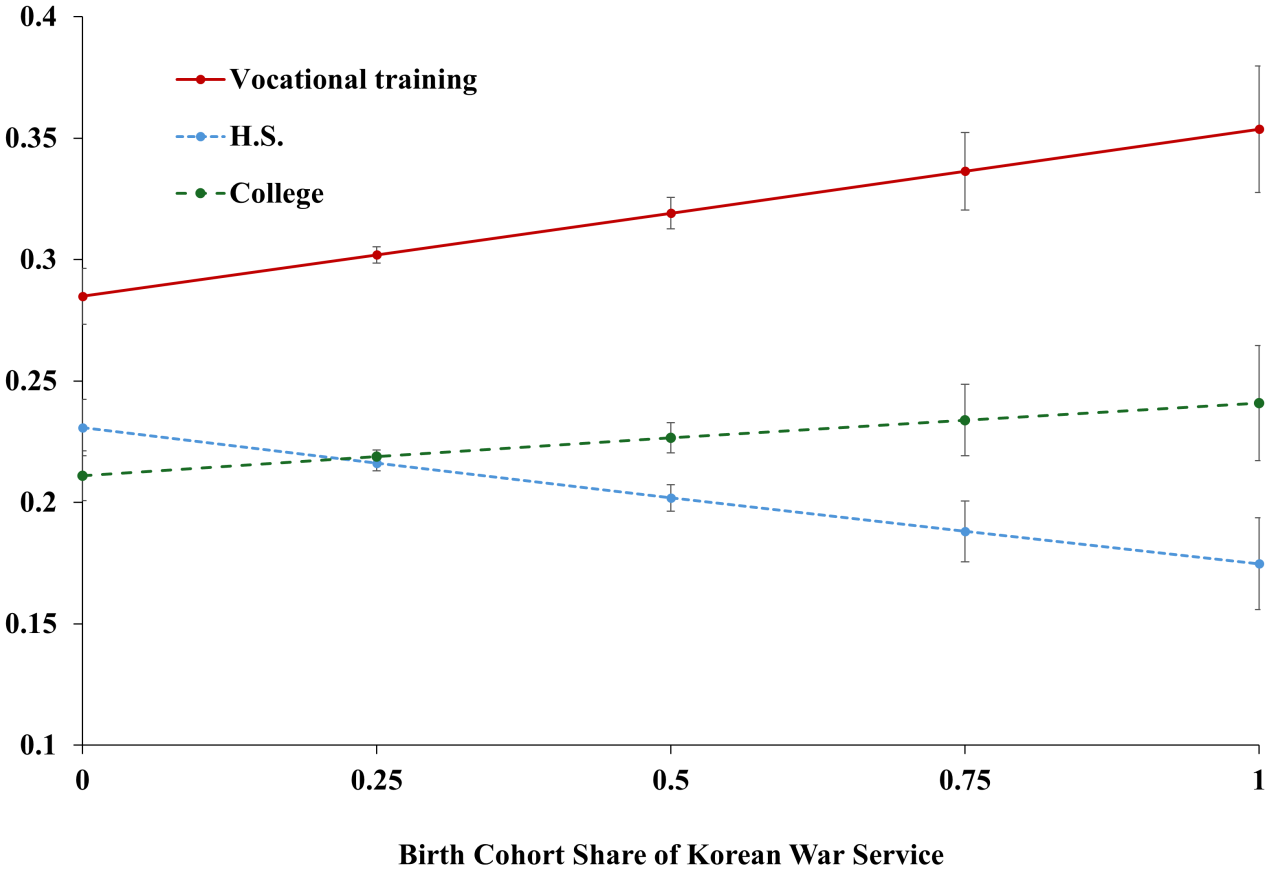
Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Figure 6
Predicted probabilities of training choices by share of WWII service



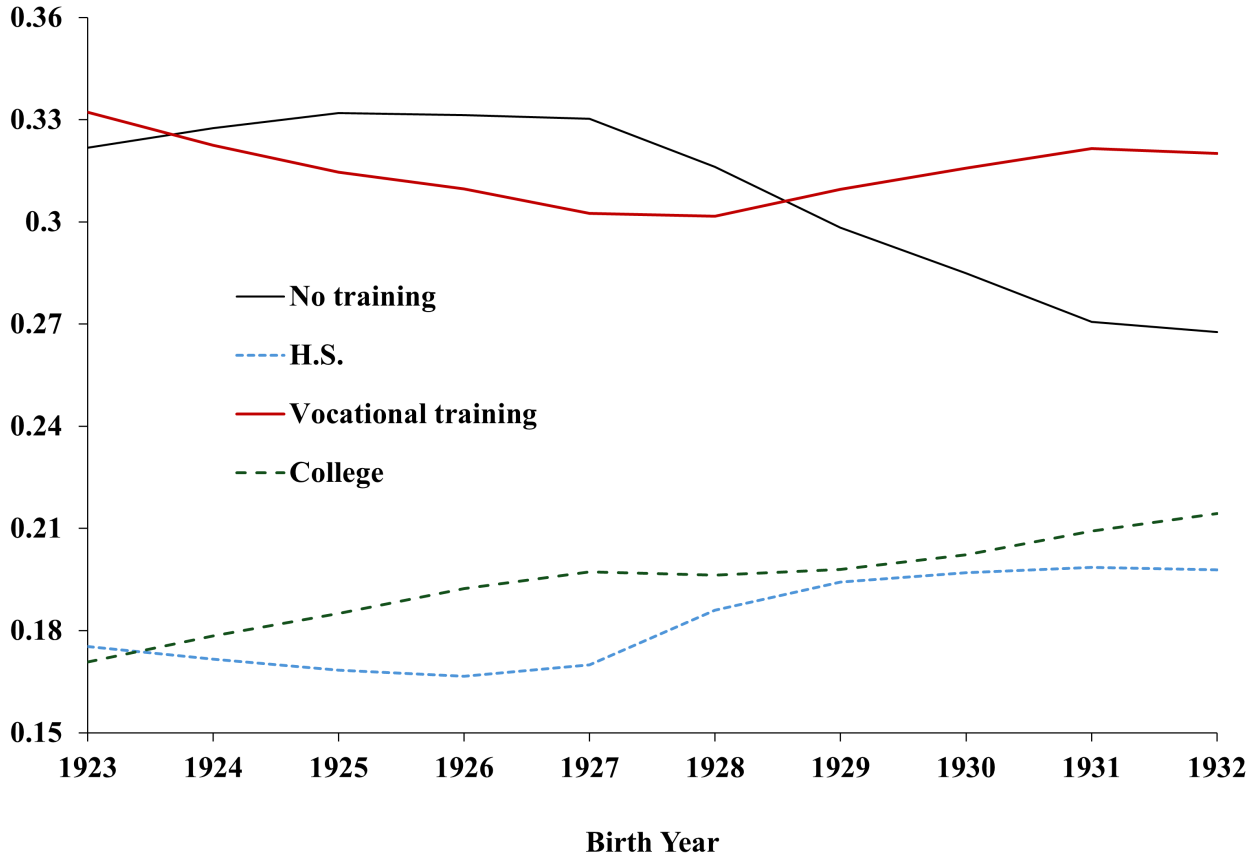
Predicted probabilities of choosing vocational school, high school, or college as one's probability of WWII service increases, using estimates from the multinomial logit model (Equation 2). Point estimates are computed for different levels of one's birth cohort share of WWII veterans at increments of 0.25. Confidence bands are at the 95% level.
Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Figure 7
Predicted probabilities of training choices by share of Korean War service



