Hedonic Estimates of the Cost of Conscription and an Upper Bound on the Value of a Statistical Life Based on Student Deferments in the Vietnam Era

Chris Rohlf\textsuperscript{1}
August 2010\textsuperscript{2}

Abstract

This study measures the economic cost of the Vietnam draft by measuring its effects on the market for higher education. A recently developed quasi-experimental hedonic estimation strategy measures the tuition subsidy that would increase schooling by as much as the draft did. While imprecise, my preferred estimates indicate that the marginal student would have paid roughly $30,000 in 2009 dollars to avoid serving. I then focus on fatality risk and, assuming that the other economic, health, and utility costs of service were positive, estimate an upper bound on the Value of a Statistical Life of about $3 million.

JEL Classifications: D61, J17, H56, N42

\textsuperscript{1} Center for Policy Research. 426 Eggers Hall. Syracuse University. Syracuse, NY 13244. carohlfs@maxwell.syr.edu.

\textsuperscript{2} This research was made possible in part by generous support by the National Institute for Aging. Thanks also to Orley Ashenfelter, Gary Becker, Michael Greenstone, Steve Levitt, Dimitriy Masterov, Casey Mulligan, Kevin Murphy, Tim Perri, seminar participants at the University of Chicago, and one anonymous referee for helpful comments.
The majority of countries in the world procure military personnel through some form of draft (Mulligan and Shleifer, 2005). Economists have long argued against conscription in favor of an all-volunteer army (U.S. President’s Commission on an All-Volunteer Force, 1970). Recent evidence highlights the many long-term effects that conscription has on young men’s lives (Angrist and Chen, 2008; Conley and Heerwig, 2009; Dobkin and Shabani, 2009; Eisenberg and Rowe, 2009; Lindo and Stoecker, 2010; Rohlfs, 2010a). This study aims to provide a composite measure of the cost that the Vietnam draft imposed on young men.

During the Vietnam War, attending a four-year college offered temporary immunity from the draft through the institution of student deferments. Panel A of Figure 1 shows the fraction drafted by birth year among those men who did not obtain exemptions or deferments and those who obtained student deferments. Panel B, from Card and Lemieux’s (2001) influential study, shows that, among cohorts most affected by the draft, college attendance was disproportionately high for males relative to females (who were not subject to the draft). Using a new estimation approach by Rohlfs (2010b), the economic cost of being drafted is estimated as the tuition subsidy that would be required to raise college attendance by as much as the draft did.

Figure 2 illustrates this approach. The difference-in-differences strategy shown in Figure 1 identifies the effect of student deferments on the fraction attending college, shown along the horizontal axis. Tuition is the same for men (the treatment group) as for women (the control group); consequently, this quantity difference is measured with the price held constant. Dynarski’s (2003) estimates of the effect of tuition subsidies on college attendance from 1979-1983 provide the slope of the demand curve for college education. The vertical difference in the demand curves is the economic value of a deferment for a marginal college student and can be estimated as negative one times the quantity difference divided by the slope of the demand curve.
This vertical difference in demand, termed the marginal surplus (MS) for the marginal college student, is a revealed preference measure that is comparable to marginal willingness to pay in standard hedonic models but is identified without imposing restrictive assumptions on preferences or the market (Rohlfs, 2010b). We require that the parameters from Card and Lemieux (2001) and Dynarski (2003) are identified and that Dynarski’s demand estimates generalize to men in the Vietnam Era. Because it is a market-based measure, this study does not take into account unforeseen costs of service, and it identifies the dollar value of a student deferment given the credit constraints faced by young men at the time. To convert the estimated value of a deferment into an estimated cost of the draft, we also require that the marginal student maximizes expected utility and impose a model of the perceived probability of being drafted. A key limitation of the approach used here is that it only identifies the cost of the draft for a specific subpopulation of those affected—men on the margin of attending college.

In addition to measuring the cost of the draft, this study contributes to the large and growing literature on the Value of a Statistical Life (VSL). Being drafted exposes men to fatality risk and imposes additional economic, health, and utility costs. Assuming that these other costs are positive for the marginal student, an upper bound on the VSL is constructed that addresses two important obstacles that researchers have pointed out in previous VSL estimates—there is plausibly exogenous variation across agents in the choice sets, and agents have reasonable knowledge of the risks they face (Ashenfelter, 2006; Ashenfelter and Greenstone, 2004a).

II. Empirical Results

The measure of conscription risk used here is the difference in the probability of being drafted between those who did not obtain exemptions or deferments and those who obtained...
student deferments, as shown in panel A of Figure 1. By directly comparing these probabilities at the cohort-level, this risk measure more precisely identifies the relevant tradeoffs than does Card and Lemieux’s measure of inductions per capita. Nevertheless, using this measure requires assuming that the marginal college student could not avoid the draft through other means such as conscientious objector status, a divinity or farm occupation, or fatherhood and had the average likelihood of passing the military’s physical and cognitive exams (56.8% over 1965-1973). The biases introduced by these assumptions partially counteract each other, as the marginal student probably had alternative deferment options and above average likelihood of passing the exams.

