# The Educational Legacy of the Greatest Generation: Paternal Military Service and Baby Boomer Educational Attainment

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September 2010

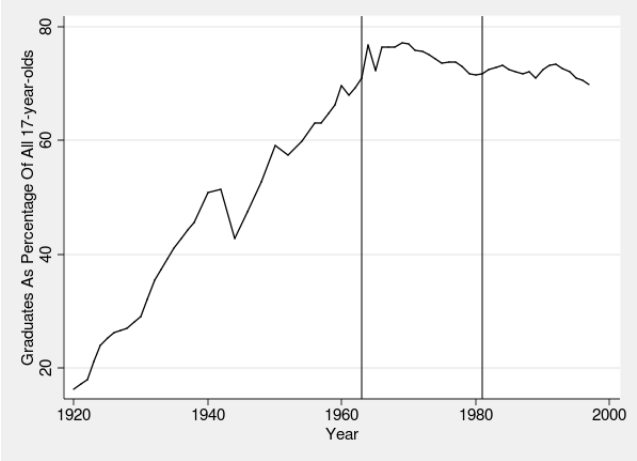
**Abstract**

The American "high school movement" of the early 20th century resulted in a dramatic rise in high school graduation rates, a trend that continued into the middle of the century interrupted only by World War II. Previous work has characterized the pre-World War II transformation of secondary education, but less attention has been focused on the continued increased in educational attainment after the War, culminating in Baby Boomer children graduating from high school at a greater rate than any previous generation. High rates of military service and subsequent subisidies for factors shown to be associated with children's educational attainment offer a possible explanation. In this paper, I link Baby Boomer children to their fathers using IPUMS data to examine this relationship. I find that father's veteran status is associated with greater educational attainment for children, but I am unable to provide evidence that this is due to an exogenous effect of military service and GI Bill subsidies and not positive selection into military service.

# 1 Introduction

Secondary schooling in the United States underwent a rapid transformation from 1910 to 1940 as the "high school movement" led to a dramatic increase in high school enrollment and graduation (Goldin 1998, Goldin and Katz 1999). This rapid rise in high school graduation, unique to the United States in this period, is evident in Figure 1. The graduation measure shown in Figure 1, calculated by Goldin (2006) as the proportion of high school graduates divided by all 17 year olds in a year, continued its steady rise until World War II. Less examined is the continuation of this expansion in secondary schooling in the postwar period well after the high school movement. Graduation rates continued to increase steadily for successive cohorts through the Baby Boomers, defined by the Census Bureau as those born between 1946 and 1964.

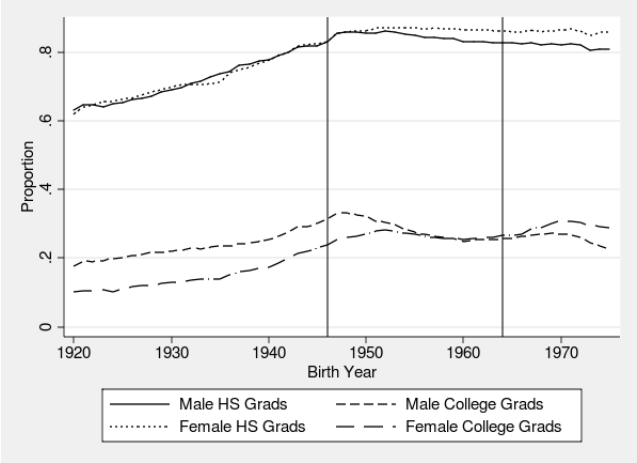
Figure 1: Proportion of 17 Year Olds Graduating from High School




Source: Goldin (2006). Vertical lines correspond to cohort boundaries of Baby Boomers.

Retrospective Census data from 2000 in Figure 2 tell a similar story, with cohort high school graduation rates rising for both men and women through those born in the late 1940s. Still other measures of high school graduation by Heckman and Lafontaine (2010) show the same pattern, with the graduation rate peaking in the early 1970s, corresponding to those

Figure 2: Proportion of Individuals Graduated from High School and College, 2000




Source: 2000 IPUMS 5% sample (Ruggles 2010). Vertical lines correspond to cohort boundaries of Baby Boomers.

born in the early to mid 1950s. This continued rise and subsequent plateau of graduation rates helped Baby Boomers attain a higher level of educational attainment than previous generations.