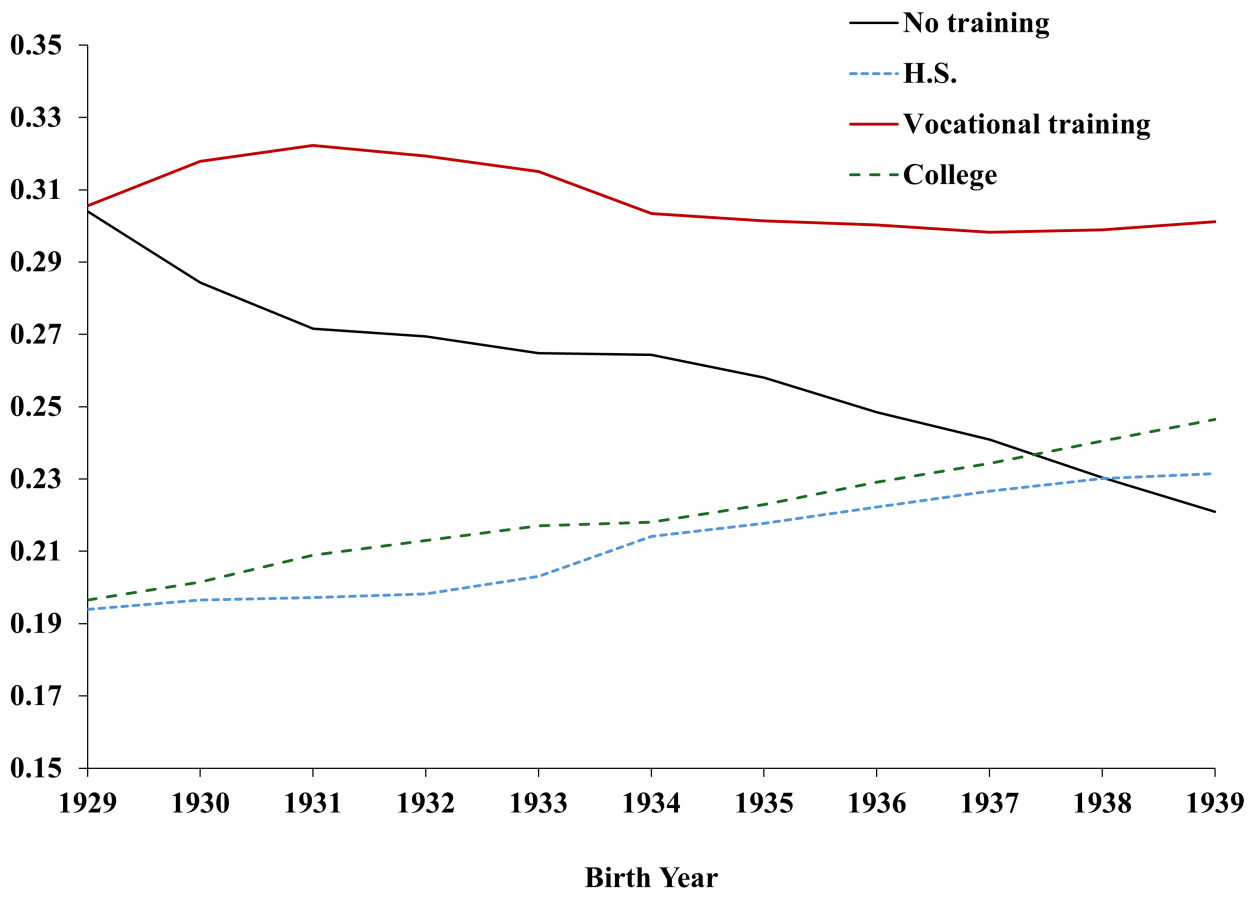
Predicted probabilities of choosing vocational school, high school, or college as one's probability of Korean War service increases, using estimates from the multinomial logit model (Equation 2). Point estimates are computed for different levels of one's birth cohort share of Korean War veterans at increments of 0.25. Confidence bands are at the 95% level.
Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Figure 8
Predicted probabilities of training decisions by birth year, 1923-1932 estimates



Predicted probabilities of choosing vocational school, high school, college, or no training by year of birth. Probabilities are computed using estimates from the multinomial logit model (Equation 2) using the WWII sample. The predicted probabilities are averaged by birth year.
Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Figure 9
Predicted probabilities of training decisions by birth year, 1929-1939 estimates



Predicted probabilities of choosing vocational school, high school, college, or no training by year of birth. Probabilities are computed using estimates from the multinomial logit model (Equation 2) using the Korean War sample. The predicted probabilities are averaged by birth year.
Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 1
G.I. Bill Education Benefits Utilization

			Level of training received			
Conflict	Eligible	Received	College	Less than college	On-the-Job	Farm
World War II	15,440,000	**7,800,000**	*2,230,000*	*3,480,000*	*1,400,000*	*690,000*
Korean War	5,509,000	**2,391,000**	*1,213,000*	*860,000*	*223,000*	*95,000*

Number of men eligible for G.I. Bill education assistance and the utilization breakdown by type of education received.

Source: Bound and Turner (2002), Appendix B2; Data originally collected from VA website http://www.gibill.va.gov/education/GI Bill.htm.

