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The Impact of a Wartime Health Shock on the Postwar Socioeconomic Status and Mortality of Union Army Veterans and their Children

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ABSTRACT

We investigate when and how health shocks reverberate across the life cycle and down to descendants by examining the impact of war wounds on the socioeconomic status and older age mortality of US Civil War (1861-5) veterans and of their adult children. Younger veterans who had been wounded in the war left the farm sector, becoming laborers. Consistent with human capital and job matching models, older wounded men were unlikely to switch sectors and experienced wealth declines. Fathers' severe wartime wounds affected daughters', but not sons', socioeconomic status. Daughters were shorter-lived if their fathers were older at the end of the war and had been severely wounded compared to daughters of fathers not severely wounded or younger when severely wounded. We suspect that early life conditions disproportionately affected daughters. Our findings illuminate the long reach of disability in a manual labor economy.

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When will a health shock reverberate across the life-cycle and down to descendants to lead to the persistence of poor health and socioeconomic status within families? A large literature has emphasized the impact of health shocks in utero and in childhood on later socioeconomic status and health (e.g. Almond 2006; Scholte et al. 2015; Bleakley 2007, 2010; Case et al. 2002; Currie and Hyson 1999), of health shocks at older ages on hours worked and labor force participation (e.g., Smith 2005; McClellan 1998), and of disability on earnings (e.g., Bartel and Taubman 1979; Charles 2003; Mok et al. 2008; Halla and Zweimüller 2013). It is widely recognized that the exact age at which health shocks occur matters for later outcomes. Economic models thus allow for critical periods of biological or psychological malleability during childhood (Heckman 2007; Conti and Heckman 2010) and for the impact of a health shock to vary by age through human capital theory (Bartel and Taubman 1979; Charles 2003). While there is evidence that earnings and labor force participation depend on the age when an individual becomes disabled in advanced economies (Charles 2003; Mok et al. 2008; Halla and Zweimüller 2013), few individuals in advanced economies become disabled at young ages and their experiences may differ from those of workers in manual labor economies.

Relatively little is known about the intergenerational transmission of health shocks, but both biological and socioeconomic channels have been implicated. There is evidence from intergenerational and multigenerational data consistent with epigenetic transmission of health in cases of extreme maternal, paternal, and grandparental over- and under-feeding (e.g. Kaati et al. 2007; Heijmans et al. 2008; Vågerö et al. 2018; Costa et al. 2018). Economic theory points to a role for the transmission of parental health through socioeconomic channels. Less healthy parents have fewer resources to invest in their children's health, ed-

ucation, and financial assets. Children's health at older ages then could arise directly from their health at younger ages or from their own socioeconomic status. Evidence showing that parental socioeconomic status affects child health and that child health affects child future educational and labor market outcomes has been pointed to as suggestive of the role that health could play in the intergenerational transmission of economic status (Currie 2009; Johnson and Schoeni 2011). However, empirical research has been stymied by the absence of data with at least two full generations and a health shock to the first generation.

This paper examines the impact of war wounds on the postwar socioeconomic status and older age mortality of US Civil War (1861-65) veterans and investigates how paternal war wounds affected the socioeconomic status and mortality of veterans' daughters and sons using a new intergenerational database that covers the complete lifespans of two generations. War wounds are an arguably exogenous health shock which can lead to immediate and permanent disability. The US Civil War provides a unique opportunity to examine the long-run and intergenerational impact of disability. Not only was the percentage of men with non-mortal wounds more than twice as large as in many previous wars, but because the US Civil War drew combatants from a broad age distribution, we can investigate how age at the end of the war influenced adjustments to health shocks.[1] If human capital is occupation or industry specific (Manovskii and Kambournov 2009; Neal 1995; Parent 2000), standard human capital and occupational matching models predict that the opportunity cost of switching occupations or industries rises with age. Because Civil War pensions were a pure income effect, we can estimate the effects of disability

[1] Among those serving in the US Army, the percentage with non-mortal battlefield wounds was 2% during the Vietnam War, 5% during World War II, and 13% during the Civil War. Estimated from https://dcas.dmdc.osd.mil/dcas/pages/report_principal_wars.xhtml Accessed on November 11, 2018.

on occupational change in the absence of work disincentives. Because, unlike most researchers using historical databases, we can trace veterans' wives back to their childhood censuses and can follow veterans' daughters after their marriages, we also can investigate the impact of veterans' health shocks on their marriage market prospects and that of their daughters.

We find that, consistent with human capital and industry and occupational matching theories, older wounded veterans were less likely to leave the farm sector and more likely more likely to experience a decline in wealth than their younger counterparts. We find little impact of wound status on the wealth of younger men once we control for farm occupation. However, younger wounded men were more likely to be in less prestigious and perhaps less pleasant jobs compared to their older counterparts, consistent with the willingness of those with reduced earnings capacity to accept lower compensating differentials (Weiss 1976). Severe paternal wounds led daughters to marry laborers rather than farmers. We find no impact of paternal wounds on the occupational class of sons, a result consistent with null or small effects of wealth shocks on sons' schooling, wealth, or occupational ranking found in other historical studies (Bleakley and Ferrie 2016). The socioeconomic status of daughters may have been more affected than that of sons by paternal wartime wounds because of marriage markets that were centered on men within the same social circle as their fathers. We also find that wounded veterans faced worse marriage prospects.

We find no effect of severe war wounds on veterans' own mortality but find a negative effect on their daughter's mortality provided that paternal wounds were to older fathers. We suspect that our findings are explained by the impact of unobserved circumstances during the formative early childhood years.

Our findings have implications not just for understanding how health shocks at young adult ages affect own aging and that of one's descendants but also for understanding how the impact of health shocks is affected by the nature of the economy (Costa 2015; Fogel 1999). In the time period we study, the US was a predominately brawn-based agricultural economy and was a much more dangerous place in terms of accident risk than it is today. In the first decade of the twentieth century, the age adjusted death rate from accidents peaked at 122.3 per 100,000 whereas in the first decade of the twenty-first century the peak age adjusted death rate from accidents was 40.4 per 100,000.[2] Disabled individuals had to cope in a manual labor economy, as is true in many developing countries today.

1 Empirical Strategy

A discharged veteran can either return to his old industry or occupation or he can switch industries or occupations. While his past training and experience would make him most productive in his old industry or occupation, a wartime health shock could lead to mismatch, particularly for physically demanding sectors such as agriculture. If he switches industries or jobs in response to a health shock, he will gain a better match but will need to invest in new skills. The older he is the less likely he is to switch because the opportunity cost of switching rises with tenure and because the pay-off period from investing in new skills or learning about the match quality is shorter. Veterans who were wounded at older ages would thus pay a relatively greater earnings penalty than younger veterans. However, because veterans wounded at older ages also would have had more time to acquire skills

[2] See https://www.cdc.gov/nchs/data-visualization/mortality-trends/. Accessed on January 7, 2019.

prior to the war, we might observe that veterans wounded at younger ages faced greater declines in earnings than their older counterparts.

What types of jobs will a veteran who is changing occupations pick? A veteran may pick a low-skill job if his health shock has increased the financial or time cost of investment in a new skill. Because poorer individuals require less compensation to take an unpleasant or less prestigious job, then, provided that income effects dominate, as shown by Weiss (1976), a veteran whose earnings capacity has declined uniformly in all jobs is more likely to pick an unpleasant or less prestigious work activity, such as being a laborer. He also is more likely to choose an occupation with risky monetary returns. Although we cannot observe earnings by occupations in this time period, in 1870 personal property and total wealth risk was highest among laborers and lowest among farmers.[3]

We first will examine whether veterans who were wounded when young were more likely to change their occupational class (farmer, professional or proprietor, artisan, and laborer) relative to veterans who were wounded when older. We also examine whether older wounded veterans paid a disproportionate penalty in terms of total wealth than younger wounded veterans. A causal interpretation of our results would require war wounds to be exogenous. While the wounded may have had different unobservable characteristics, including love of risk or conscientiousness, than the non-wounded, because we will compare the wounded and the non-wounded at different ages, we are assuming that those wounded at older ages would not differ on unobservable characteristics from those wounded at

[3]Risk was estimated as the occupational class specific standard deviation of the residuals from a regression of the logarithm of personal property wealth or total wealth on dummies for state of birth, age, and occupational group. The sample we used was the 1870 IPUMS (Ruggles et al. 2018) restricted to white men age 25-59 who were born in a Union State or its territories. Professionals and proprietors had the highest mean personal property and total wealth followed by farmers whereas laborers had the lowest.

younger ages.