Multiple factors could explain the greater educational attainment of Baby Boomer children. Clearly, the greater educational attainment of the parents of Baby Boomers–those taking part in the rapid rise in secondary school enrollment during the high school movement–would be expected to play a role in increasing children's educational attainment. While previous research has struggled to identify effects of exogenous variation in parental education on children's educational attainment, Oreopoulos, Page, and Stevens (2006) have exploited variation in compulsory schooling laws as a source of such variation. To the extent that increasingly educated cohorts of parents come about through similar mechanisms, their results suggest that positive effects on children's educational progress would be expected.

But education was not the only parental characteristic undergoing dramatic change in the post-World War II period. As the nation rapidly suburbanized, the homeownership rate rose dramatically in the mid-20th century. Indeed, for white households the homeowner-

ship rate increased from 42% in 1940 to 64% in 1960 (Collins and Margo 2006). As with parental education, a growing body of research has shown that homeownership can affect child outcomes. For example, Haurin, Parcel and Haurin (2002) find that children living in owned homes have greater math and reading achievement and lower incidence of behavioral problems than their counterparts in rented homes. Similarly, Green and White (1997) and Aaronson (2000) find that parental homeownership is associated with greater educational attainment for children. Hence, the substantial increase in homeownership might also have played a role in increasing educational attainment of Baby Boomer children.

The legislation which would come to be known as the GI Bill, intended to aid the reintegration of World War II veterans (and later, veterans of other conflicts), notably subsidized both homeownership and postsecondary schooling for veterans. The latter was accomplished through scholarships and stipends for veterans attending college, while homeownership was encouraged through the establishment of the VA loan program. Through this program veterans could obtain mortgages, often with preferential interest rates and generally with little or no down payment. Indeed, previous research has shown that veterans took advantage of these incentives. Work by Bound and Turner (2002) and Stanley (2003) has demonstrated effects of GI Bill incentives on veterans' postsecondary educational attainment, while Yamashita (2008) and Fetter (2010) have estimated sizable impacts of the VA loan program on veteran homeownership.

The prevalence of military service among the fathers of Baby Boomer children, the demonstrated impact of programs for veterans on fathers' education and homeownership, and evidence of intergenerational effects of these characteristics suggest that military service may have played a role in increasing the educational attainment of Baby Boomer children. I therefore seek to answer two questions. First, is there evidence that the continuing gain in educational attainment for those born after World War II is related to fathers' military

service? Second, if there is a relationship, is this a causal relationship due to either military service itself of the benefits that were associated with it, or is it related to positive selection into the service during World War II and the Korean War?

I confront the challenge of finding appropriate intergenerational data to examine the basic relationship. Having established a significant positive relationship, I next attempt to answer the question of the role of selection in this relationship. I review the ways in which previous studies of veteran effects have addressed selection into military service in this time period, explaining the strategies I implement to account for selection. My results suggest that my current methods are not able to provide a convincing answer to the second question posed above.

# 2 Intergenerational Data

A range of previous studies have attempted to estimate the effect of changes in parental characteristics on their children's outcomes. These studies have used a wide range of datasets, from samples of twins like the NAS-NRC twin sample (Behrman and Taubman 1989) to large sets of Korean American adoptees (Sacerdote 2007). One commonality of these many sources of data, however, is that they lack the detailed information on parental military service needed to analyze its effects on children.

Some researchers have used panel data on families from the National Longitudinal Surveys of Youth (NLSY) and Panel Study of Income Dynamics (PSID) to examine intergenerational linkages. For example, Rosenzweig and Wolpin (1994) use a sample of mothers and children from the NLSY to provide evidence that increased maternal schooling leads to greater academic achievement by children. Studies of intergenerational income mobility

(for example, Behrman and Taubman 1990) have often used the PSID. However, while these surveys collect information on military service, neither the PSID nor the modern cohorts of the NLSY contain data on sufficient numbers of Baby Boomer children and their parents. Data from a series of similar surveys of the NLS Original Cohorts may contain fathers and children from appropriate periods. However, father characteristics can only be obtained for those children in these cohorts whose fathers were born between 1907 and 1921. These fathers likely represent a distinctive subset of fathers of Baby Boomer children, especially because members of many of these cohorts were relatively unlikely to have served in the military. Moreover, the NLS Original Cohorts do not provide a very large set of fathers linked to children.

An appropriate dataset to examine the relationship between fathers' military service and childrens' educational attainment must link children to their fathers and contain detailed information on fathers' military service, childrens' educational attainment, and a host of other family characteristics. Oreopoulos *et al.* (2006) propose a method of examining intergenerational effects on children's education using cross-sectional Census data, which I adopt for this study. This methodology has inherent limitations, but it allows me to examine this issue using a large set of fathers and children. Moreover, by using the Census, I am able to take advantage of the military service information collected for fathers.