The National Vietnam Veterans Readjustment Study (NVVRS, Research Triangle Institute, 1989, described in detail in Rohlf, 2010a) is used to measure the fraction drafted separately by birth year for men who did not obtain exemptions or deferments and those who obtained student deferments; men who volunteered for service are excluded from the sample. Due to measurement problems in the survey data, administrative sources are used to calculate conscription risk for the main lottery cohorts (1950 and later) for the non-student category. Following Card and Lemieux, a three-year moving average is used; for 1949, the last birth year primarily affected by the pre-lottery rules, a two-year average of 1948 and 1949 is used.

Table 1 presents the results from this study. Columns (1) and (2) show estimates in which schooling is measured using the fraction attending college at ages 20-21 from the October

---

3 The fraction drafted among men born in 1950 and 1951 is unusually high in the NVVRS relative to other datasets, probably due to small nonveteran sample sizes and lottery-induced enlistment being misclassified as conscription. Additionally, unlike the schooling decision, the enlistment decision was often made after lottery numbers were known, so that the population who did not volunteer is not comparable between the pre-lottery and lottery periods (cf. Angrist, 1991; Angrist and Krueger, 1992). For these reasons, conscription risk for non-students in the lottery periods is computed from administrative data as the ratio of draftees to those examined (from U.S. Census Bureau, 1972, 1974; U.S. Selective Service System, 1971-3) times the fraction of lottery numbers that were called for examination (195/365, 125/365, and 95/365 for the 1950, 1951, and 1952 cohorts and zero for later cohorts). Another obstacle with the lottery cohorts is that the switch from drafting men in their middle and early 20s to the lottery-era policy of only drafting 19-year-olds required men to act more quickly than before if they wished to obtain student deferments (Angrist, 1990; Bradford, 1969, pg. 9; Flynn, 1993, pp. 204-5, 246). Excluding these lottery cohorts from the sample has negligible effects on the final estimates.
Current Population Survey (CPS, Bruno and Curry, 1995), as in the top curve in panel B of Figure 1. Columns (3) and (4) measure schooling as the fraction who completed some college by 1980, as in the bottom curve in the same figure.\textsuperscript{4} Columns (1) and (3) estimate the draft’s effect on schooling using Card and Lemieux’s linear interpolation approach that assumes that, in the absence of the draft, the log male-female enrollment ratio would have declined linearly according to the dashed line in Figure 1. Columns (2) and (4) estimate this effect using Card and Lemieux’s alternative approach in which the log of the male-female schooling ratio is regressed on the cohort-level measure of conscription risk, controlling for a time trend.

The first row of Table 1 shows the log difference in schooling between the birth years with the highest conscription risk and those with zero risk. For the linear interpolation method, this difference is computed as the distance between the actual and interpolated enrollment ratios shown in panel B of Figure 1, averaged over 1947 to 1949. For the regression-based method, this difference is computed as the average over the 1947 to 1949 cohorts of the risk reduction provided by student deferments multiplied by the coefficient on that risk in the schooling regression. The risk reduction provided by deferments is computed as the difference in the two curves in panel B of Figure 1, averaged over the 1947 to 1949 cohorts (hence, a three-year average over an already smoothed variable). Computed directly from the microdata, this weighted mean difference is 0.112 with a standard error of 0.026. Row 2 presents our estimate of the economic cost of the draft, estimated as row 1 divided by the 0.112 risk reduction, then divided by Dynarski’s (2003) estimate of 2.64*10\textsuperscript{-5} (with a standard error of 1.33*10\textsuperscript{-5}) of the per

\textsuperscript{4} The estimates in this table use the 1980 Census (Ruggles, et al., 2004) rather than the 1990 Census used by Card and Lemieux because the microdata samples of the 1980 Census include both age and quarter of birth. The quarter of birth variable helps to avoid misclassification of birth years, as those with birthdays before the April 1 survey date (in quarter one) have birth years of 1979 minus age rather than 1980 minus age.
dollar effect of a tuition subsidy on the probability of attending college by age 23.\textsuperscript{5} Standard errors are computed using the delta method and account for the imprecision in the time-series schooling regressions, the risk measure, and the tuition effect.\textsuperscript{6} Of those drafted during the peak years (from the 1966 to 1968 fiscal years), 0.985\% died in service (U.S. Census, 1974; U.S. Department of Defense, 2005). Row 3 divides the cost in row 2 by this probability of service-related death to compute an upper bound estimate of the VSL.