Table 2
Training alternatives used in multinomial logit model

		Share of workers	
	Definition	Born 1923-32	Born 1929-39
Less than high school	$<$ 12 years ed.; No voc. training	30.80%	25.88%
High school	Exactly 12 years ed.; No voc. training	18.21%	21.18%
Vocational training	Completed vocational training; $\leq$ 14 years	26.55%	25.84%
College	$>$ 12 years ed.; No voc. training	24.44%	27.10%
N		304,607	321,460

Classification of training decisions used to estimate Equation 2. Vocational training completion is observed as reported in the 1970 census. See Appendix B for details on the questionnaire and sample construction.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 3
Vocational training completion rates

	Born 1923-32			Born 1929-39		
	All	White	Black	All	White	Black
No vocational training	68.45%	67.70%	76.65%	69.18%	68.39%	77.28%
Any vocational training	31.55%	32.30%	23.35%	30.82%	31.61%	22.72%
N	304,607	279,100	25,507	321,460	292,940	28,520

Percentages of black and white men who completed vocational training as reported in the 1970 census. See Appendix B for details on the questionnaire and sample construction.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 4
Vocational Training completion rates by field of study

	Born 1923-32			Born 1929-39		
	All	White	Black	All	White	Black
Trades & Crafts	56.31%	56.23%	57.45%	54.77%	54.92%	52.67%
Business	13.25%	13.43%	10.54%	13.68%	13.77%	12.42%
Engineering & Drafting	12.93%	13.35%	6.62%	14.02%	14.41%	8.50%
Agriculture & Home Econ.	3.51%	3.51%	3.53%	2.67%	2.66%	2.81%
Nursing & Health	2.48%	2.40%	3.58%	2.71%	2.57%	4.72%
Other	5.36%	5.29%	6.43%	5.98%	5.94%	6.48%
Not reported	6.17%	5.79%	11.85%	6.17%	5.73%	12.39%
N	96,110	90,154	5,956	99,079	92,599	6,480

Percentages of black and white men who completed vocational training by field of study, as reported in the 1970 census. See Appendix B for details on the questionnaire and sample construction.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 5
Vocational school completion rates by field of study and years of education

Panel A: Born 1923-32				
	$\leq$ 12 years	12 years	13-15 years	16 years
Trades & Crafts	69.66%	62.21%	41.51%	26.83%
Business	6.02%	12.97%	22.00%	19.15%
Engineering & Drafting	5.05%	10.43%	22.42%	26.30%
Agriculture & Home Economics	4.51%	3.63%	2.19%	2.61%
Nursing & Health	1.38%	1.67%	2.59%	7.24%
Other	4.95%	4.49%	5.14%	9.26%
Not reported	8.43%	4.60%	4.16%	8.60%
N	27,780	39,950	15,643	12,737
Panel B: Born 1929-39				
	$\leq$ 12 years	12 years	13-15 years	16 years
Trades & Crafts	69.44%	62.36%	40.30%	24.17%
Business	5.96%	12.60%	20.60%	20.41%
Engineering & Drafting	5.17%	10.92%	24.44%	24.97%
Agriculture & Home Economics	2.41%	2.87%	1.98%	3.30%
Nursing & Health	1.58%	1.75%	2.94%	7.61%
Other	5.58%	4.92%	5.68%	10.78%
Not reported	9.85%	4.58%	4.05%	8.75%
N	21,167	46,685	18,021	13,206

Percentages of black and white men who completed vocational training by field of study and years of school, as reported in the 1970 census. See Appendix B for details on the questionnaire and sample construction.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 6
Effect of G.I. Bill on vocational school completion, 1923-1932 birth cohorts

	Voc. Training	Voc. Training, ≤ 14	Voc. Training, ≤ 12
Fraction WWII	0.086***	0.035*	0.031
	(0.021)	(0.015)	(0.017)
Fraction Korea	0.142***	0.070***	0.058*
	(0.024)	(0.019)	(0.024)
Black	-0.095*	-0.117*	-0.082
	(0.046)	(0.043)	(0.041)
Black x Fraction WWII	0.052	0.114	0.079
	(0.068)	(0.065)	(0.062)
Black x Fraction Korea	0.040	0.119	0.076
	(0.082)	(0.075)	(0.071)
N	302,166	302,166	302,166
Fixed Effects	No	No	Yes
Mean dep. variable	0.315	0.265	0.222

Estimates of Equation 1. "Voc. Training" is equal to 1 if a person completed any vocational school. "Voc. Training, ≤ 14" and "Voc. Training, ≤ 12" are equal to 1 if a person completed any vocational school and has at most 14 or 12 years of education, respectively. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans in one's quarter of birth. "Black" is equal to 1 if the person is identified as black in the 1970 Census. Fixed effects are at the state of birth level. The sample includes black and white men born between 1923 and 1932. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05, **p < 0.01, ***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 7
Effect of G.I. Bill on vocational school completion, 1929-1939 birth cohorts

	Voc. Training	Voc. Training, ≤ 14	Voc. Training, ≤ 12
Fraction Korea	0.069***	0.034	0.017
	(0.017)	(0.018)	(0.022)
Fraction WWII	-0.140	-0.116	-0.115
	(0.076)	(0.098)	(0.099)
Black	-0.052***	-0.035***	-0.026***
	(0.004)	(0.004)	(0.004)
Black x Fraction Korea	-0.015	-0.002	-0.007
	(0.012)	(0.010)	(0.010)
Black x Fraction WWII	-0.173**	-0.191**	-0.145*
	(0.062)	(0.059)	(0.071)
N	318,834	318,834	318,834
Fixed Effects	No	No	Yes
Mean dependent variable	0.308	0.258	0.211

Estimates of Equation 1. "Voc. Training" is equal to 1 if a person completed any vocational school. "Voc. Training, ≤ 14" and "Voc. Training, ≤ 12" are equal to 1 if a person completed any vocational school and has at most 14 or 12 years of education, respectively. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans in one's quarter of birth. "Black" is equal to 1 if the person is identified as black in the 1970 Census. Fixed effects are at the state of birth level. The sample includes black and white men born between 1929 and 1939. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05, **p < 0.01, ***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 8
Effect of G.I. Bill on vocational school, 1923-1932 birth cohorts, southern states

	Voc. Training	Voc. Training, ≤ 14	Voc. Training, ≤ 12
Fraction WWII	0.105*	0.079	0.070
	(0.045)	(0.046)	(0.041)
Fraction Korea	0.153*	0.108	0.096
	(0.059)	(0.059)	(0.055)
Black	-0.089	-0.158**	-0.140**
	(0.052)	(0.053)	(0.048)
Black x Fraction WWII	0.010	0.133	0.130
	(0.078)	(0.080)	(0.074)
Black x Fraction Korea	-0.016	0.143	0.137
	(0.092)	(0.092)	(0.083)
N	87,121	87,121	87,121
Fixed Effects	No	No	Yes
Mean dependent variable	0.282	0.238	0.202

Estimates of Equation 1. "Voc. Training" is equal to 1 if a person completed any vocational school. "Voc. Training, ≤ 14" and "Voc. Training, ≤ 12" are equal to 1 if a person completed any vocational school and has at most 14 or 12 years of education, respectively. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans in one's quarter of birth. "Black" is equal to 1 if the person is identified as black in the 1970 Census. Fixed effects are at the state of birth level. The sample includes black and white men born between 1923 and 1932 in southern states. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 9
Effect of G.I. Bill on vocational school, 1929-1939 birth cohorts, southern states