While I cannot link fathers in the U.S. Census to children who have left the household, I can match fathers to children so long as they remain in the household. Therefore, I am able to match large numbers of young children to fathers who live with them. Because these children living in their parents' households are young, this necessarily means that I lack data on ultimate high school graduation and postsecondary educational attainment. However, for these younger children, I am able to generate a measure of relative educational progress adapted from that proposed by Oreopoulos *et al.* (2006). Using the set of all children in the

sample, I determine the median grade completed by those born in the same quarter by state of residence. I then compare each child's last completed grade to the median for her cohort. Children at or above this median are judged to be at the appropriate grade for age.

Oreopoulos *et al.* (2006) and Page (2006) intend this measure to be a rough proxy for grade repetition, which is in turn predictive of ultimate educational attainment. However, a validation study by Cascio (2005) using more recent data from the Current Population Survey finds that 21% of those who did not repeat a grade are classified as below grade, while 12% of repeaters are classified as being at the appropriate grade. Historical Census data like those used here likely exhibit similar systematic misclassification errors. But by using this as the dependent variable for my analyses, I focus on the impact on a child's educational progress relative to her peers, both as a result of grade repetition and as a result of other factors. This is in contrast to absolute measures of educational attainment like high school or college graduation, and to direct measures of grade retention which are not available for this sample.

I use IPUMS 1% samples (Ruggles 2010) from the 1960 and 1970 U.S. Censuses to construct a sample of Baby Boomer children in households with fathers. I link fathers to Baby Boomer children between the ages of 7 and 15 in the same household. This yields a sample of children born from January 1946 to March 1953 in the 1960 sample, and born from April 1954 to March 1963 in the 1970 sample. These cohorts cover much of the Baby Boomer generation. I limit the sample to nonfarm households containing fathers and children born in the U.S., without allocated values for race, sex, age, or father's veteran status. To simplify my analysis, I confine it to children of white fathers. Finally, I only link children to fathers who are at least 18 years older.

As shown in Table 1, the samples of children linked to their father are similar to the

Table 1: Sample Characteristics: All Baby Boomer 7-15 year olds and those linked to fathers

| | 1960 IPUMS Sample | | 1970 IPUMS Sample | |
|---|---|---|---|---|
| | Children | Linked Children | Children | Linked Children |
| Age | 10.03 | 10.02 | 10.98 | 10.97 |
| Family size | 5.53 | 5.43 | 5.57 | 5.54 |
| Family owns home | 0.69 | 0.75 | 0.73 | 0.81 |
| At grade for age | 0.80 | 0.82 | 0.79 | 0.81 |
| Number of observations | 219,218 | 165,387 | 312,926 | 220,458 |

Notes: Samples of Baby Boomer 7-15 year olds constructed from 1960 and 1970 IPUMS 1% samples using restrictions given in text.

entire samples of children of the appropriate ages in 1960 and 1970. The linked children are, on average, slightly more likely to be at or above the median grade for their age cohorts and to live in homeowning households. Linked children are nearly identical in age and have similar numbers of family members living in their households relative to all children in the sample.

The IPUMS data contain extensive information on parental characteristics. I construct from information on homeownership an indicator of whether a household owns its home (as opposed to renting). As shown in Table 1, linked children are more likely to live in homes owned by their parents. The time trend in homeownership rates is also evident in both the sample of all children and the linked sample; the homeownership rate for each increased in 1970 over its 1960 level.

In addition to homeownership, I take advantage of the extensive father characteristics in these samples. Of primary importance is the suite of military service indicators in IPUMS. Male Census respondents were asked if they had served in the military, and if so, during which periods. I use this information to construct indicators of all service and of service in the World War II and Korean War periods.[1] Fathers also report their last completed year of

[1]The World War II and Korean War periods specified in the Census correspond to the periods of service

education. From this, I construct indicators for high school and college graduates, keeping in mind that I do not have direct graduation information. With this caveat, however, these serve as measures of overall educational attainment.

Table 2: Father Characteristics: Linked 7-15 year olds in 1960 and 1970

| | 1960 Sample | 1970 Sample |
|---|---|---|
| Mean | | |
| Age | 40.2 | 40.9 |
| Family size | 5.4 | 5.5 |
| Percent | | |
| Married | 99.3% | 98.9% |
| Own home | 75.5% | 81.3% |
| Military veteran | 65.7% | 67.9% |
| World War II veteran | 61.7% | 33.3% |
| Korean War veteran | 5.3% | 28.2% |
| High school graduate | 50.2% | 64.4% |
| College graduate | 12.2% | 18.1% |

Notes: Samples of Baby Boomer 7-15 year olds linked to fathers in same households constructed from 1960 and 1970 IPUMS 1% samples using restrictions given in text.