As in Card and Lemieux, the CPS data on fraction enrolled at ages 20-21 produce much larger estimates (of 0.191 and 0.191 here) than do the Census data on the fraction who completed some college by 1980 (which produce estimates of 0.021 and 0.017). Card and Lemieux attribute this difference to current servicemen being excluded from the CPS data but included as veterans in the Census data. The relevant population in this study is those who did not volunteer, some of whom were drafted; hence, the appropriate sample population is something between what is found in these two datasets. Averaging across the estimates from the CPS and Census datasets, the linear interpolation method in columns (1) and (3) produces an estimated cost of the draft of $36,000 and an upper bound on the VSL of $3.65 million. The same averages for the regression approach in columns (2) and (4) produce an estimated cost of the draft of $23,100 and an upper bound on the VSL of $2.35 million.

These upper bound VSL estimates of $2.34 million and $3.65 million are lower than Costa and Kahn’s (2004) labor market OLS estimates of the VSL for a young man in 1970,\

\textsuperscript{5} Dynarski uses a difference-in-differences strategy that focuses on the elimination in 1982 of a roughly $8,300 (measured in 2009 dollars) Social Security tuition benefit for the children of deceased fathers. The estimate with covariates is used and is computed as her coefficient (0.219, from pg. 283) divided by $8,300.

\textsuperscript{6} Robust standard errors are used for the time-series regressions, which include the 1941-1960 birth years. Dynarski’s reported standard error is used for the tuition effect. For the linear interpolation, a constant standard deviation is assumed in the time-series and estimated from the 1943-1951 cohorts; the variance for the linear interpolation is computed as the variance of the average from 1947-1949 minus a weighted average of the 1943 and 1951 values. For the conscription risk, a separate standard deviation is measured from the NVVRS for each of the students’ and non-students’ moving averages for each of 1947, 1948, and 1949; the standard error is then computed for the difference between non-students and students averaged over these three years.
which range from $4.58 million to $8.10 million. Previous researchers have found large economic and health-related costs of Vietnam-era conscription, which suggests that the true VSL is well below this upper bound. This evidence provides support for Ashenfelter and Greenstone’s (2004b) finding that the true VSL is lower than that obtained from OLS.

If we suppose that the cost of being drafted was similar for the marginal college student as for the average draftee, multiplying our preferred cost of being drafted estimates of $23,900 and $36,000 by 1.83 million (the number of men drafted from 1965 to 1973, U.S. Selective Service System, 1965-73), we obtain a total cost of Vietnam-era conscription of $42.3 billion to $65.8 billion. Daggett (2010) estimates that U.S. government expenditures attributable to the Vietnam War totaled $720 billion in 2009 dollars. The estimates presented here suggest that the social cost of conscription was 5.9% to 9.1% as large as the dollar cost of the war effort.

References


Figure 1: Fraction Drafted and Log Male-Female Schooling Ratio by Cohort

Panel A: Conscription Risk by Draft Classification

Panel B: Male-Female Relative Schooling Outcomes

Notes to Figure 1: Panel A is constructed from the NVVRS and administrative sources as described in the text. The unusual pattern of higher risk among deferrers in 1941-1942 is driven by very small sample sizes among the earliest birth cohorts. Panel B is reproduced with permission from Card and Lemieux (2001, pg. 100).
Figure 2: Demand for Education and the Effect of the Vietnam Draft

Demand for college alone

Demand for college plus student deferment

Tuition

College attendance

Observed difference in quantity demanded

Marginal surplus (MS) for the marginal student

$P^*$
Table 1: Computation of the Cost of the Vietnam Draft

<table>
<thead>
<tr>
<th></th>
<th>(1)</th>
<th>(2)</th>
<th>(3)</th>
<th>(4)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Effect on Schooling estimated using . . .</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fraction enrolled at ages 20-21</td>
<td>Fraction completed some college by 1980</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Linear interpolation</td>
<td>Conscription risk as regressor</td>
<td>Linear interpolation</td>
<td>Conscription risk as regressor</td>
</tr>
<tr>
<td>1. Log difference in enrollment between highest and lowest draft years</td>
<td>0.191</td>
<td>0.119</td>
<td>0.021</td>
<td>0.017</td>
</tr>
<tr>
<td></td>
<td>(0.095)**</td>
<td>(0.038)**</td>
<td>(0.016)</td>
<td>(0.006)**</td>
</tr>
<tr>
<td>2. Estimated cost of being drafted with probability one</td>
<td>$64,900</td>
<td>$40,300</td>
<td>$7,050</td>
<td>$5,930</td>
</tr>
<tr>
<td></td>
<td>(46,700)</td>
<td>(20,700)*</td>
<td>(6,560)</td>
<td>(3,141)*</td>
</tr>
<tr>
<td>3. Upper bound on VSL</td>
<td>$6.58 million</td>
<td>$4.09 million</td>
<td>$716,000</td>
<td>$602,000</td>
</tr>
<tr>
<td></td>
<td>(4.74 million)</td>
<td>(2.10 million)</td>
<td>(666,000)</td>
<td>(319,000)*</td>
</tr>
</tbody>
</table>

Notes to Table 1: Calculations described in detail in the text. ** and * denote 5% and 10% significance.