	Voc. Training	Voc. Training, ≤ 14	Voc. Training, ≤ 12
Fraction Korea	0.092**	0.048	0.018
	(0.033)	(0.031)	(0.031)
Fraction WWII	-0.071	-0.090	-0.153
	(0.158)	(0.175)	(0.155)
Black	-0.095***	-0.080***	-0.057***
	(0.006)	(0.006)	(0.006)
Black x Fraction Korea	-0.001	0.018	0.002
	(0.015)	(0.014)	(0.014)
Black x Fraction WWII	-0.160*	-0.187*	-0.124
	(0.064)	(0.073)	(0.087)
N	94,517	94,517	94,517
Fixed Effects	No	No	Yes
Mean dependent variable	0.267	0.225	0.187

Estimates of Equation 1. "Voc. Training" is equal to 1 if a person completed any vocational school. "Voc. Training, ≤ 14" and "Voc. Training, ≤ 12" are equal to 1 if a person completed any vocational school and has at most 14 or 12 years of education, respectively. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans in one's quarter of birth. "Black" is equal to 1 if the person is identified as black in the 1970 Census. Fixed effects are at the state of birth level. The sample includes black and white men born between 1929 and 1939 in southern states. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 10
Effect of G.I. Bill on years of school and college

	Any Training	≤ 14	Years of School	Years of College	College Grad
Fraction WWII	0.086***	0.035*	0.831**	0.427***	0.100***
	(0.021)	(0.015)	(0.286)	(0.110)	(0.025)
Fraction Korea	0.142***	0.070***	1.120**	0.441**	0.100**
	(0.024)	(0.019)	(0.391)	(0.142)	(0.034)
Black	-0.095*	-0.117*	-2.089***	-0.417*	-0.064
	(0.046)	(0.043)	(0.423)	(0.171)	(0.039)
Black x Fraction WWII	0.0520	0.1140	0.2360	-0.1430	-0.0500
	(0.068)	(0.065)	(0.617)	(0.248)	(0.056)
Black x Fraction Korea	0.0400	0.1190	1.0940	-0.2870	-0.0910
	(0.082)	(0.075)	(0.747)	(0.299)	(0.067)
N	302,166	302,166	302,166	302,166	302,166
Mean dep. Variable	0.315	0.265	11.552	0.990	0.174

Estimates of Equation 1. "Any Training" is equal to 1 if a person completed any vocational school. "≤ 14" is equal to 1 if a person completed any vocational school and has at most 14 years of education. "Years of College" are years of school greater than 12. "College Grad" is equal to 1 if years of school are 16 or greater. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans in one's quarter of birth. "Black" is equal to 1 if the person is identified as black in the 1970 Census. Fixed effects are at the state of birth level. The sample includes black and white men born between 1923 and 1932. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05, **p < 0.01, ***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 11
Effect of G.I. Bill on training fields, 1923-1932 birth cohorts

	Any Training	Trades	Agri.	Engin.	Business	Health
Fraction WWII	0.086***	0.046*	0.016**	0.031*	-0.0150	0.0010
	(0.021)	(0.018)	(0.005)	(0.015)	(0.011)	(0.005)
Fraction Korea	0.142***	0.073**	0.012	0.048*	-0.006	0.004
	(0.024)	(0.023)	(0.006)	(0.019)	(0.014)	(0.006)
Black	-0.095*	-0.026	-0.022**	0.005	-0.056**	0.005
	(0.046)	(0.040)	(0.007)	(0.013)	(0.019)	(0.009)
Black x Fraction WWII	0.0520	-0.0020	0.025*	-0.0350	0.0540	-0.0060
	(0.068)	(0.059)	(0.011)	(0.019)	(0.027)	(0.014)
Black x Fraction Korea	0.0400	-0.0260	0.033**	-0.048*	0.071*	-0.0020
	(0.082)	(0.069)	(0.012)	(0.022)	(0.034)	(0.016)
N	302,166	302,166	302,166	302,166	302,166	302,166
Mean dep. Variable	0.315	0.178	0.011	0.041	0.042	0.008

Estimates of Equation 1. "Any Training" is equal to 1 if a person completed any vocational school. The remaining dependent variables are equal to 1 if a person completed that particular field of training as defined in the 1970 Census. "Trades" is trades and crafts, "Agri." is agriculture and home economics, "Engin." is engineering and drafting, "Business" is business and office work, "Health" is nursing and health fields. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans in one's quarter of birth. "Black" is equal to 1 if the person is identified as black in the 1970 Census. Fixed effects are at the state of birth level. The sample includes black and white men born between 1923 and 1932. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05, **p < 0.01, ***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 12
Effect of G.I. Bill on training fields, 1929-1939 birth cohorts

	Any Training	Trades	Agri.	Engin.	Business	Health
Fraction WWII	-0.1400	-0.0240	-0.0210	-0.083**	-0.0140	0.0060
	(0.076)	(0.063)	(0.015)	(0.030)	(0.027)	(0.011)
Fraction Korea	0.069***	0.036**	0.004	0.005	0.009	0.004
	(0.017)	(0.013)	(0.003)	(0.007)	(0.008)	(0.003)
Black	-0.052***	-0.038***	-0.001	-0.015***	-0.012***	0.006***
	(0.004)	(0.003)	(0.001)	(0.002)	(0.002)	(0.001)
Black x Fraction WWII	-0.173**	-0.062*	0.0090	0.0160	-0.109*	0.0110
	(0.062)	(0.025)	(0.017)	(0.027)	(0.043)	(0.024)
Black x Fraction Korea	-0.0150	0.0030	-0.0030	-0.012*	0.0010	-0.0050
	(0.012)	(0.007)	(0.002)	(0.004)	(0.007)	(0.003)
N	318,834	318,834	318,834	318,834	318,834	318,834
Mean dep. Variable	0.308	0.169	0.008	0.043	0.042	0.008

Estimates of Equation 1. "Any Training" is equal to 1 if a person completed any vocational school. The remaining dependent variables are equal to 1 if a person completed that particular field of training as defined in the 1970 Census. "Trades" is trades and crafts, "Agri." is agriculture and home economics, "Engin." is engineering and drafting, "Business" is business and office work, "Health" is nursing and health fields. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans in one's quarter of birth. "Black" is equal to 1 if the person is identified as black in the 1970 Census. Fixed effects are at the state of birth level. The sample includes black and white men born between 1929 and 1939. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 13
Effect of G.I. Bill on vocational school, alternate sample ranges

Panel A: Extending sample window forward

	1923-28	1923-29	1923-30	1923-31	1923-32	1923-33	1923-34	1923-35	1923-36
Fraction WWII	-0.0030	0.092*	0.095**	0.083**	0.086***	0.089***	0.071***	0.073***	0.075***
	(0.042)	(0.037)	(0.030)	(0.026)	(0.021)	(0.018)	(0.015)	(0.015)	(0.015)
Fraction Korea	0.090	0.180**	0.165*	0.134**	0.142***	0.143***	0.119***	0.122***	0.125***
	(0.061)	(0.063)	(0.061)	(0.042)	(0.024)	(0.016)	(0.012)	(0.012)	(0.012)
N	185,234	215,068	245,138	273,350	302,166	329,925	357,972	386,428	414,767
Mean dependent variable	0.314	0.313	0.314	0.315	0.315	0.315	0.314	0.313	0.312