These father characteristics are summarized in Table 2. Fathers in the sample are, on average, approximately 30 years older than the children to whom they are linked. Almost all of these fathers are married. Since fathers must be in the household with their children to be matched and the vast majority of children to unwed parents would live with the mother, the vast majority of the matched children have married fathers. However, it should be noted that matched families were of similar size to unmatched familes, as was shown in Table 1.

Fathers differ markedly between the two Census years, with those in the 1970 sample significantly more likely to have graduated from high school and college, reflecting the general trends in graduation rates discussed in Section 1. While they have similar rates of military service, fathers in the 1970 sample are more likely to have served in the Korean War and less

conferring eligibility for GI Bill benefits, provided that a veteran served 90 days in the appropriate period and received an honorable discharge.

likely to have served in World War II than their counterparts in the 1960 sample. Because these groups of fathers differ in such significant ways, I analyze them separately in later sections.

# 3 Correlation Between Children's Educational Progress and Fathers' Veteran Status

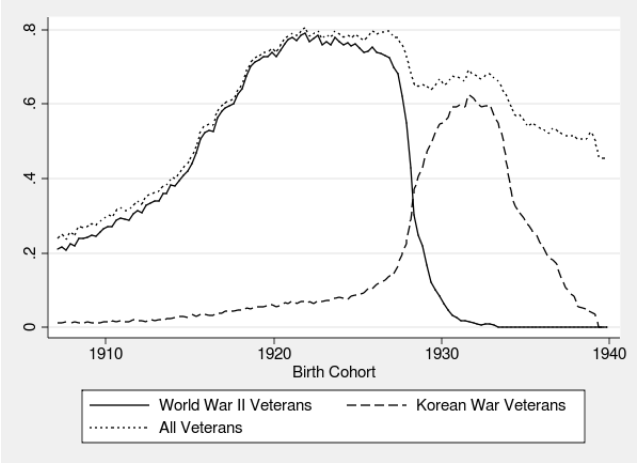
As shown in Figure 3, the vast majority of white men born in draft-eligible years served in World War II.[2] Similarly, large proportions of some cohorts served in the Korean War, though the draft was shorter-lived and less widespread than the draft for World War II. We have seen above that large majorities of the fathers in the 1960 and 1970 linked IPUMS samples were also veterans. In this section I use regression to investigate if the educational progress of the baby-boomer children in these samples was correlated with their fathers' veteran status. I also examine whether that correlation was related to veteran status alone, or to homeownership and father's education level, both characteristics that were subsidized for veterans after their service.

My basic regression framework is intended to estimate the educational progress of children, controlling for basic child characteristics related to educational outcomes. The dependent variable I use is the measure of whether child is at grade for age. I estimate linear probability models of the form:

$$AtGradeForAge_i = \alpha + \beta VetFather_i + \gamma X_i + \delta Y_i + \epsilon_i \quad (1)$$

[2]Notably, however, the majority of those serving in World War II were not involved in combat; Stouffer *et al.* (1949) estimate that one fourth of those serving in World War II served in combat.

Figure 3: Proportion of White Male Birth Cohort Serving in the Military




Source: 1970 IPUMS Form 2 samples, pooled to create a nationally representative 3% sample of respondents. Cohorts contain all white males with unallocated values for veteran status variables.

where $X_i$ is a vector of controls for the child's age, birth quarter, and sex. For each model, I then add sets of controls as the vector $Y_i$. First, I add controls for family size and the father's marital status. Then, I add separate controls for homeownership and the education level of the father (in the form of indicator variables for high school and college graduation). Finally, I estimate the model with all controls.

The age of a child's father likely plays a significant role in her childhood experiences, and this relationship may be highly nonlinear in father's age. I control for age in a minimally parametric way by including indicator variables for each possible birth year of fathers.

Results for these models estimated using pooled data from all fathers and children in each sample are shown in Table 3. In both samples, children of veterans are significantly more likely than children of nonveterans to be at or above grade level for age. The difference in educational progress is attenuated slightly by controlling for family size and father's marital status. It is reduced more significantly by controlling for father's educational attainment and homeownership. However, in both samples a significant gap in educational progress remains even after controlling for all of these characteristics.