We will examine how the interaction between paternal wounds and age affected children's socioeconomic status and mortality. If a wound reduces earnings capacity, particularly at older ages, wounded fathers would have fewer resources to invest in their children. Children might receive less schooling, fewer health investments, and lower financial transfers as adults. Sons might receive less occupational training. Daughters' circumstances might be more proscribed and their marriage market limited to men within the same occupational class or social circle as their fathers.

Wounds may proxy not just for disability but also for combat stress: the wounded would also have been more likely to have seen their comrades killed. While we find, consistent with Costa and Kahn (2007), that veterans from companies with above median combat fatalities and below median cohesion were shorter-lived than men from other types of companies, we do not find that adding controls for company combat fatalities and cohesion affected our results, and we find no evidence of transmission to children.

In the analyses of wartime wounds, a possible confounding factor is pension recipiency and we investigate both the inclusion and exclusion of pension recipiency in our analyses. Men who received pensions were in worse health and, because the criterion until 1890 was a war-related disability, the wounded were the ones most likely to be on the pension rolls. The correlation between pensions and health will lead to an underestimate of the negative impact of wounds on outcomes.[4]

[4]We do not have a good instrumental variable for pension recipiency in the 1870s and 1880s: political variables such as closeness of elections were too weak. In 1900, when law changes provided exogenous variation, there was no evidence of selection in who received a pension (Costa 1995). The only statistically significant predictors of receiving a pension between 1870 and 1880, conditional on not having one in 1870, were having been wounded and having been discharged for disability. (The impact of a having been

Pension recipiency could have a positive effect on outcomes because pensions provided income and were a pure income effect. Men with a pension might have better marriage prospects and would be more likely to choose pleasant or prestigious low-paying work activities, as illustrated in Weiss' (1976) work on the impact of wealth effects on occupational choice. We therefore would expect that pensions would push men to be farmers or small proprietors. However, as shown in Weiss (1976), pensions would push men toward monetarily higher risk occupations, which in this time period would be that of laborers.

2 Data

Veterans are drawn from a sample of 39,388 men in 330 randomly drawn Union Army volunteer infantry companies, collected by the program project, Early Indicators of Later Work Levels, Disease, and Death (NIA P01 AG10120, PI: Fogel). The sample was constructed from hand written military service and pension records (including detailed examining surgeons' exams), preserved in the National Archives, and from manuscript census schedules. The sample is representative of the Northern population of military age in 1860 in terms of socioeconomic status (Fogel 1993).

The military service and the pension records contain enlistment information, including occupation and place of enlistment, and also wartime experiences such as illnesses and wounds. The Union Army pension records exist because in 1862 Congress established a program to provide pensions for soldiers who had incurred permanent bodily injury or

wounded was twice as large as having been discharged for disability.) Observable characteristics such as 1870 property wealth did not affect recipiency, suggesting no selection on observable characteristics. Our results are from a probit regression where the dependent variables was receiving a pension on or before 1880 conditional on not having one in 1870.

disability while in the service and for the dependents of soldiers who had died from causes that could be traced directly to injuries received or diseases contracted while in Union Army service. The pension program effectively became a universal disability and old age pension program in 1890 and the number of veterans on the rolls doubled.

A sample of the children of veterans who lived until 1900 is being linked to death records and all available manuscript census schedules to obtain occupational, residential, and family information under the program project Early Indicators, Intergenerational Processes, and Aging (NIA P01 AG10120, PI: Costa). Veterans are being linked to any census or death record information not previously collected and the children's mothers are being linked to their childhood censuses. The records of the children of all ex-POWs have been collected, but collection and cleaning of the records of non-POW children still is on-going. This paper focuses on the 7,810 out of 8,500 white non-POWs whose children's records already have been cleaned and coded.

Linkage rates to both on-line death records and to manuscript census schedules are high. Children's linkage rates to the census are highest for 1880 (93%), when most of them were in their fathers' households (mean year of birth is 1878), and fall as they start to establish their independent households. Seventy-four percent of children were linked to death records. Among children with death records, sons are slightly over-represented with 1.09 sons for every daughter. (See the Data Appendix for additional details.)

The veterans and their wives in the sample are representative, in terms of cohort mortality, to a random sample of the population drawn from genealogies, but are higher than those from period life tables of the population which are for disproportionately urban populations. The children's mortality data are best suited to examining mortality at older ages:

a comparison of cohort life expectancies with those from a genealogical database suggests that among veterans' children deaths prior to age 40 or 50 are understated, particularly for women (see the Supporting Information to Costa et al. 2018).

We create several variables from the data for our analyses. Our primary variable of interest is whether a veteran had been wounded in the war. We also examine whether he was discharged for disability and the wound was arguabley severe, that is, it led to a discharge for disability, amputation, or blindness (all blindness was in one eye only in our sample). Our dependent variables of interest for our analyses of veterans are veterans' occupational class in 1880 (classified as farmer, professional or proprietor, artisan, and laborer), veteran's total wealth in 1870 (the last census year this information was asked), and years lived after 1900. Our control variables for veterans are birth year (or age at the end of the war), occupational class at enlistment (farmer, professional or proprietor, artisan, and laborer), dummies for enlistment year, a dummy equal to one if the veteran enlisted in a city of population size 50,000 or more, and father's real estate and personal property wealth. We also control for pension recipiency either in 1870 or in 1880. In our analyses of marriage quality, we also examine father-in-law's personal property wealth. Our dependent variables of interest for our analyses of children are sons' occupational class in 1910 (farmer, professional or proprietor, artisan, and laborer), the occupational class of daughters' husbands in 1910, and years lived after age 45. The control variables are birth year, veterans' enlistment characteristics (occupational class, enlistment year dummies, and the city size dummy), veterans' post-war socioeconomic status (total wealth in 1870 and occupational class in 1880), population density in childhood county, the number of siblings, and, in examining mortality, socioeconomic status in 1910.

3 The Wounded

In the full Union Army sample, 21% of men suffered a non-mortal wound during wartime, 5% died from war injuries or wounds, and 25% of men who survived the war had been wounded (see Table 1). Non-mortal wounds may have had the beneficial effect (for the men) of removing them from field and thus lowering their risk of death. Nineteen percent of men were discharged for disability, but the cause is often unknown (9% of all men were discharged for disability without any given reason). Only 3% of all men were known to have been discharged because of war wounds. Among veterans who survived to 1900 and for whom we have date of death, 31% of veterans had been wounded during the war. Amputees were a relatively small proportion of the population (less than 3% among survivors to 1900).

We did not find a difference between the wounded and the non-wounded in the relationship between the probability of dying during the war and age, suggesting that there was no difference in unobserved severity of wounds by age group. Figure 1 compares the probability of a wartime death for the wounded and the non-wounded by two year age group (measured at war's end) as estimated from a probit regression with controls for enlistment year dummies, enlistment occupational class, and a dummy for city size.

Wounds, however, might affect entry into the sample, which consists of children and their veteran fathers. The wounded would be less attractive in the marriage market both because of lower earnings and because of disfigurement. Those who were not married before the war might never marry, might make worse marriage matches when they did marry, and might have fewer children because their lower earnings reduced fertility or

increased child death rates. However, because the wounded were more likely to be on the pension rolls, pension income might help their marriage prospects and enable them to have more children who survived to adulthood.