Panel B: Extending sample window backward

	1919-32	1920-32	1921-32	1922-32	1923-32
Fraction WWII	0.250***	0.202***	0.140***	0.114***	0.086***
	(0.030)	(0.031)	(0.024)	(0.025)	(0.021)
Fraction Korea	0.349***	0.282***	0.201***	0.171***	0.142***
	(0.042)	(0.042)	(0.030)	(0.030)	(0.024)
Mean dep. var.	423,299	395,019	364,566	333,339	302,166
Mean dependent variable	0.318	0.319	0.318	0.317	0.315

Estimates of Equation 1. Each column shows the effects on vocational school completion as defined in the 1970 Census using samples with different ranges of birth years. The baseline range in 1923-1932. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans in one's quarter of birth. Fixed effects are at the state of birth level. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05, **p < 0.01, ***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 14
Effect of G.I. Bill on vocational training with state-level controls

	Any Training	$\leq$ 14 years	Any Training	$\leq$ 14 years
Fraction WWII	0.083***	0.065***	-0.0120	-0.0110
	(0.016)	(0.014)	(0.028)	(0.024)
Fraction Korea	0.134***	0.112***	0.0220	0.0220
	(0.018)	(0.015)	(0.033)	(0.027)
Mobilization rate	0.251***	0.146**	0.250***	0.132*
	(0.050)	(0.049)	(0.051)	(0.050)
Manufacturing share (1940)	0.398***	0.323***	0.391***	0.330***
	(0.052)	(0.054)	(0.052)	(0.054)
Agriculture share (1940)	0.070*	0.0330	0.098**	0.068*
	(0.027)	(0.026)	(0.030)	(0.029)
Construction share (1940)	0.3570	0.501**	0.464*	0.617**
	(0.180)	(0.164)	(0.194)	(0.174)
Education spending	-0.003*	-0.0010	-0.0030	-0.0010
	0.0020	0.0010	0.0020	0.0010
Voc./H.S. ratio			-0.157***	-0.129***
			(0.040)	(0.034)
Voc/H.S. x Fraction WWII			0.227***	0.171**
			0.057	(0.048)
Voc/H.S. x Fraction Korea			0.256***	0.190**
			(0.070)	(0.060)
Mean dep. var.	284,583	284,583	284,583	284,583
Mean dependent variable	0.314	0.266	0.314	0.266

Estimates of Equation 1. "Any Training" is equal to 1 if a person completed any vocational school. "$\leq$ 14" is equal to 1 if a person completed any vocational school and has at most 14 years of education. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans by quarter of birth. "Mobilization rate" is the state share of men drafted in WWII. "Manufacturing", "Agriculture", and "Construction" shares are the fractions of workers in those industries in 1940. "Education spending" is the log of spending on public schools in 1939. "Voc./H.S. ratio" is the ratio of vocational to high school enrollment in 1940. The sample includes black and white men born between 1923 and 1932. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)); Acemoglu et al. (2004); Lleras-Muney (2002).

Table 15
Effect of WWI service on training

	Any Training	Years of College	Years of School
Fraction WWI	-0.0070	-0.1760	-0.6150
	(0.041)	(0.131)	(0.576)
Black	-0.071***	-0.291***	-2.746***
	(0.004)	(0.014)	(0.067)
Black x Fraction WWI	-0.005	0.198**	0.483
	(0.021)	(0.061)	(0.283)
Mean dep. var.	110,275	110,275	110,275
Mean dependent variable	0.173	0.079	8.655

Estimates of Equation 1. "Any Training" is equal to 1 if a person completed any vocational school. "Years of College" are years of school greater than 12. "Fraction WWI" is the share of WWI veterans in one's quarter of birth. "Black" is equal to 1 if the person is identified as black in the 1970 Census. The sample includes black and white men born between 1896-1904. Fixed effects are at the state of birth level. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 16
Effect of G.I. Bill on women's training

	Any Training	Voc. Training, ≤ 14	Trades	Business	College Grad	Years of School
Fraction WWII	0.0300	-0.004	0.009	0.031	-0.005	0.366
	(0.046)	(0.047)	(0.018)	(0.033)	(0.031)	(0.280)
Fraction Korea	0.060	0.010	0.012	0.048	0.017	0.601
	(0.056)	(0.059)	(0.022)	(0.040)	(0.040)	(0.365)
Black	0.102**	0.084*	0.030	0.029	-0.048	-0.973**
	(0.037)	(0.036)	(0.024)	(0.025)	(0.024)	(0.321)
Married	-0.044	-0.040	0.024	-0.005	-0.023	0.330
	(0.033)	(0.035)	(0.014)	(0.023)	(0.022)	(0.202)
Married x Fraction WWII	0.024	0.028	-0.033	-0.017	0.006	-0.080
	(0.048)	(0.050)	(0.021)	(0.034)	(0.032)	(0.298)
Married x Fraction Korea	0.007	0.021	-0.043	-0.026	-0.008	-0.089
	(0.056)	(0.060)	(0.025)	(0.040)	(0.038)	(0.362)
N	318,100	318,100	318,100	318,100	318,100	318,100
Mean dependent variable	0.201	0.179	0.029	0.098	0.084	11.276

Estimates of Equation 1. "Any Training" is equal to 1 if a person completed any vocational school. "Voc. Training, ≤ 14" is equal to 1 if a person completed any vocational school and has at most 14 years of education. "Trades" and "Business" are equal to 1 if a person completed trades and crafts or business/office training, respectively. "College Grad" is equal to 1 if a person has 16 or more years of school. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans in one's quarter of birth. "Black" is equal to 1 if the person is identified as black in the 1970 Census. "Married" is equal to 1 if a person is married. Fixed effects are at the state of birth level. The sample includes black and white women born between 1923 and 1932. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 17
Effect of G.I. Bill on relative odds of training decisions, 1923-1932 birth cohorts

	H.S.	Voc. Train.	College
Fraction WWII	0.919	1.503*	1.680**
	(0.171)	(0.252)	(0.289)
Fraction Korea	1.754*	2.293***	2.137**
	(0.438)	(0.520)	(0.495)
N	302,166		
Base alternative	No training		
IIA test statistic	123.32	-79.17	1.69

Estimates of Equation 2. Estimates are reported as odds ratios and show the probability of completing a given training path relative the probability of the base alternative. The base alternative is "no training", defined as completing fewer than 12 years of school with no vocational training. See Table 2 for a summary of the training alternatives. The IIA tests are based on the Hausman-McFadden chi-squared test, where a low p-value suggests IIA is violated. A negative test statistic suggests that IIA may hold, however it implies the asympototic properties of the test are not met. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans in one's quarter of birth. The sample includes black and white men born between 1923 and 1932. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4, and state of birth fixed effects. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 18
Effect of G.I. Bill on relative odds of training decisions, 1929-1939 birth cohorts