Table 3: Educational Progress Gap for Children of Veterans and Nonveterans: Pooled OLS Results

| | Model | | | | | |
|---|---|---|---|---|---|---|
| Sample | (1) | (2) | (3) | (4) | (5) | Sample Size |
| 1960 | .041 | .031 | .020 | .025 | .016 | 164,204 |
| | (.002) | (.002) | (.002) | (.002) | (.002) | |
| 1970 | .032 | .027 | .012 | .021 | .008 | 218,141 |
| | (.002) | (.002) | (.002) | (.002) | (.002) | |
| Family Characteristics | No | Yes | Yes | Yes | Yes | |
| Father's Education | No | No | Yes | No | Yes | |
| Homeownership | No | No | No | Yes | Yes | |

Notes: Samples of 7-15 year old Baby Boomer children and their fathers constructed from 1960 and 1970 IPUMS samples using restrictions given in text. The educational progress gap is the difference in proportion of children of veterans at grade for age relative to children of nonveterans. All models include controls for age and birth quarter of child and indicator variables for each birth year of fathers. "Family characteristics" are controls for father's marital status and family size. Robust standard errors are in parentheses.

These estimated effects on educational progress are sizable relative to the incidence of children below grade for age: 18% of children in the 1960 sample and 19% of children in the 1970 sample. In this context, an association of three to four percentage points in the absence of controls represents a significant reduction in the proportion of children below median grade level for their age. Even the estimated one to two percentage point association found when controlling for all covariates is a meaningful shift in children's educational progress in this context.

To further examine the sensitivity of the model to my method of controlling for father's age, I take the approach that Angrist and Krueger (1994) used as a first step in analyzing the difference in wages for World War II veterans relative to nonveterans: I estimate a separate regression model for each birth year of fathers. This is equivalent to fully interacting all controls with father's age. The results, shown in Table 4 for the 1960 sample, echo the results of the pooled model. In each year, a gap of at least three percentage points is present before the addition of controls beyond the basic controls for child's age, birth quarter, and

sex. This gap consistently narrows with controls for family characteristics, father's education, and homeownership; as in the pooled model, however, a gap remains across cohorts of fathers even controlling for these factors.

I find similar results across all cohorts of fathers in the 1970 sample. Examining fathers in a given birth year, gaps in child educational progress that are both statistically significant and meaningful remain after controlling for child characteristics. The addition of family and father covariates reduces these gaps but does not eliminate them completely.

In summary, I find significantly higher educational progress of children of veterans relative to children of nonveterans in both the 1960 and 1970 samples. Between 60% and 75% of this gap is explained by differences in observed family characteristics, homeownership, and fathers' education. But even controlling for these covariates, a gap of approximately one percentage point remains in the probability of a child being at grade for age.

# 4 Identification

Military service does not represent an ideal natural experiment, since selection into service in World War II and the Korean War was nonrandom. However, a range of previous studies has taken advantage of cross-cohort variation in levels of service to estimate exogenous effects of service in these wars on various outcomes.

For example, Angrist and Krueger (1994) examine effects of World War II service on income. They find sizable positive effects of World War II service on income using OLS. They use variation in service rates across birth quarters as a result of the use of birthdate in the draft from 1925 to 1928 to instrument for service. Using these IV models, they find evidence of a negative or zero effect on income.

Table 4: Educational Progress Gap for Children of Veterans and Nonveterans: OLS Results, 1960 Sample

| | Model | | | | | |
|---|---|---|---|---|---|---|
| Father's Birth Year | (1) | (2) | (3) | (4) | (5) | Sample Size |
| 1917 | .037 | .029 | .021 | .024 | .017 | 7731 |
| | (.009) | (.009) | (.009) | (.009) | (.009) | |
| 1918 | .036 | .024 | .017 | .019 | .014 | 8776 |
| | (.009) | (.009) | (.009) | (.009) | (.009) | |
| 1919 | .034 | .027 | .024 | .022 | .020 | 8664 |
| | (.010) | (.010) | (.010) | (.010) | (.010) | |
| 1920 | .032 | .024 | .015 | .015 | .008 | 9805 |
| | (.010) | (.010) | (.010) | (.010) | (.010) | |
| 1921 | .049 | .039 | .031 | .031 | .025 | 10260 |
| | (.011) | (.011) | (.010) | (.011) | (.011) | |
| 1922 | .069 | .059 | .047 | .051 | .042 | 10326 |
| | (.011) | (.011) | (.011) | (.011) | (.011) | |
| 1923 | .051 | .044 | .032 | .034 | .025 | 9705 |
| | (.011) | (.011) | (.011) | (.011) | (.011) | |
| 1924 | .075 | .067 | .048 | .057 | .042 | 9775 |
| | (.011) | (.011) | (.011) | (.011) | (.011) | |
| 1925 | .061 | .057 | .046 | .050 | .041 | 8803 |
| | (.012) | (.011) | (.011) | (.012) | (.011) | |
| 1926 | .066 | .060 | .045 | .052 | .039 | 7400 |
| | (.012) | (.012) | (.012) | (.012) | (.012) | |
| 1927 | .033 | .028 | .015 | .020 | .009 | 6697 |
| | (.011) | (.011) | (.011) | (.011) | (.011) | |
| 1928 | .031 | .025 | .018 | .023 | .017 | 5111 |
| | (.011) | (.011) | (.011) | (.011) | (.011) | |
| Family Characteristics | No | Yes | Yes | Yes | Yes | |
| Father's Education | No | No | Yes | No | Yes | |
| Homeownership | No | No | No | Yes | Yes | |