We examine who, among men who were not married before the end of the war, has children using a probit model in which the dependent variable (a dummy equal to one) is a function of

$$\beta_1 W + \beta_2 D + \beta_3 P + \beta_4 X \tag{1}$$

or

$$\beta_1 W + \beta_2 P + \beta_3 X \tag{2}$$

where W indicates a wound, D indicates a discharge for disability, P indicates pension recipiency in 1880, and X is a vector of controls (occupational class at enlistment, enlistment year dummies, a city size dummy, age at the end of the war, and indicators for native-born and Irish-born).

We also use a poisson model to investigate, conditional on having children, the impact of having been wounded on the number of children. The independent variables are the same as in Equation 1. We present marginals for both the probit and the poisson models.

Men who had been wounded in the war and who were not married prior to the war were slightly less likely to have any children (see Table 2), controlling for a discharge for disability and for whether they were on the pension rolls in 1880. However, the magni-

tude of the effect was small. Veterans' probability of having a child was 0.88 and being wounded decreased this probability by 0.02, a 2% decline. Being on the pension rolls in 1880 increased this probability by 0.03. Controlling for wounds, a discharge for disability did not have a statistically significant impact on the probability of having children. Because almost all of those without children were unmarried, being wounded and being on the pension rolls affected fertility through marriage.

Conditional on having children, men who were wounded had one quarter fewer children when the average number was 5, an 8% decline (see Table 2). A discharge for disability had a similar effect. However, we cannot determine whether this was a fertility or a mortality effect. Pension recipiency in 1880 had no impact on the number of children.

We investigate the quality of the marriage match by running quantile regressions where the dependent variable is the logarithm of father-in-law's personal property wealth in 1860 and the independent variables are the same as those in Equation 1, with the exception that we run some specifications with and without controls for pension recipiency in 1870. Among the men who married after the war, the wounded married women whose fathers had 17 to 22% less personal property wealth than their non-wounded counterparts (see Table 3). The impact was statistically significant at the 1% level at the 50th and 75th quantiles, but not at the 25th. Controlling for wounds, a discharge for disability did not have a statistically significant effect on marriage quality. Pension recipiency in 1870 proxies in part for poor health.

We found some evidence of differential effects of being wounded by broad age group. When we examined veterans who were older than age 25 at the end of the war and unmarried we found that the impact of being wounded on having any children was -0.036

($\hat{\sigma}$ =0.015,$P > |z|$ =0.016), a 4% decline compared to the 2% decline among all age groups. Conditional on having children, we found no differential age effects of being wounded on the number of children (results not shown). Our results suggest that the older veterans who were in our sample of men with children were the relatively healthy because those who were unhealthy dropped out. We thus may underestimate the impact of wounds on veteran and child socioeconomic and mortality outcomes. Because our findings for marriage quality are for younger men, they suggest that children of younger veterans might have worse health or socioeconomic outcomes because of fewer transfers from maternal grandparents or worse maternal health.

4 Veterans' Socioeconomic Outcomes

Men wounded in the war were less likely both to remain and to become farmers by 1880 than the non-wounded (see the transition matrices between enlistment and 1880 occupation in Table 4). Sixty-one percent of wounded farmers remained farmers compared to 65% of non-wounded farmers. Those who switched occupational class were disproportionately laborers in 1880 if wounded (24% vs 21% if not wounded). Wounded professionals and proprietors, artisans, and laborers were less likely to become farmers if wounded. Very few men had no occupation at all, consistent with the absence of work disincentives in pensions.[5]

We control for enlistment characteristics by estimating a multinomial logit choice model in which the outcomes are the occupational classes of farmer, professional or pro-

[5]We find that neither wounds or pension recipiency were either statistically significant or, in terms of estimated magnitudes, economically meaningful predictors of having no occupation in 1880.

prietor, artisan, and laborer. (Men without an occupation are omitted from the analysis because there were so few of them.) The independent variables are

$$\beta_1 W + \beta_2 A + \beta_3 (W \times A) + \beta_4 X \tag{3}$$

where W is a dummy indicator if the veteran had been wounded, A is his age in 1865, and X is a set of control variables which includes dummy variables for his occupational class at enlistment, a dummy variable indicating whether he enlisted in a city of 50,000 or more, the logarithm of his father's real estate wealth, the logarithm of his father's personal property wealth, and a dummy indicator for whether he was receiving a pension. Standard errors are clustered at the company level.

At every age, the estimated probability, using Equation 2, of being a farmer in 1880 is greater among those who had not been wounded, but the probabilities converge the greater age at the end of the war. By age 29 the estimated probabilities by wound status are no longer statistically significantly different (see the first panel of Figure 2). The wounded also were more likely to be laborers at younger but not older ages, but the difference was not statistically significant after age 26 (see the fourth panel of Figure 2).

We investigate age effects in more detail by dividing the sample into two, where one sample consists of men who were less than age 25 at the end of the war, and the second sample consists of men who were older than age 25. We run multinomial logit models where the outcome variables are the occupational classes and the dependent variables are

$$\beta_1 W + \beta_2 D + \beta_3 X \tag{4}$$

where W indicates a wound, D indicates a discharge for disability, and X includes age at the end of the war as well as the other X variables in Equation 2.

A wound received when young decreased a veteran's probability of being a farmer by 0.04 and increased his probability of being a laborer by 0.05 (see Table 5). A discharge for disability decreased his probability of being a farmer by 0.05. In contrast, among veterans who were older than age 25 at the end of the war, there was no statistically significant impact of wounds on 1880 occupational class. As expected, enlistment occupation dwarfed the effects of wounds on occupational transitions. Among men younger than age 25 at the end of the war, farm occupation at enlistment increased the probability of being a farmer in 1880 by 0.41 and a laborer occupation at enlistment increased the probability of being a laborer in 1880 by 0.11.[6]

Table 5 also suggests that farming was a desirable occupation: pension recipiency had a positive and statistically significant impact on being a farmer in 1880 among older men, and among younger men the magnitude of the effect was similar. Sons of wealthier fathers were more likely to be farmers or professionals or proprietors and less likely to be artisans or laborers. A standard deviation increase in the logarithm of paternal personal property wealth increased the probability that a veteran was a farmer roughly by 0.04 and decreased the probability that he was a laborer by 0.03.

Did older wounded veterans fare relatively worse than younger wounded veterans? We first examine the impact of being wounded on the logarithm of veterans' total wealth in

[6]Being a farmer at enlistment increased the probability of being a farmer in 1880 by 0.405 ($\hat{\sigma}$ =0.074, P $> |z| = 0.000$) and being a laborer at enlistment increased the probability of being a laborer in 1880 by 0.105 ($\hat{\sigma}$ =0.061, P $> |z| = 0.084$).

1870 by running quantile regressions with dependent variables of the form

$$\beta_1 W + \beta_2 A + \beta_3 (W \times A) + \beta_4 X \tag{5}$$

where W is a dummy indicator for wounded, A is a set of 2 year age dummies, and X consists of dummy variable indicators for occupation at enlistment and enlistment year, a dummy variable indicating if enlistment was in a city of 50,000 or more, and the logarithms of paternal real estate and of father's personal property wealth.

Figure 3, which graphs the impact of wounds by age group based on Equation 5, shows that, at the 50th percentile, men who had been wounded and were older at the end of the war had less total wealth than their counterparts who had not been wounded if they were older than age 30 at the end of the war. We therefore divide the sample into those less than age 30 and those age 30 or older at enlistment and run quantile regressions where the dependent variable is total wealth and the independent variables are dummy indicators for wounded and discharged for disability, age, the same additional control variables used in Equation 5, and, in some specifications, an indicator for father's farm occupational status in 1870.