	H.S.	Voc. Train.	College
Fraction WWII	0.266*	0.291*	0.506
	(0.160)	(0.162)	(0.286)
Fraction Korea	0.912	1.375**	1.534***
	(0.110)	(0.155)	(0.175)
N	318,834		
Base alternative	No training		
IIA test statistic	12.66	-39.06	-7.25

Estimates of Equation 2. Estimates are reported as odds ratios and show the probability of completing a given training path relative the probability of the base alternative. The base alternative is "no training", defined as completing fewer than 12 years of school with no vocational training. See Table 2 for a summary of the training alternatives. The IIA tests are based on the Hausman-McFadden chi-squared test, where a low p-value suggests IIA is violated. A negative test statistic suggests that IIA may hold, however it implies the asympototic properties of the test are not met. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans in one's quarter of birth. The sample includes black and white men born between 1929 and 1939. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4, and state of birth fixed effects. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 19
Effect of G.I. Bill on training decisions, 1923-1932 birth cohorts, base case = college

	No Training	Voc. Train.	H.S.
Fraction WWII	0.457***	0.690*	0.423***
	(0.084)	(0.128)	(0.085)
Fraction Korea	0.343***	0.7870	0.6040
	(0.085)	(0.195)	(0.162)
N	287,035		
Base alternative	College		
IIA test statistic	15.30	-79.17	123.32

Estimates of Equation 2. Estimates are reported as odds ratios and show the probability of completing a given training path relative the probability of the base alternative. The base alternative is "college", defined as completing more than 12 years of school with no vocational training. See Table 2 for a summary of the training alternatives. The IIA tests are based on the Hausman-McFadden chi-squared test, where a low p-value suggests IIA is violated. A negative test statistic suggests that IIA may hold, however it implies the asympototic properties of the test are not met. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans in one's quarter of birth. The sample includes black and white men born between 1923 and 1932. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4, and state of birth fixed effects. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 20
Effect of G.I. Bill on training decisions, 1929-1939 birth cohorts, base case = college

	No Training	Voc. Train.	H.S.
Fraction WWII	2.602	0.748	0.684
	(1.571)	(0.449)	(0.440)
Fraction Korea	0.601***	0.8260	0.547***
	(0.073)	(0.098)	(0.069)
N	300,539		
Base alternative	College		
IIA test statistic	-5.21	-39.10	12.70

Estimates of Equation 2. Estimates are reported as odds ratios and show the probability of completing a given training path relative the probability of the base alternative. The base alternative is "college", defined as completing more than 12 years of school with no vocational training. See Table 2 for a summary of the training alternatives. The IIA tests are based on the Hausman-McFadden chi-squared test, where a low p-value suggests IIA is violated. A negative test statistic suggests that IIA may hold, however it implies the asympototic properties of the test are not met. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans in one's quarter of birth. The sample includes black and white men born between 1929 and 1939. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4, and state of birth fixed effects. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 21
Effect of vocational training on labor market outcomes, 1923-1932 birth cohorts

	OLS			2SLS		
	Log Wage	Poverty	Employed	Log Wage	Poverty	Employed
Voc. Train.	0.060***	-0.024***	0.020***	0.1930	0.317*	0.2280
	(0.003)	(0.001)	(0.001)	(0.343)	(0.156)	(0.150)
Black	-0.330***	0.126***	-0.082***	-0.289**	0.229***	-0.0190
	(0.006)	(0.002)	(0.002)	(0.106)	(0.047)	(0.045)
N	242,434	297,950	302,166	242,434	297,950	302,166
Mean dep. variable	1.403	0.062	0.932	1.403	0.062	0.932
First stage F-stat.	-	-	-	2913.27	3675.70	3819.83

Estimates of Equation 4. "Vocational training" is a binary variable equal to 1 if a person completed any vocational training as reported by the 1970 Census. "Black" is equal to 1 if the person is identified as black in the 1970 Census. All labor market outcomes are binary variables observed in the 1970 Census. All regressions include fixed effects are at the state of birth level. The sample includes black and white men born between 1923 and 1932. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4. Standard errors are shown in parentheses. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table 22
Effect of vocational training on labor market outcomes, 1929-1939 birth cohorts

	OLS			2SLS		
	Log Wage	Poverty	Employed	Log Wage	Poverty	Employed
Voc. Train.	0.055***	-0.024***	0.021***	0.2490	-0.1320	0.0410
	(0.003)	(0.001)	(0.001)	(0.194)	(0.078)	(0.077)
Black	-0.296***	0.125***	-0.082***	-0.240***	0.093***	-0.076***
	(0.005)	(0.002)	(0.002)	(0.056)	(0.023)	(0.022)
N	259,726	313,485	318,834	259,726	313,485	318,834
Mean dep. variable	1.363	0.065	0.938	1.363	0.065	0.938
First stage F-stat.	-	-	-	3821.18	4826.03	5079.96