Notes: Samples of 7-15 year old Baby Boomer children and their fathers constructed from 1960 and 1970 IPUMS samples using restrictions given in text. The educational progress gap is the difference in proportion of children of veterans at grade for age relative to children of nonveterans. All models include controls for age and birth quarter of child. "Family characteristics" are controls for father's marital status and family size. Robust standard errors are in parentheses.

Yamashita (2008) uses a similar approach of instrumenting for service using quarter of birth to examine impacts on veteran homeownership, finding significant positive effects on

homeownership for white veterans. By contrast, Fetter (2010) analyzes effects on homeownership but uses a regression discontinuity approach. He relies on two major discontinuities in military service: for those with birth dates before and after January 1, 1928 and January 1, 1934. Like Yamashita, Fetter finds significant impacts on homeownership.

Bound and Turner (2002) use similar methods to estimate impacts on educational attainment. They effectively instrument for veteran status using quarter of birth dummies by aggregating at the birth cohort level. Additionally, they use one of the discontinuities identified by Fetter as an instrument. Using these models, they estimate a positive effect of veteran status on postsecondary education.

I take two approaches to instrumenting for military service. For both approaches, I use cross-cohort variation in service rates to examine the effect of veteran status on children. The primary difference lies in the instruments used.

## 4.1 Birth Cohort Indicators as Instruments

First, I use birth cohort indicators as instruments for a father's veteran status. I estimate this model using two-stage least squares with the first stage taking the form:

$$VetFather_i = \alpha + \beta Z + \gamma Y + \delta X_i + \epsilon_i \tag{2}$$

where $Y$ is a vector of father's year of birth indicators and $Z$ is a vector of indicators interacting father's year of birth with father's quarter of birth. $X_i$ is a vector of controls, containing in all models child's age and birth quarters, and in some models the father's marital status and family size.

The second stage estimates the child's at-grade-for-age status using the father's predicted veteran status from the first stage:

$$AtGradeForAge_i = \alpha + \beta VetFather_i + \gamma Y + \delta X_i + \epsilon_i \tag{3}$$

I estimate this model using three groups of father cohorts. First, I use children from the 1960 sample with fathers born in 1925-1928, the years used by Angrist and Krueger (1994) to identify the effect of World War II service on income. They chose these cohorts because in these years, voluntary enlistment was prohibited and local draft boards filled quotas in order of birthdate beginning with January 1, generating significant variation in service rates by quarter of birth. For this model, I control for father's age as Angrist and Krueger did, using indicator variables for each possible father's birth year.

Second, using the 1960 sample, I examine children of fathers of cohorts in which more than 40% of white males served in World War II. These cohorts, from the third quarter of 1914 through the first quarter of 1928, yield fathers aged 32-46 in 1960. Third, I examine the corresponding group of cohorts from which more than 40% served in the Korean War. These cohorts, from the third quarter of 1928 through the fourth quarter of 1933, contain fathers aged 27-32 in 1970. For these models, I control for father's age in one of three ways: (1) with a linear trend, (2) with a quadratic trend, or (3) with indicators for the father's year of birth.