Wounds reduced median wealth holdings by 24% among younger veterans and by 35% among older veterans, controlling for age and enlistment characteristics (see Table 6). Additionally controlling for pension recipiency and for farm occupation in 1870 has little impact on the coefficients on war wounds among older men, but controlling for farm occupation more than halves the coefficient on the wound indicator for younger men (and it becomes statistically insignificant), suggesting that moves out of the farm sector explain

much of the impact of being wounded on total wealth holdings for younger men. (Much of the working capital of farmers would have been tied up in their wealth.) Despite wounds, younger men were able to maintain their wealth, probably because of their occupational transitions. Older men, for whom occupational changes may have had low future pay-offs, were more likely to see wealth losses if they had been wounded. For older men, the impact of wounds was comparable to a 1% increase in paternal personal property wealth, which increased an older veteran's wealth holdings by 32.5% ($\hat{\sigma}$ =0.130, P $> |z| = 0.012$) when we did not control for farmer occupation in 1870 and by 27.1% ($\hat{\sigma}$ =0.086, P $> |z| =$ 0.002) when we controlled for farmer occupation in 1870. Note that adding a control for the company war-time death rate from injuries did not change the results, suggesting that wounds are proxying for physical disability rather than combat trauma.

We investigated the impact of wound severity by classifying wounds into two types: severe wounds, that is, those which led either to a discharge for disability for wounds or to amputation or blindness, and all other wounds. Controlling for pre-war characteristics and 1870 pension recipiency and farm occupation, we found that veterans severely wounded when older experienced a 45.1% decline in median wealth ($\hat{\sigma}$ =0.131, P $> |z| = 0.001$). However, our results for younger men were not stable. We could not estimate changes across occupational classes by age group for the severely wounded because of singularity in the covariance matrix. However, among all veterans a severe wound decreased the probability of being a farmer by 0.068 ($\hat{\sigma}$ =0.027, P $> |z| = 0.012$) and increased the probability of a professional or proprietor occupation by 0.027 ($\hat{\sigma}$ =0.011, P $> |z| =$ 0.018). All other wounds decreased the probability of being a farmer by 0.027 ($\hat{\sigma}$ =0.015, P $> |z| = 0.068$) and increased the probability of being a laborer by 0.026 ($\hat{\sigma}$ =0.014, P

$> |z| = 0.063$).

We could not find effects of wounds, regardless of severity, or discharges for disability, regardless of inclusion or exclusion of post-war controls, on veterans' mortality (results not shown). While wounds may have been disabling, they did not affect mortality either through biological, psychological, or socioeconomic channels.

5 Children's Socioeconomic and Mortality Outcomes

We did not find a statistically significant effect of all wounds on children's occupational classes in 1910, but we did find that daughters of severely wounded fathers were less likely to be married to farmers and more likely to be married to laborers in 1910. Table 7 presents the marginals from a multinomial logit in which the dependent variable is occupational class (farmer, professional/proprietor, artisan, laborer) and the independent variables take the form

$$\beta_1 SW + \beta_2 OW + \beta_3 X \tag{6}$$

where SW indicates a paternal severe wound, OW indicates a paternal "other" wound, and X includes birth year, paternal enlistment characteristics (occupational class, enlistment year, and city size), and, in one of the specifications, paternal post-war characteristics (1880 occupational class and 1870 total wealth). Standard errors are clustered at the family level.

The probability that a daughter would be married to a farmer fell by 0.073 if her father

was severely wounded. Her probability of being married to a laborer rose by 0.056 if her father was severely wounded. When we control for paternal post-war socioeconomic status, the magnitude and statistical significance of the impact of a severe paternal war wound on the probability that the daughter of a severely wounded veteran was married to a farmer falls from -0.073 to -0.064. Our findings suggest that the marriage markets of daughters of severely wounded veterans were limited both by potential transfers and by family social circles, which may have been in part occupation-specific. Paternal farm occupation in 1880 was a good predictor of daughters' marrriage to farmers, increasing the probability by 0.246 ($\hat{\sigma}$ =0.032, P $> |z| = 0.000$). A paternal laborer occupation increased the probability of marriage to a laborer by 0.109 ($\hat{\sigma}$ =0.031, P $> |z| = 0.000$). The logarithm of total paternal wealth lowered the probability of marriage to a laborer by 0.002 ($\hat{\sigma}$ =0.001, P $> |z| = 0.009$) and increased the probability of marriage to a farmer by 0.002 ($\hat{\sigma}$ =0.001, P $> |z| = 0.050$). Among daughters there was no statistically significant correlation between a less severe paternal wound and husbands' occupational class.

The effect of a paternal wound on sons' occupational class in 1910, using a specification similar to Equation 5, was mixed. Sons of severely wounded fathers were less likely to be laborers and more likely to be farmers but statistical significance disappears once we control for paternal post-war characteristics (see Table 7). However, we did find statistically significant effects of paternal occupation and total wealth on sons' occupational choices.[7]

[7]Having a father who was a farmer in 1880 increased the probability of being a farmer in 1910 by 0.229 ($\hat{\sigma}$ =0.030, P $> |z| = 0.030$) and having a father who was a laborer increased the probability of being a laborer by 0.119 ($\hat{\sigma}$ =0.030, P $> |z| = 0.000$). The logarithm of total paternal wealth increased

We also investigated the impact of paternal wounds on children's educational outcomes by examining who, among school-age children, was in school in 1880 and by examining survivors to 1940 (the only census to ask about education). We did not find any statistically significant effects of paternal wounds (results not shown).

Among children a severe paternal wound at older ages affected mortality above age 45, provided the father was age 25 or older at the end of the war. The effects are concentrated among daughters. The Kaplan Meier survival curves in Figure 4 show that the children of the severely wounded had lower survival rates compared to the children of the less severely wounded and children of the non-wounded whereas the survival rates of the children of the less severely wounded resembled those of the non-wounded. When we further subdivided the samples by sex, we found that this pattern held only for daughters (see Figure 5). Our analysis therefore focuses on daughters.

We ran Cox proportional hazard regression models of years lived after age 45 where the dependent variables were

$$\beta_1 SW + \beta_2 A + \beta_3 (SW \times A) + \beta_4 X \tag{7}$$

where SW is a dummy variable equal to one if the veteran had been severely wounded, A is a dummy equal to 1 for age greater than or equal to 25 at the end of the war, and X is a set of control variables. The specifications include as control variables birth year and paternal enlistment characteristics and the standard errors are clustered at the family level.

the probability of being a laborer by 0.003 ($\hat{\sigma}$ =0.001, P $> |z| =$ 0.000) and the probability of being a professional or proprietor by 0.003 ($\hat{\sigma}$ =0.001, P $> |z| =$ 0.000). The logarithm of total paternal wealth decreased the probability of being an artisan by 0.002 ($\hat{\sigma}$ =0.001, P $> |z| =$ 0.003) and of being a laborer by 0.004 ($\hat{\sigma}$ =0.001, P $> |z| =$ 0.000).

We also present a specification in which we control for paternal post-war characteristics and daughters' husbands' occupational class in 1910. We stratify on a dummy indicator if the daughter was born before 1880.

Controlling only for paternal enlistment characteristics and birth year, daughters of fathers with a severe paternal wound received at an older age were 1.27 times more likely to die at any age after age 45 than children of fathers who had not been severely wounded at an older age (see Table 8). The effects persist controlling for paternal post-war socioeconomic status and husband's occupational class, the number of siblings, and population density in the birth county. There were no differential effects by paternal wound among daughters of fathers who were young when the war ended. Effects on sons were statistically insignificant. In contrast, the sons of fathers who had been severely wounded at older ages were 1.100 ($\hat{\sigma}$ =0.072, P $> |z| = 0.147$) times more likely to die than the sons of fathers who had not been wounded.

