

MARRIAGE AND MEN'S WEALTH ACCUMULATION IN THE UNITED STATES, 1860-1870

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This paper explores how changes in marital status affected men's wealth accumulation in mid-nineteenth-century America, using a longitudinal sample of Union Army veterans linked to the 1860 and 1870 census manuscript schedules. Controlling for the endogeneity of wealth and marital selection, this paper provides strong evidence that marriage had positive effects on men's wealth accumulation, whereas ending a marriage had negative effects. The estimated wealth premium on married men is about 60 percent per marital year. This substantial wealth premium is closely related to wives' specializing in household production, and farmers and craftsmen economically benefited from the unpaid labor of their wives.

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I. INTRODUCTION

Although marital status has been historically considered one of the main factors that determine life cycle accumulation of wealth, less is

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known about the ‘long-term’ economic consequence of marital selection in nineteenth-century America.¹ Using a longitudinal sample of Union Army veterans linked to both 1860 and 1870 census manuscript schedules, this study explores historical aspects of the role of marriage, marital duration, divorce, wife’s death, and remarriage in determining men’s wealth. The detailed information on marriage and spouse is obtained from the pension records in the Union Army veterans’ dataset. The use of their military records is also beneficial for figuring out how significantly the wealth premium on married veterans was influenced by wartime stress and health.

Considering the endogeneity of wealth and marital selection, this study estimates that married veterans accumulated about 60 percent more wealth per marital year than single veterans, but ending a marriage by divorce, separation or wife’s death led to a low level of wealth accumulation. Compared with the findings of recent studies that use modern data, this study of mid-nineteenth-century American males finds that the wealth premium on married men in the past was much larger than today’s.

This study explains the substantial gain from marriage in two socio-economic aspects of nineteenth-century America. First, women were expected to fulfill a selfless dedication to motherhood and housekeeping throughout the nineteenth century; the increase of married men’s productivity followed their wives specializing in household production in the rapidly industrializing periods. Second, in spite of women’s low labor force participation over the period, the unpaid labor of wives was valuable especially for farmers and craftsmen. Thus this study provides

¹ Individual or household wealth of nineteenth-century America has been explored in various aspects. Many previous studies have been concerned about wealth distribution and its inequality by region, race, nativity, and occupation (Soltow, 1975; Steckel, 1990; Wilcox, 1992; Yang, 1992). Some statistical techniques have been used to estimate the population wealth distribution from the sample distribution (Wilcox, 1992), and to estimate the amount of inheritance received by men when their parents passed away (Soltow, 1982). More recently, some longitudinal studies have looked into the wealth accumulation of European immigrants (Ferrie, 1994), and the effects of wartime stress and health while in service on wealth accumulation of Union Army veterans (Lee, 2005). These micro-studies have been primarily based on the U.S. census manuscripts, and explored the period of 1850-1870 because the individual wealth variables are available only for the 1850, 1860 and 1870 censuses. While marital status was not included in the U.S. census questionnaire until 1880; the 1850-1880 censuses have questionnaires asking whether the respondent had married within the 12 months preceding the census day.

historical evidence supporting the productivity hypothesis—the increase of men's productivity due to their wives' division of labor and specialization within the household—in the economics of marriage and divorce.

II. DATA

This study is based on historical data collected by the project 'Early Indicators of Later Work Levels, Disease, and Death' (referred as the EI project hereafter).² The primary sample for the EI project consists of 35,570 white males mustered into the Union Army during the Civil War, who were chosen randomly from the company books stored at the National Archives in Washington, D.C. The project provides lifetime military, medical, and socioeconomic information on these individuals by linking them to various historical documents: the military, pension and medical records, the surgeons' certificates data, and the census records (Fogel, 2000a and 2000b). From the EI project samples, I searched for 992 veterans who are linked to both 1860 and 1870 census manuscript schedules, out of the available nineteenth-century censuses which uniquely recorded the dollar value of any real estate and personal property owned by the respondents.³ This study uses total wealth, summing two types of wealth, as the dependent variable.