## 4.2 Regression Discontinuity Approach

Next, I take a strategy similar to that of Fetter (2010). I focus on two birth dates after which cohort military service rates drop dramatically: January 1, 1928 and January 1,

Table 5: Sample Characteristics: IV Samples

| | | 1960 IPUMS | | 1970 IPUMS |
|---|---|---|---|---|
| Father Cohorts: | | 1925-1928 | 1914(3)-1928(1) | 1928(3)-1933 |
| Means | | | | |
| | Age | 9.3 | 10.0 | 11.0 |
| | Family size | 5.5 | 5.5 | 5.8 |
| | Father's age | 33.0 | 38.2 | 38.5 |
| Proportions | | | | |
| | At grade for age | 82.0% | 83.0% | 81.7% |
| | Family owns home | 72.0% | 76.5% | 82.5% |
| | Father Married | 99.4% | 99.4% | 99.1% |
| | Father veteran | 75.5% | 77.0% | 72.2% |
| | Father WWII veteran | 70.9% | 75.7% | 5.2% |
| | Father Korean War veteran | 8.3% | 4.3% | 61.8% |
| | Father HS graduate | 48.2% | 53.9% | 68.5% |
| | Father college graduate | 10.3% | 13.1% | 20.6% |
| Number of observations | | 28,011 | 115,426 | 67,101 |

Notes: Samples of Baby Boomer 7-15 year olds constructed from 1960 and 1970 IPUMS 1% samples using restrictions given in text. Cohort birth quarters are in parentheses; for example, 1914(3) is the third quarter of 1914.

1934. I estimate models using the first date for the 1960 sample, and using the second date for both samples. For each, I use data from cohorts within three years of the break point, excluding the cohorts before and after the break point.

I use two-stage least squares, specifying a first stage allowing for separate linear trends before and after the break point:

$$VetFather_i = \alpha + \beta \mathbf{1}(FC_i < c) + \gamma \mathbf{1}(FC_i < c)(FC_i - c) + \delta \mathbf{1}(FC_i > c)(FC_i - c) + \lambda X_i + \epsilon_i \quad (4)$$

for a child with father in father cohort $FC$ with relevant cutoff $c$, with indicators $\mathbf{1}(FC < c)$ for father's birth before the cutoff and $\mathbf{1}(FC > c)$ for father's birth after the cutoff. The excluded instrument is then the indicator $\mathbf{1}(FC_i < c)$. $X_i$ is a vector of controls, containing in all models child's age and birth quarters, and in some models the father's marital status

and family size. The $VetFather$ is an indicator for whether the child's father is a veteran.

The second stage estimates the child's at-grade-for-age status using the father's predicted veteran status from the first stage, again allowing for linear trends in the father's cohort before and after the cutoff:

$$AtGradeForAge_i = \alpha + \beta VetFather_i + \gamma \mathbf{1}(FC_i < c)(FC_i - c) + \delta \mathbf{1}(FC_i > c)(FC_i - c) + \lambda X_i + \epsilon_i \quad (5)$$

Table 6: Sample Characteristics: Regression Discontinuity Samples

| | 1960 IPUMS Sample | 1970 IPUMS Sample | |
|---|---|---|---|
| Cutoff: | World War II | World War II | Korean War |
| Means | | | |
| Age | 9.1 | 11.4 | 10.5 |
| Family size | 5.4 | 5.8 | 5.7 |
| Father's age | 32.4 | 41.5 | 35.9 |
| Proportions | | | |
| At grade for age | 82.0% | 81.8% | 81.7% |
| Family owns home | 70.3% | 84.4% | 79.9% |
| Father Married | 99.3% | 98.9% | 99.2% |
| Father veteran | 70.0% | 78.6% | 62.4% |
| Father WWII veteran | 60.4% | 42.3% | 0.0% |
| Father Korean War veteran | 11.5% | 38.1% | 48.2% |
| Father HS graduate | 48.0% | 65.2% | 69.0% |
| Father college graduate | 9.5% | 21.5% | 18.3% |
| Number of observations | 31,405 | 60,843 | 60,965 |

Notes: Samples of Baby Boomer 7-15 year olds constructed from 1960 and 1970 IPUMS 1% samples using restrictions given in text.

## 4.3 Results

The estimated coefficients on the effect of having a veteran father estimated with the IV models using the sample of fathers born 1925-1928 as in Angrist and Krueger 1994)

Table 7: Relative Educational Progress for Children of Veterans: IV Results for those with fathers born 1925-1928

| | No Family Controls | Family Characteristic Controls |
|---|---|---|
| Veteran father | .067<br>(.066) | .075<br>(.065) |
| First stage F statistic on excluded instruments | 12.7 | 12.9 |

Notes: Samples of 7-15 year olds constructed from 1960 and 1970 IPUMS samples using restrictions given in text. All models contain controls for child's age in years and birth quarter. Robust standard errors are in parentheses.

are shown in Table 7. The standard errors of these estimates are sufficiently large that no reasonable effect on educational progress could be identified as distinguishable from zero. Hence, while the point estimates are quite large, these effects are not statistically significant at any reasonable level of significance.