The most common causes of death among veterans' children were cardiovascular disease and cancer (see Table 9). Causes of death are known for 40% of the sample. Excess causes of death among the daughters of veterans who had been severely wounded at older ages were largely from the combined category of cardiovascular and stroke and from the combined category of respiratory, pneumonia, influenza, and tuberculosis. We estimated competing risks proportional hazard models for daughters, conditional on the availability of cause of death information, in which we examine time until death from specific causes and the independent variables are

$$\beta_1 SW + \beta_2 A + \beta_3 (SW \times A) + \beta_4 X. \tag{8}$$

where SW is a dummy variable equal to one if the veteran had been severely wounded, A is his age group (less than or at least age 25) at the end of the war, and X is a set of control variables consisting of birth year and father's pre-enlistment characteristics. Standard errors are clustered at the family level. To maintain the proportionality assumption we stratify on a dummy indicator if own birth year was before 1880. Daughters were 1.37 and 1.88 times more likely to die of cardiovascular disease or stroke and respiratory, pneumonia, influenza, or tuberculosis, respectively if their father had been severely wounded in the war at an older age compared to the children of non-wounded, younger veterans (see Table 10). Among all daughters of older fathers, those of severely wounded fathers were 1.415 ($\hat{\sigma}$ =0.245, P $> |z| = 0.045$) and 2.073 ($\hat{\sigma}$ =0.527, P $> |z| = 0.004$) times more likely to die of these respective causes compared to daughters of non-wounded fathers. We could find no statistically significant effects of severe wounds on any specific causes of sons' deaths.[8]

6 Discussion of the Mortality Results

Why did paternal severe wounds received at older ages reduce daughters' but not sons' lifespans? The burden of caregiving does not appear to play a role: we found no evidence that adult daughters were more likely to live with a father if he had been wounded in the war (results not shown). Our sample size is large enough such we are unlikely to be detecting a spurious statistical result; a power calculation reveals that to find a hazard ratio

[8]For the combined category of respiratory, pneumonia, influenza, and tuberculosis, among sons of older fathers, those whose father had been severely wounded were 1.175 ($\hat{\sigma}$ =0.269, P $> |z| = 0.482$) times more likely to die than those whose fathers had not been wounded.

of 1.27 for a binary variable at the 1% level of significance we need a sample of 1,100, assuming power of 0.8 and an unrealistically high correlation with the other variables of 0.5.[9] Our previous results showed that fathers who were wounded at older ages were the ones less likely to adapt by switching occupational class and were the ones experiencing declines in wealth. Although we control for paternal wealth and county population density, our controls may be insufficient proxies for early childhood circumstances. The geographical correlation between coronary and rheumatic heart disease and chronic bronchitis and past post-neonatal mortality (Barker 2007), suggests that worse childhood circumstances such as crowding within the home, which led to the spread of infectious disease, or poorer in-utero and early childhood nutrition may explain the relation we find between paternal wounds and daughters' older age mortality. Severe paternal war wounds may have affected daughters more than sons even controlling for children's adult socioeconomic status because girls may be more sensitive to in-utero nutritional shocks as seen in findings from the Dutch Hunger Winter (Stein et al. 2007, Lumey et al. 2009, Tobi et al. 2009), were more exposed to infectious disease because of their work within the household, or were more susceptible to infectious disease between age 5 and 25 (Goldin and Lleras-Muney 2018).

Our results differ from our findings on paternal ex-POW trauma affecting the mortality of sons only (Costa et al. 2018), a transmission we argued was most consistent with an epigenetic explanation. In follow-up work, we are finding that the transmission of paternal ex-POW trauma was particularly pronounced for the sons of younger men in contrast to

[9]The highest correlation was with the father's enlistment year dummies and it was only -0.06 for those enlisting in 1864.

our results that the impact of war wounds was larger for the sons of older men and even larger for their daughters. Our combined findings suggest that the type of health shock and its timing are crucial for whether and how the shock is transmitted to later generations.

7 Conclusion

The twentieth century witnessed a radical transformation in the types of goods and services produced and in the processes used to produce them. Concurrent with these changes, professional, managerial, clerical, sales, and service workers grew from one-quarter to three quarters of total employment between 1910 and 2000 (Wyatt and Hecker 2006). This shift has been implicated as a cause in the long-run decline in musculoskeletal disabilities at older ages (Costa 2000), but, more recently, has led to rising obesity (Lakdawalla and Philipson 2009). Another outcome of this shift, and of jobs becoming less dangerous in the two decades after World War II, is the decline in permanent disability from on the job accidents (Costa and Kahn 2004). Our finding that permanent disabilities had an intergenerational reach suggests that the brawn-based economies of the past were a drag on women's long-run economic mobility and health improvement.

Data Appendix

The Early Indicators project is collecting the records of the children of 8,500 white non-POWs who survived to 1900 and of 1,999 white ex-POWs who survived to 1900. Only the children of veterans who survived until 1900 were traced because information in the

pension records is needed to link children to death records and manuscript census records, but only in 1900 was pension coverage close to universal. However, the biases introduced by not examining veterans who survived the war but died before 1900 appear to be minimal because our inability to find them in the 1870 and 1880 censuses suggests that most excess deaths among ex-POWs were before 1870.

Information on veterans' children was obtained from veterans' manuscript census schedules which list all members of the household and from family circulars which were part of the veteran's pension file (and would have been completed by all of the veterans in the sample). The family circulars contain children's names, birth and death dates and often daughters' married names. All of the veterans' children were linked to on-line death records and to all of the manuscript census schedules from 1850 to 1940, with the exception of 1890, using familysearch.org, ancestry.com, Find A Grave, and deathindexes.com, with each record often leading to another record. Records that were found may include (not necessarily in order) death records (often with parents' names, exact birth dates, exact death dates and other family member names), birth records (with exact birth dates and parents names), marriage records (with spouses' names and often with parents' names), WWI draft registration cards (with exact birth dates and next of kin, often a parent or a spouse), and Social Security claim or death index (with exact birth dates and frequently with parents' names).

Linkage rates are given in Table 11. The availability of on-line death records is the primary determinant of linkage to death records. Although death sources are available in some form on-line for all 50 states, each state varies in the types of death information and dates available. Census linkage rates in the current children's sample are high for the

following reasons: the pension records often provide names of the veterans' spouses and children (including daughters' married names), various addresses for the veteran, date of birth and birthplaces for the veterans and their children, birth date and marriage date and place for the veterans' spouses, and, at times, death dates for the veterans' children; 2) the sample is a Northern sample (the North had better records), and the children are all native-born; 3) when daughters' married names are unavailable in the pension records, these names can be found in on-line marriage records using their parents' names and places of residences. All linkages were done by staff with extensive training in genealogical research, and all links undergo an extensive series of cross-checks.

Linkage methods are designed to reduce the rate of false positives. By using Ancestry trees, inputters follow the hints provided, attach relevant documents, and see multiple match points from a variety of sources that corroborate new information when it is found. Inputters determine on a case by case basis which information is the strongest to use in their search parameters, then examine the actual record image and determine the strength of the match by reviewing all the available information. Inputters can also recognize indexing errors, decipher poor handwriting, sort through mistakes on the record and make informed decisions.

We have investigated the use of mechanized algorithms for finding birth, death, and census records, but these yielded too many false positives relative to our manual searches because, unlike humans, extant matching algorithms do not recognize matching points from a variety of records nor connect the dots to follow the clues when one record leads to the next. Mechanized methods are limited to digitized records and cannot open the document to examine the image in order to recognize errors in indexing and recording;

they cannot alter the search sequence nor change the importance of search fields on a case by case basis, and are unable to eliminate results that make no sense. Common linkage methods such as those examined in Bailey et al. (2017) and those used on Family Search yield numerous false positives. The advantage having human inputters use extensive information to find individuals is that it avoids probabilistic matches, such as those used by the Census Bureau in their linkage projects, which permit only coarse inference when the number of entities relative to the number of records is small (Johndrow et al. 2018).