There are several limitations of using Union Army dataset. First, searching for the recruits in the 1860 and 1870 censuses is confined to the states for which an index of the 1870 census is available at the time of data collection, such as the District of Columbia, Delaware, Iowa, Kansas,

² The project is sponsored by the National Bureau of Economic Research, the National Institutes of Health, the Center for Population Economics at the University of Chicago, and Brigham Young University. See more details at <http://www.cpe.uchicago.edu>.

³ Although the pension records, to which veterans are linked, contain wealth information such as wage or income, they are difficult to use for comparing veterans' wealth levels at a given period. Even if veterans are also linked to the 1850, 1900, and 1910 census data, these linkages are not used in this paper for the following reasons. First, not all the census data have enough wealth information. In the 1850 census, only real estate wealth was surveyed, and the 1900 and 1910 census data do not provide numerically measurable wealth information. Second, 1850 census-linked veterans were very young, and so were mostly unmarried in 1850. Contrarily, 1900 and 1910 census-linked veterans were very old, and so were mostly married. Thus I would not find various effects of marital status on wealth accumulation if these linkages were used.

Maine, Minnesota, Missouri, Ohio, and West Virginia. Thus, those who migrated to the states in 1870 for which the indexes were not available were excluded from the linked sample. Second, the successful linkage to the censuses was not entirely random. The index used for the linkage is a list of surnames of household heads in the states. If the name being searched for was more common, there were too many possibilities to search in a reasonable amount of time. In the case, if a recruit had more information on residence or family in the pension records, then he was more likely to be located in the censuses; if not, he was generally dropped (Fogel, 2000a and 200b).⁴ Due to these problems, the sample used in the paper is relatively small, and may not be representative of the white population in the northern states at large.

Marital status in 1860 and 1870, a key control variable, was inferred with the pension records and census data. The pension records provide detailed information on veterans' marriage and spouses, including the dates of marriage, divorce, and separation. But the pension laws were relaxed to provide pensions for almost all Union Army veterans in 1890, and in fact, the marital records are primarily collected for veterans who survived until 1898 (Fogel 2000a). This implies that the records of veterans who died prior to 1898 may have been lost or destroyed; using only pension records to establish veterans' marital status would make the results biased toward single men, particularly for the old age group. Unlike the pension records, the 1860 and 1870 census data do not have enough information on marriage and spouse. Only it is possible to infer marital status at a high accuracy by examining the last names, ages, and genders of a veteran and his other household members. But this method is not perfect. For example, a divorced person without children could be inferred as a single. Thus given limited data, the second best method is to first infer marital status with the census records, and then to correct it with the pension records. The inferring method used in this study, its accuracy, and related issues are discussed in the appendix.

⁴ The number of Union Army samples linked to the 1860 and 1870 censuses, respectively, is 11,396 and 1,620. The index for the 1870 census is now available for the entire states (particularly at <http://www.ancestry.com>), but it is still difficult to make successful linkages of those with common names.

III. MARRIAGE AND WEALTH ACCUMULATION

To estimate how much the selection of marriage affected single men's wealth accumulation, I choose 564 veterans who were single in 1860 out of 992 veterans linked to both 1860 and 1870 census manuscript schedules. In terms of the mean value of total wealth, as presented in Table 1, single veterans who were married by 1870 (the single-married group) had a higher wealth level in both years than did those who remained single in 1870 (the single-single group). Even though the gap of total wealth between two groups had been reduced due to a large growth of wealth of the single-single group, the disparity was still substantial in 1870.

[Table 1] Wealth Profile by Marital Status Change Between 1860 and 1870

Groups by Marital Status	Obs.	Average			1860			1870			% Change of Mean Wealth
		Age in 1860	Mean (\$)	Median (\$)	Zero (%)	Mean (\$)	Median (\$)	Zero (%)			
All	992	24	494	0	57.3	1,857	873	20.4	275.9		
Marital Status (1860-1870)											
Married-Married	370	32	1,041	545	9.5	2,686	1,685	8.1	158.0		
Married-Dissolved	20	36	1,210	578	10.0	1,308	500	25.0	8.1		
Dissolved-Remarried	20	29	542	206	35.0	1,503	825	20.0	177.3		
Dissolved-Dissolved	4	40	1,533	354	50.0	1,175	950	0.0	-23.4		
Single-Married	441	19	133	0	89.3	1,558	760	17.2	1071.4		
Single-Dissolved	14	21	179	0	85.7	1,373	0	57.1	667.0		
Single-Single	123	17	21	0	94.3	662	0	64.2	3052.4		

Note: Zero(%) denotes the proportion of samples who had zero valued wealth (see footnote 6).