The corresponding estimated coefficients for the other IV samples are presented in Table 8. For these samples, when a linear trend is used, the point estimate of this effect is large but only statistically significant for the 1960 sample. Further controlling for father's age with a quadratic time trend or cohort dummies generates estimates that are not statistically distinguishable from zero. This comes about both because the point estimates are much smaller and because the excluded instruments become much less predictive of veteran status. Indeed, the F statistics on the excluded instruments are only reasonably large in the models using the 1960 sample and either a linear or quadratic time trend. Further controlling for father's age weakens the instruments considerably.

These results suggests that the estimated effects in the models with a linear specification for the father's age control may be an artifact of the nonlinear relationship between father's age and the child's educational progress. Unfortunately, these are the only models for which the first stage F statistic exceeds any reasonable threshold suggesting a sufficiently

Table 8: Relative Educational Progress for Children of Veterans: IV Results Using Other Samples

| | Father's Birth Time Trend | | | | | |
|---|---|---|---|---|---|---|
| | Linear Trend | | Quadratic Trend | | Year Dummies | |
| | 1960 | 1970 | 1960 | 1970 | 1960 | 1970 |
| Veteran father | .081 | .074 | .013 | -.003 | .007 | .015 |
| | (.016) | (.057) | (.054) | (.103) | (.066) | (.090) |
| First stage F statistic on excluded instruments | 53.3 | 11.0 | .4 | 3.6 | 4.4 | 5.5 |

Notes: Samples of 7-15 year olds constructed from 1960 and 1970 IPUMS samples with fathers born from the third quarter of 1914 through the first quarter of 1928 for 1960 sample and from the third quarter of 1928 through the fourth quarter of 1933 for the 1970 sample. All models contain controls for child's age in years and birth quarter. Robust standard errors are in parentheses.

strong instrument. The diagnostics proposed by Staiger and Stock (1997) suggest that the instruments are quite weak when a nonlinear control for age is specified.

Table 9: Relative Educational Progress for Children of Veterans: Regression Discontinuity Results

| | 1960 Sample | | 1970 Sample | | | |
|---|---|---|---|---|---|---|
| | World War II Cutoff | | World War II Cutoff | | Korean War Cutoff | |
| Model: | (1) | (2) | (1) | (2) | (1) | (2) |
| Veteran father | -.019 | -.022 | .166 | .134 | .131 | .152 |
| | (.040) | (.040) | (.288) | (.294) | (.053) | (.052) |
| First stage F statistic on excluded instrument | 431.7 | 432.7 | 11.0 | 10.5 | 1.25 | 1.93 |

Notes: Samples of 7-15 year olds constructed from 1960 and 1970 IPUMS samples using restrictions given in text. Model (1) contains controls for child's age in years and birth quarter as well as separate linear trends in father's birth cohort before and after the cutoff. Model (2) adds controls for family size and father's marital status. Robust standard errors are in parentheses.

Using the regression discontinuity approach yields stronger instruments at the World War II cutoff in the 1960 sample. However, when using children with fathers from the same cohorts in the 1970 sample, the first stage is unable to predict fathers' veteran status well; the adjusted R-squared in the first stage is less than .03 in models with and without family

controls. As a result, the estimated standard errors are extremely large, so that no possible effect could be statistically distinguished from zero.

As with the IV models, the regression discontinuity around the Korean War cutoff suffers from weak instrument problems. While using these models I estimate a large and statistically significant effect, the weakness of the instrument suggests that this estimate is significantly biased. Taken together, the various instrumental variables and regression discontinuity approaches I have applied do not appear to be appropriate for this question.

# 5 Conclusions

The question of whether fathers' military service impacted Baby Boomer children's educational attainment is a difficult one to answer given the challenges posed by available data and selection into military service. Borrowing heavily from previous work on intergenerational effects of parental education, I have compiled a set of Baby Boomer children linked to their fathers from Census data. These data provide strong evidence that a father's military service in World War II or the Korean War is associated with increased educational progress by his children relative to their peers. Observed differences in family characteristics, homeownership, and educational attainment by veteran fathers explain some, but not all, of this gap.

However, the selection problem proves considerably more challenging. Using multiple methods modeled on and expanding upon previously used approaches, I encounter weak instruments across an array of models. While an IV model using cross-cohort variation in service rates estimates positive effects of fathers' military service, this effect is not robust to specification of nonlinear trends in fathers' age. On the whole, these models are unable

to estimate effects on children's educational attainment of the modest size found in OLS models, suggesting that a more fruitful path might involve further further exploration of alternative methods of addressing the issue of selection.

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