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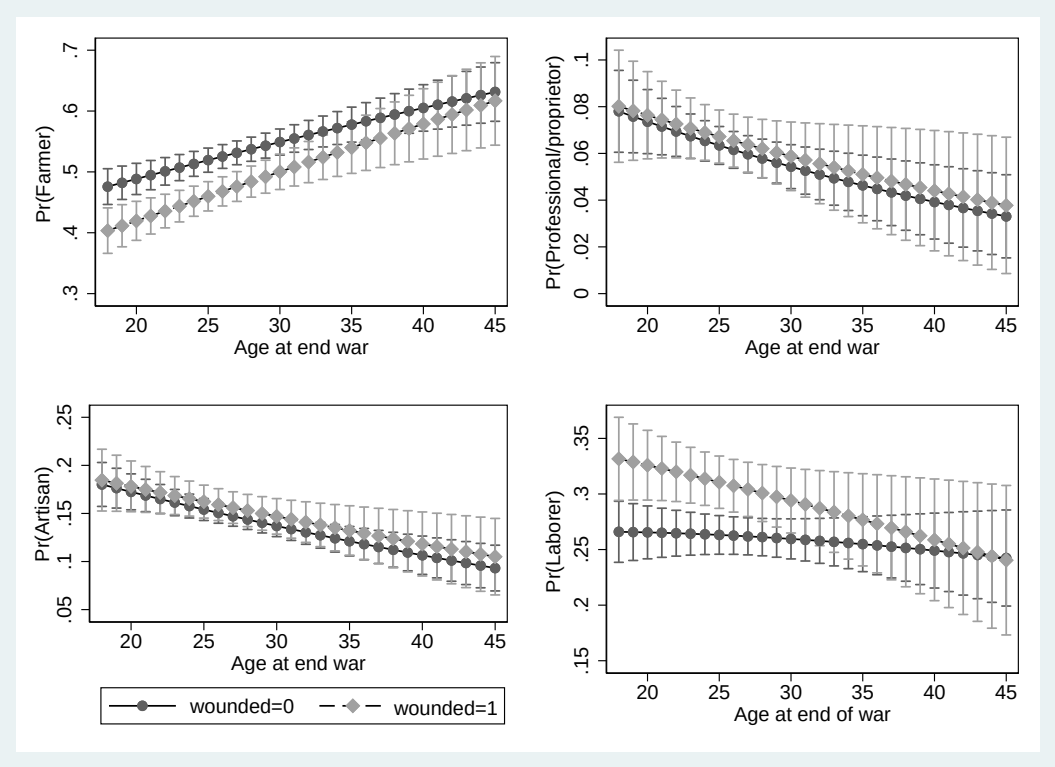
Figure 1: Impact of Wounds on Probability of Wartime Death by Age

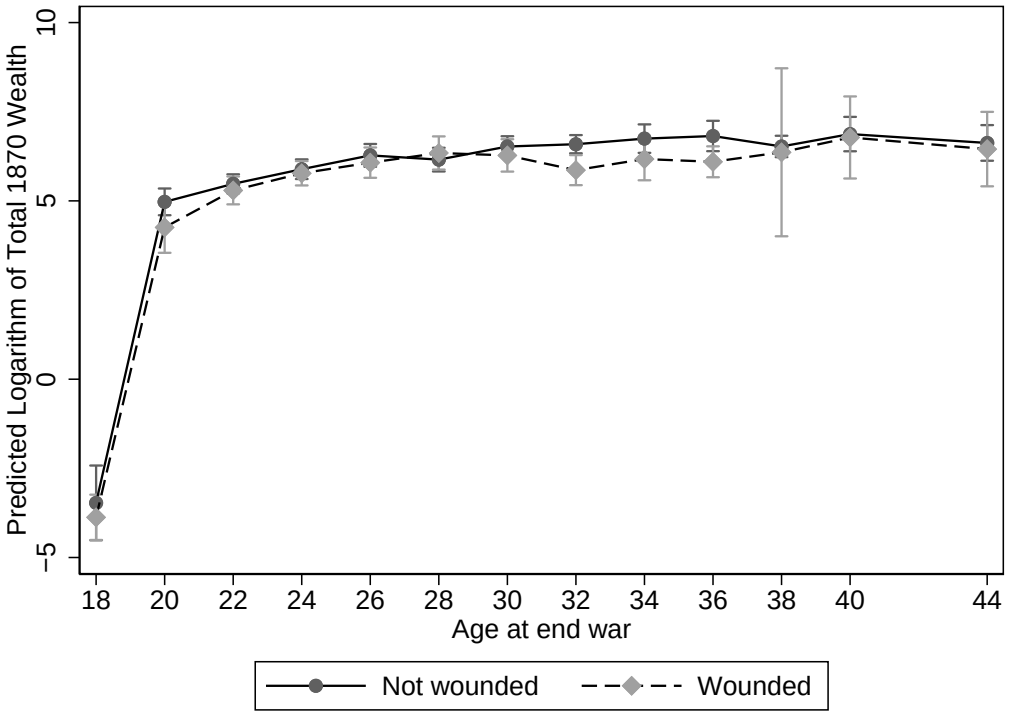
Confidence intervals indicated by the vertical lines. Estimated from the Union Army sample of 39,341 men using a probit regression in which the dependent variables is a dummy equal to 1 if the soldier died in the war and the independent variables are dummy variable indicating if the soldier was wounded, dummy variables for 2 year age groups (except for the first and last age groups), the interaction between the wounded dummy and the age dummies, and controls for enlistment characteristics (occupational class and city size).

Figure 2: Impact of Wounds on Occupational Class Probabilities by Age at End of the War



Estimated from the multinomial logit in Equation 3 with standard errors clustered on the company.

Figure 3: Impact of Wounds on Total 1870 Wealth by Age Group at End of the War

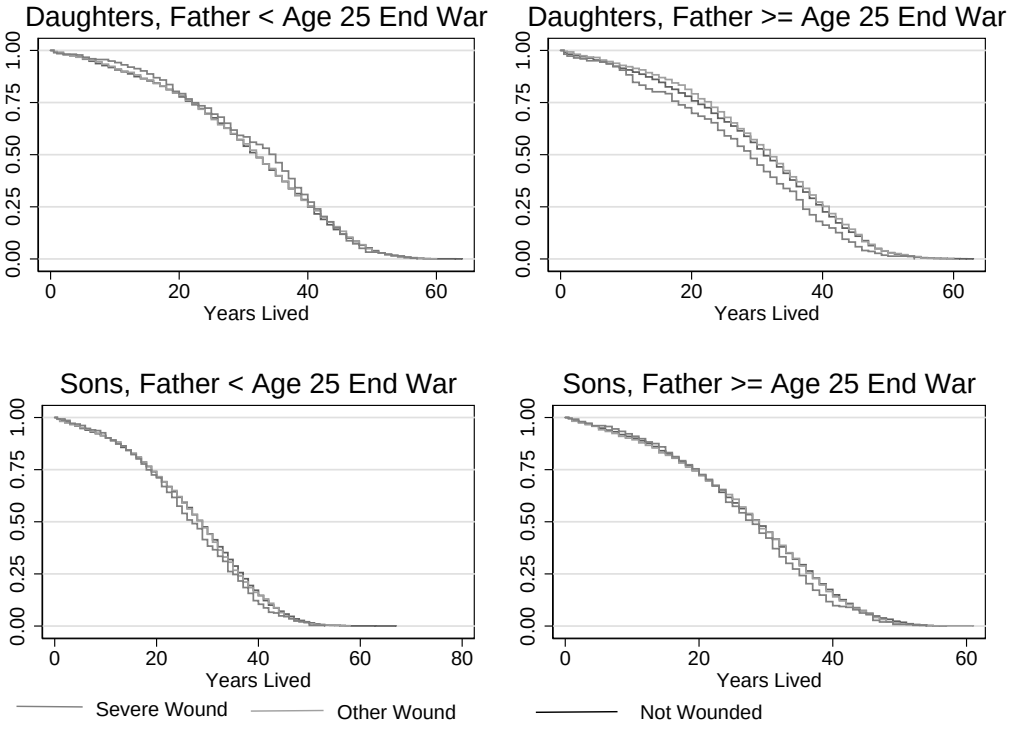


Estimated from the quantile regression in Equation 5.