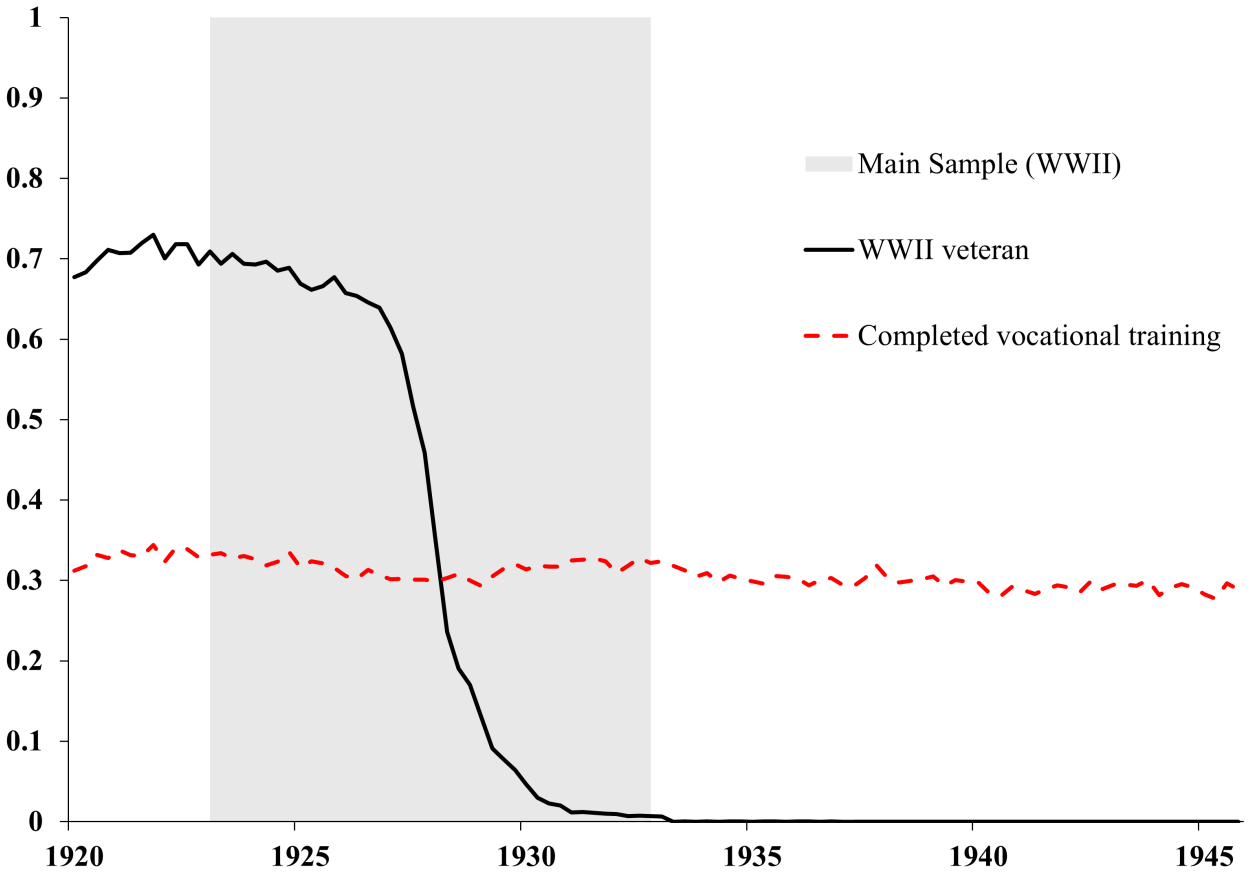
Estimates of Equation 4. "Vocational training" is a binary variable equal to 1 if a person completed any vocational training as reported by the 1970 Census. "Black" is equal to 1 if the person is identified as black in the 1970 Census. All labor market outcomes are binary variables observed in the 1970 Census. All regressions include fixed effects are at the state of birth level. The sample includes black and white men born between 1929 and 1939. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4. Standard errors are shown in parentheses. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Appendix

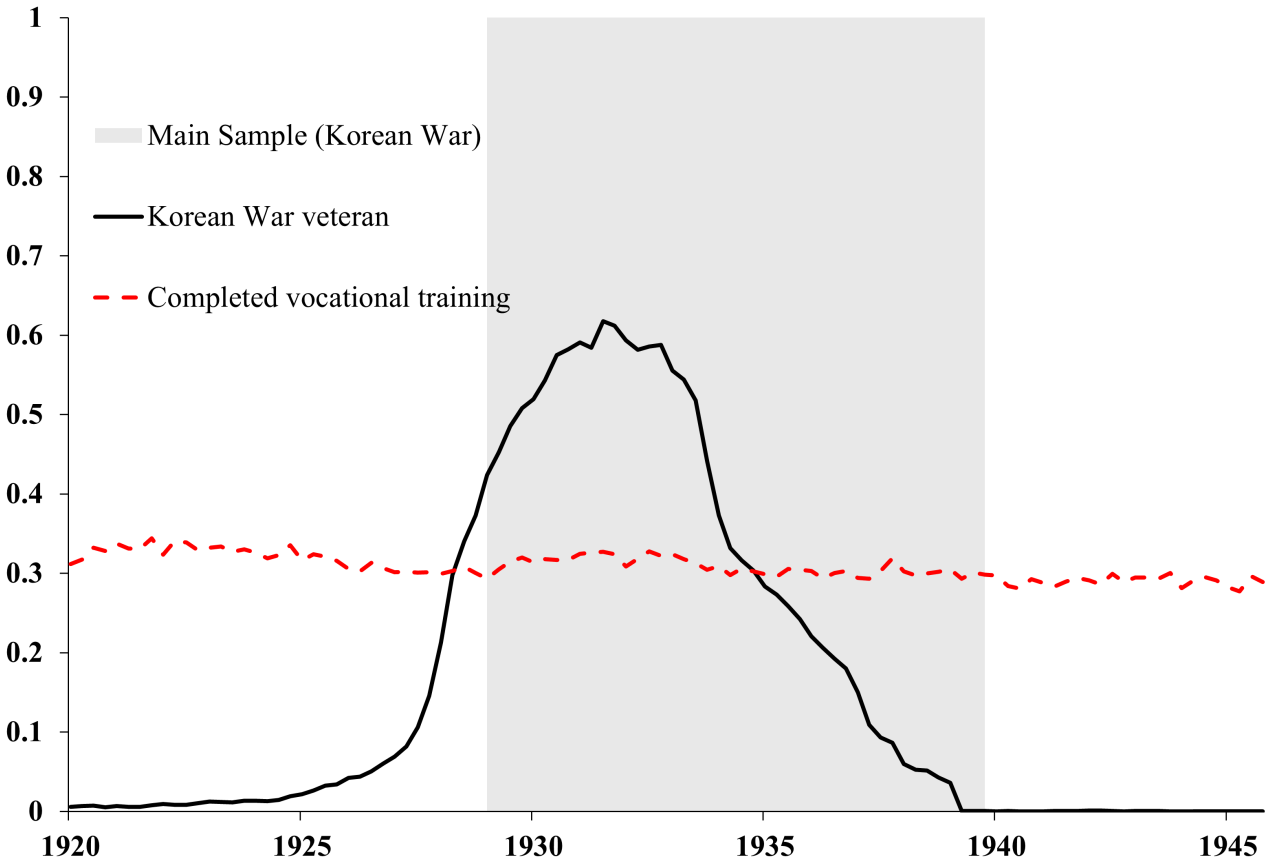
A Appendix figures and tables

Figure A1
Share of WWII veterans & vocational school completion by birth cohort



The solid black line plots the share of black and white men identified as WWII veterans on the 1970 Census. Men who also served in the Korean War are excluded. The dashed red line plots the share of vocational school completion. All shares are calculated at the birth quarter level. The gray shading extends from 1923 through 1932 and demarcates the main working sample used to estimate Equation 1 for the WWII G.I. Bill. Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Figure A2
Share of Korean War veterans & vocational school completion by birth cohort



The solid black line plots the share of black and white men identified as WWII veterans on the 1970 Census. Men who also served in the Korean War are excluded. The dashed red line plots the share of vocational school completion. All shares are calculated at the birth quarter level. The gray shading extends from 1929 through 1939 and demarcates the main working sample used to estimate Equation 1 for the Korean War G.I. Bill.
Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table A1
With and without fixed effects

	Voc. Train.	Voc. Train., ≤ 14	Voc. Train.	Voc. Train., ≤ 14
Fraction WWII	0.088***	0.039*	0.086***	0.035*
	(0.020)	(0.015)	(0.021)	(0.015)
Fraction Korea	0.148***	0.078***	0.142***	0.070***
	(0.024)	(0.019)	(0.024)	(0.019)
Black	-0.125*	-0.137**	-0.095*	-0.117*
	(0.050)	(0.046)	(0.046)	(0.043)
Black x Fraction WWII	0.058	0.118	0.052	0.114
	(0.073)	(0.068)	(0.068)	(0.065)
Black x Fraction Korea	0.052	0.127	0.040	0.119
	(0.087)	(0.079)	(0.082)	(0.075)
N	304,607	304,607	302,166	302,166
Fixed Effects	No	No	Yes	Yes
Mean dependent variable	0.316	0.266	0.315	0.265

Estimates of Equation 1. "Voc. Train." is equal to 1 if a person completed any vocational school. "Voc. Train., $\leq$ 14" is equal to 1 if a person completed any vocational school and has at most 14 years of education. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans in one's quarter of birth. "Black" is equal to 1 if the person is identified as black in the 1970 Census. Fixed effects are at the state of birth level. The sample includes black and white men born between 1923 and 1932. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table A2
With and without fixed effects

	Voc. Train.	Voc. Train., ≤ 14	Voc. Train.	Voc. Train., ≤ 14
Fraction Korea	0.063***	0.028	0.069***	0.034
	(0.017)	(0.018)	(0.017)	(0.018)
Fraction WWII	-0.167*	-0.140	-0.140	-0.116
	(0.078)	(0.099)	(0.076)	(0.098)
Black	-0.081***	-0.057***	-0.052***	-0.035***
	(0.003)	(0.004)	(0.004)	(0.004)
Black x Fraction Korea	-0.016	-0.002	-0.015	-0.002
	(0.012)	(0.010)	(0.012)	(0.010)
Black x Fraction WWII	-0.181**	-0.194**	-0.173**	-0.191**
	(0.059)	(0.059)	(0.062)	(0.059)
N	321,460	321,460	318,834	318,834
Fixed Effects	No	No	Yes	Yes
Mean dependent variable	0.308	0.258	0.308	0.258

Estimates of Equation 1. "Voc. Train." is equal to 1 if a person completed any vocational school. "Voc. Train., $\leq$ 14" is equal to 1 if a person completed any vocational school and has at most 14 years of education. "Fraction WWII" and "Fraction Korea" are the shares of WWII and Korean War veterans in one's quarter of birth. "Black" is equal to 1 if the person is identified as black in the 1970 Census. Fixed effects are at the state of birth level. The sample includes black and white men born between 1929 and 1939. Regressions include linear and quadratic time trends, defined as birth year - 1929 + birth quarter/4. Standard errors are clustered by quarter of birth and are shown in parentheses. $*p < 0.05$, $**p < 0.01$, $***p < 0.001$.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table A3
Vocational training completion rates, women

	Born 1923-32			Born 1929-39		
	All	White	Black	All	White	Black
No vocational training	79.87%	79.64%	81.97%	79.54%	79.54%	79.58%
Any vocational training	20.13%	20.36%	18.03%	20.46%	20.46%	20.42%
N	322,042	290,385	31,657	337,291	301,176	36,115

Percentages of black and white women who completed vocational training, as reported in the 1970 census. See Appendix B for details on the questionnaire.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table A4
Vocational training by field, women

	Born 1923-32			Born 1929-39		
	All	White	Black	All	White	Black
Business	48.86%	51.22%	24.42%	48.69%	50.92%	29.97%
Nursing & Health	22.48%	21.51%	32.44%	24.01%	22.96%	32.86%
Trades & Crafts	14.18%	13.52%	21.04%	12.61%	12.12%	16.67%
Not reported	7.69%	7.15%	13.35%	7.65%	7.15%	11.79%
Other	3.71%	3.69%	4.01%	4.05%	4.03%	4.19%
Agriculture & Home Economics	2.19%	2.00%	4.22%	2.25%	2.05%	3.88%
Engineering & Drafting	0.88%	0.91%	0.53%	0.75%	0.76%	0.64%
N	64,820	59,111	5,709	69,000	61,627	7,373

Percentages of black and white women who completed vocational training by field of study, as reported in the 1970 census. See Appendix B for details on the questionnaire.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

Table A5
Vocational training by education, women

Born 1923-32				
	$\leq$ 12 years	12 years	13-15 years	16 years
Trades & Crafts	27.68%	13.41%	5.95%	3.45%
Business	31.68%	58.43%	49.19%	25.40%
Engineering & Drafting	0.74%	0.62%	1.31%	2.08%
Agriculture & Home Economics	3.11%	1.73%	1.21%	5.68%
Nursing & Health	18.66%	17.96%	34.19%	36.01%
Other	3.03%	2.43%	3.62%	15.47%
Not reported	15.10%	5.43%	4.53%	11.90%
N	13,186	34,694	12,278	4,662

Percentages of black and white women who completed vocational training by field of study and years of school, as reported in the 1970 census. See Appendix B for details on the questionnaire.

Source: 1970 U.S. Population Census, IPUMS (Ruggles et al. (2024)).

B Data and sample construction

B.1 U.S. Census (Ruggles et al. (2024))

- 1970, 1% samples
  - Vocational training: completion + field of training
  - Veteran status (WWII, Korea)
  - Race, birth state/country, birth quarter

  Two different survey forms, not linked
  - Form 1:
    - 3 samples, each 5% of population (state, metro area, neighborhood)
    - Vocational school completion
      - *SCHLVOC*: respondent ever completed a vocational training program
      - If yes, main field of training (Business, nursing/health, trades/crafts, engineering/drafting, agriculture/home economics
  - Form 2:
    - 3 samples, each 15% of population (state, metro area, neighborhood)
    - Veteran status by conflict (*VETWWII*, *VETKOREA*)
- 1940, 1% sample
  - State industry shares (manufacturing, agriculture, construction)
  - State urban/rural shares

B.2 Biennial Survey of Education, 1939 (Lleras-Muney (2002))

- Pre-WWII state characteristics
  - Population, education expenditures, manufacturing employment/wages

B.3 Digest of State Boards for Voc. Ed., 1940

- U.S. Office of Education, Vocational Division; digitized records
  - Vocational school enrollment by state

B.4 1970 Census Questionnaire Text

27(a). Has this person ever completed a vocational training program?* For example, in high school; as apprentice; in school of business, nursing or trades; technical institute; or Armed Forces schools.

- Yes
- No (skip to 28)

**Count only programs that he finished. Do not count courses which are not part of an organized program of study. Do not count training he got on-the-job, in company schools, in college after the second year, or by correspondence.*

27(b). What was his main field of vocational training? Fill one circle.

- Business, office work
- Nursing, other health fields
- Trades and crafts (mechanic, electrician, beautician, etc.)
- Engineering or science technician; draftsman
- Agriculture or home economics
- Other field - Specify