Figure 4: Kaplan Meier Graph for Children by Paternal Wound Status

The sample consists of all children born after the war who survived to age 45.

Figure 5: Kaplan Meier Graph for Children by Paternal Wound Status



The sample consists of all children born after the war who survived to age 45.

Table 1: Percentage Disabled, Injured, or Wounded

	During War	Survived to 1866	Survived to 1900
Wounded or Injured	26.27	25.15	30.95
Non-mortal wound or injury	21.41		
Non-mortal battlefield wound	13.64		
Discharged disability (any cause)		18.77	18.99
Discharged for			
Wounds or Injuries		3.00	3.42
Vague reason (e.g., disability)		0.76	0.71
Other reason (e.g., disease)		7.49	7.77
No reason given		8.58	8.21
Amputation		2.07	2.60
Observations	39,341	33,485	15,133

Estimated from the full Union Army sample.

Table 2: Impact of Wounds on Probability of Having Any Children and on Number of Children, Marginal Effects, Not Married Before the War

	Any Children			Number of Children		
	$\frac{\partial y}{\partial x}$	$\hat{\sigma}$	p	$\frac{\partial y}{\partial x}$	$\hat{\sigma}$	p
Dummy=1 if						
wounded	-0.019	0.010	0.066	-0.251	0.101	0.012
discharged disability	-0.001	0.011	0.944	-0.214	0.111	0.054
on the pension rolls	0.025	0.011	0.020	0.048	0.115	0.678

Marriages known to have occurred during or prior to the war are excluded, yielding 6,172 observations. The probability of having a child was 0.883. Among those with children the mean number of children was 5 and the total number of observations was 5,138. Additional control variables were age at the end of the war, indicator variables for father's US birth and Irish birht, occupational class at enlistment, enlistment year dummies, and a dummy for enlistment in a city of over 50,000. Standard errors are clustered at the company level.

Table 3: Impact of Wounds on Marriage Quality, Post-War First Marriages

Dependent Variable:	Father-In-Law's Personal Property Wealth in 1860								
	25th Quantile			50th Quantile			75th Quantile		
	β	$\hat{\sigma}$	p	β	$\hat{\sigma}$	p	β	$\hat{\sigma}$	p
Specification 1									
Dummy=1 if									
wounded	-0.173	0.108	0.109	-0.223	0.075	0.003	-0.194	0.072	0.007
discharged disability	0.009	0.126	0.942	0.000	0.089	1.000	0.061	0.084	0.471
Specification 3									
Dummy=1 if									
wounded	-0.118	0.105	0.261	-0.140	0.081	0.084	-0.186	0.078	0.018
discharged disability	0.053	0.121	0.664	0.068	0.094	0.471	0.046	0.091	0.617
on pension in 1870	-0.288	0.166	0.084	-0.243	0.128	0.058	-0.175	0.125	0.162

Marriages known to have occurred during or prior to the war are excluded. 1,130 observations. Additional control variables in all three specifications were enlistment year dummies, dummies for occupational class at enlistment, age at the end of the war, and a dummy for enlistment in a city of 50,000 or more.

Table 4: Occupational Transitions between Enlistment and 1880 by Wound Status

Enlistment	1880 Occupation					
Occupation	F	PP	A	L	None	Total
Not wounded						
Farmer (F)	1,531	109	186	482	44	2,352
	65.34%	4.27%	7.94%	20.57%	1.88%	100.00%
	83.75%	50.76%	36.54%	52.79%	57.89%	66.51%
Professional/	38	31	17	26	7	119
Proprietor (PP)	31.93%	26.05%	14.29%	21.85%	5.88%	100.00%
	2.08%	15.74%	3.34%	2.85%	9.21%	3.38%
Artisan (A)	116	39	250	128	9	542
	21.40%	7.20%	46.13%	23.62%	1.66%	100.00%
	6.35%	19.80%	49.12%	14.02%	11.84%	15.38%
Laborer (L)	143	27	56	277	16	519
	27.55%	5.20%	10.79%	53.37%	3.08%	100.00%
	7.82%	13.71%	11.00%	30.34%	21.05%	14.73%
Total	1,828	197	509	913	76	3,523
	51.89%	5.59%	14.45%	25.92%	2.16%	100.00%
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Wounded						
Farmer (F)	682	58	93	265	25	1,123
	60.73%	5.16%	8.28%	23.60%	2.23%	100.00%
	79.86%	50.00%	31.96%	47.24%	65.79%	60.38%
Professional/	12	19	4	14	1	50
Proprietor (PP)	24.00%	38.00%	8.00%	28.00%	2.00%	100.00%
	1.41%	16.38%	1.37%	2.50%	2.63%	2.69%
Artisan	60	20	139	86	3	308
	19.48%	6.49%	45.13%	27.92%	0.97%	100.00%
	7.03%	17.24%	47.77%	15.33%	7.89%	16.56%
Laborer	100	19	55	196	9	379
	26.39%	5.01%	14.51%	51.72%	2.37%	100.00%
	11.71%	16.38%	18.90%	34.94%	23.68%	20.38$
Total	854	116	291	561	38	1,860
	45.91%	6.24%	15.65%	30.16%	2.04%	100.00%
	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%

Table 5: Impact of Wounds on Occupational Class Probabilities in 1880

	< 25 yrs at end war			≥ 25 yrs at end war		
Variable: Wounded						
Farmer	-0.042	0.020	0.035	-0.016	0.020	0.426
Professional/proprietor	-0.003	0.010	0.769	0.005	0.011	0.611
Artisan	-0.007	0.015	0.633	0.008	0.013	0.548
Laborer	0.052	0.018	0.005	0.002	0.018	0.902
Variable: Discharged disability						
Farmer	-0.049	0.023	0.031	-0.029	0.019	0.135
Professional/proprietor	0.018	0.011	0.100	0.016	0.009	0.080
Artisan	0.025	0.017	0.131	0.020	0.015	0.181
Laborer	0.006	0.021	0.761	-0.007	0.020	0.721
Variable: On pension in 1880						
Farmer	0.034	0.024	0.161	0.043	0.022	0.053
Professional/proprietor	0.018	0.011	0.106	-0.013	0.011	0.248
Artisan	-0.023	0.019	0.214	-0.040	0.017	0.018
Laborer	-0.028	0.023	0.217	0.011	0.020	0.585
Variable: Logarithm father's real estate wealth						
Farmer	0.007	0.002	0.002	0.006	0.003	0.042
Professional/proprietor	0.001	0.001	0.245	0.002	0.001	0.243
Artisan	-0.001	0.002	0.717	0.002	0.002	0.338
Laborer	-0.008	0.002	0.001	-0.010	0.002	0.000
Variable: Logarithm father's personal property wealth						
Farmer	0.043	0.013	0.001	0.036	0.021	0.107
Professional/proprietor	0.014	0.005	0.009	0.013	0.009	0.157
Artisan	-0.027	0.009	0.003	0.005	0.014	0.687
Laborer	-0.030	0.011	0.009	-0.053	0.021	0.012

Estimated from the multinomial logit model in Equation 4. The sample consists of 2,547 veterans less than age 25 at the end of the war and 2,783 veterans age 25 or older at the end of the war. Standard errors are clustered on the company. Additional control variables include the veteran's age at the end of the war, his occupational class at enlistment, enlistment year dummies, a dummy indicator for a city of 50,000 or more, and dummies indicating that wealth information is unknown. Standard errors are clustered at the company level.

Table 6: Impact of Wounds on Total Median 1870 Wealth Holdings

	$<$ 30 yrs at end war			$\geq$ 30 yrs at end war		
With pre-war controls only						
Dummy=1 if						
wounded	-0.235	0.092	0.011	-0.347	0.129	0.007
discharged disability	-0.110	0.089	0.222	0.001	0.132	0.992
Plus control for pension in 1870						
Dummy=1 if						
wounded	-0.293	0.117	0.012	-0.325	0.130	0.012
discharged disability	-0.138	0.181	0.291	-0.045	0.133	0.736
Plus control for farmer in 1870						
Dummy=1 if						
wounded	-0.116	0.116	0.321	-0.328	0.114	0.004
discharged disability	0.185	0.161	0.252	-0.179	0.093	0.005
Plus control for company injury death rate						
Dummy=1 if						
wounded	-0.114	0.125	0.359	-0.297	0.118	0.012
discharged disability	0.183	0.138	0.185	-0.164	0.111	0.140

Estimated from median regressions in which the dependent variable is the logarithm of total 1870 wealth holdings. The additional independent variables are age at the end of the war, occupational class at enlistment, dummy variables for enlistment year, a dummy variable indicating if enlistment was in a city of 50,000 or more, the logarithm of paternal real estate wealth, the logarithm of paternal personal property wealth, and dummy indicators if paternal wealth information was missing. The sample consists of 3,731 veterans less than age 30 at the end of the war and 1,345 veterans age 30 or older at the end of the war.

Table 7: Paternal Wounds and Occupational Class of Daughters' Husbands and of Sons

	Daughters' Husbands			Sons		
	$\frac{\partial Y}{\partial x}$	$\hat{\sigma}$	p	$\frac{\partial Y}{\partial x}$	$\hat{\sigma}$	p
No Paternal Post-War SES Controls						
Impact of severe wound on						
Farmer	-0.073	0.034	0.033	-0.006	0.026	0.814
Professional/Proprietor	0.009	0.029	0.786	0.043	0.023	0.060
Artisan	0.008	0.024	0.732	0.019	0.021	0.365
Laborer	0.056	0.026	0.031	-0.056	0.028	0.045
Impact of other wound on						
Farmer	-0.015	0.018	0.413	-0.022	0.014	0.126
Professional/Proprietor	-0.005	0.015	0.724	-0.015	0.013	0.244
Artisan	0.016	0.013	0.213	0.020	0.011	0.073
Laborer	0.004	0.016	0.801	0.017	0.144	0.247
With Paternal Post-War SES Controls						
Impact of severe wound on						
Farmer	-0.064	0.032	0.050	-0.002	0.025	0.938
Professional/Proprietor	0.002	0.028	0.950	0.028	0.022	0.201
Artisan	0.005	0.023	0.817	0.021	0.020	0.305
Laborer	0.056	0.025	0.025	-0.047	0.027	0.087
Impact of less severe wound on						
Farmer	-0.008	0.017	0.650	-0.007	0.013	0.614
Professional/Proprietor	-0.006	0.015	0.664	-0.013	0.012	0.284
Artisan	0.012	0.013	0.357	0.012	0.011	0.259
Laborer	0.003	0.016	0.871	0.008	0.014	0.573

Estimated from the multinomial logit model in Equation 6. The dependent variable is either the occupational class of the daughters' husbands or the sons. The samples consists of the 4,765 daughters of 3,062 veterans who lived to and were married in 1910 and whose husbands had an occupation and 7,033 sons of 3,908 veterans who lived to 1910 and had an occupation. The standard errors are clustered on the family. The regressions control for birth year and paternal enlistment characteristics (occupational class, enlistment year dummies, and a dummy if the city population size was 50,000 or more). The paternal post-war ses controls consist of the logarithm of total paternal wealth in 1870, paternal occupational class in 1880, and the number of siblings.

Table 8: Hazard Ratios of Mortality by Paternal Wound Status

	(1)			(2)		
	e^{β}	$\hat{\sigma}$	$p > \|z\|$	e^{β}	$\hat{\sigma}$	$p > \|z\|$
Father $<$ 25Y at end war						
and not severely wounded	1.000			1.000		
and severely wounded	0.955	0.060	0.468	0.951	0.072	0.510
Father $\geq$ 25Y at end war						
and not severely wounded	1.018	0.026	0.493	0.974	0.032	0.434
and severely wounded	1.274	0.094	0.001	1.269	0.125	0.016
Test of proportional hazards assumption						
χ^2, $\Pr > \chi^2$	$\chi^2(13)$=	12.97	0.450	$\chi^2(23)$=	29.89	0.272

Estimated from the Cox proportional hazard model in Equation 8. The dependent variables is the number of years lived after age 45. Standard errors are clustered on the family. All specifications control for birth year and paternal enlistment characteristics (occupational class, enlistment year dummies, a dummmy indicator if city population was 50,000 or more), and stratify on a dummy indicator for birth year prior to 1880. Specification 2 is restricted to daughters who who were married in 1910. Specification 2 also controls for paternal post-war characteristics (occupational class in 1880, the logarithm of total weatlh in 1870), county of birth population density circa 1880, the number of siblings, and husband's occupational class in 1910. Specification 1 uses 8,006 observations. Specification 2 uses 4,765 observations.

Table 9: Causes of Death

	Percent		
	All	Daughters	Sons
Missing cause of death	60.71		
Cause of death (if known)			
Cardiovascular	60.62	60.12	61.03
Stroke	8.14	9.24	7.20
Cancer	14.41	17.02	12.20
Gastrointestinal	7.04	7.97	6.25
Respiratory	9.28	8.23	10.17
Pneumonia	8.90	9.08	8.75
Influenza	1.47	1.24	1.67
Tuberculosis	2.19	1.73	2.59
Infectious (not TB or gastrointestinal)	4.71	4.48	4.90
Kidneys	11.53	11.30	11.73
Liver	3.29	3.43	3.17
Accident	5.21	3.63	6.56
Suicide	1.04	0.02	1.72

Causes of death are not mutually exclusive.

Table 10: Hazard Ratios of Mortality by Paternal Wound Status

	All Causes			Cardiovascular or Stroke			Respiratory/Pneumonia Influenza/TB		
	e^{β}	$\hat{\sigma}$	$p > \|z\|$	e^{β}	$\hat{\sigma}$	$p > \|z\|$	e^{β}	$\hat{\sigma}$	$p > \|z\|$
Father $<$ 25Y at end war									
and not severely wounded	1.000			1.000			1.000		
and severely wounded	0.961	0.108	0.724	1.184	0.159	0.207	0.522	0.203	0.094
Father $\geq$ 25Y at end war									
and not severely wounded	1.003	0.042	0.942	0.969	0.052	0.557	0.906	0.090	0.322
and severely wounded	1.259	0.165	0.079	1.371	0.236	0.067	1.877	0.479	0.013
Test of proportional hazards assumption									
$\chi^2(12)$, $\Pr > \chi^8$	χ^2=	9.18	0.327	$\chi^2(8)$=	13.27	0.103	$\chi^2(8)$=	11.21	0.190

Estimated from the Cox proportional hazard model in Equation 7. The dependent variables is the number of years lived after age 45. Standard errors are clustered on the family. All specifications control for birth year and paternal occupational class at enlistment and enlistment year dummies. The sample consists of 3,062 daughters of 3,201 veterans.

Table 11: Linkage Rates to Census and Death Information for Veterans (Survived to 1900) and their Children Born After 1866

	Veterans Living in Census Year	Children Not Known to be Dead	Children Alive, Year of Death Known
Death records	99.9	73.7	100.0
Census (born before census)			
1850	75.0		
1860	78.2		
1870	83.6	78.0	79.7
1880	95.2	88.9	93.0
1900	95.6	78.8	89.4
1910	96.0	73.4	88.0
1920	92.4	70.9	88.0
1930	94.5	68.6	88.3
1940	62.5	60.3	83.2

Both children known to be alive and children with missing death dates are included in ”Not Known to be Dead.” Children ”Not Known to be Dead” were searched for in all censuses. The higher linkage rates for those known to be alive suggest that many children with missing death dates were probably dead.