In the marital status, the 'dissolved' group includes the divorced, separated, or widowed. The 1860 wealth level is constant value in 1870 dollars.

It is generally thought that unobservable individual characteristics can play a role in not only accumulating wealth but also deciding to marry (Nakosteen and Zimmer, 1987).⁵ If those characteristics increase both the

⁵ The large literature on determinants of marriage finds that marriage is affected by economic factors such as the relative wages of men and women, macroeconomic conditions, education, and income taxes (Alm and Whittington, 1997; Sander, 1992; Schultz, 1994). In particular, the variable of education is often used as a measure of spouse's potential wealth or earnings. Empirically, on the other hand, various studies provide strong evidence that men with a higher earning potential have more stable unions (Lehrer, 2003; Michael, 1979).

probability of being married and the level of wealth, an OLS regression would overestimate the effect of marriage on wealth accumulation. But if they work in the opposite direction, marital wealth premium could be underestimated in an OLS regression.

To check out the significance of endogeneity and the direction of bias, I start this section with a two-stage probit least squares model (2SPLS). The key assumption of the model is that a single veteran's individual characteristics influence his choice of marriage between 1860 and 1870, and his decision affects subsequent wealth accumulation by 1870.

A wealth equation that accounts for the value of marriage is:

$$\ln W_7 = \alpha \ln W_6 + \beta M + X \cdot \Pi + \varepsilon, \quad \varepsilon \sim N(0, \sigma_\varepsilon^2) \quad (1)$$

where $\ln W_7$ and $\ln W_6$ denote the logarithms of 1870 and 1860 wealth respectively, and M denotes an indicator variable indicating whether or not the veteran got married by 1870.⁶ Additionally, the matrix X as determinants of wealth accumulation includes age in 1860, its squared value, illiteracy, and nativity, total wealth of other household members in 1860, and height at enlistment. Several indicator variables are also used to estimate whether the movement to another state, from rural to urban, or from urban to rural area had a meaningful influence on wealth accumulation.⁷ Occupation accounts for a large part of personal wealth level because wage income is quite different across occupations. Occupation also reflects educational level and unobservable individual ability, which cannot be obtained from the given data. I particularly use indicator variables that indicate occupational changes between 1860 and 1870.⁸ Finally, the years of military service throughout the Civil War will

⁶ Note that the 1870 census enumerator instructions excluded the value of clothing and cases where the total value of personal property was less than \$100; these exceptions were not included in the instructions for 1860 (Source: <http://www.ipums.org>). For veterans who possessed no wealth, the log of wealth was given as zero. Moreover, I used the 1860 wealth level which was adjusted to 1870 dollars. (1860:1870=84.81:100; source: Berry, 1988)

⁷ The 100 cities with the largest populations, based on the 1860 and 1870 censuses, are classified into urban areas. (source: Gibson, 1998)

⁸ There are two notable points about occupation data. First, 86% of recruits in the sample belonged were unemployed in 1860. Even if we imagine any high unemployment rate or presence of numerous young men in the sample, this value is still unacceptable. One possible explanation is that when a person was working in his father's farm, his occupation was not recorded, either as a

show the effect of wartime experiences on later wealth.⁹

The marital selection equation in the 2SPLS model is described using a probit model as follows:

$$M^* = \alpha_2 \ln W_6 + Z \cdot \Phi + u, \quad u \sim N(0, 1) \quad (2)$$

$$M = 1 \text{ if } M^* > 0, \quad 0 \text{ otherwise} \quad (3)$$

where M^* denotes an unobservable index of the propensity of a veteran to be observed as married in 1870, and Z is a vector of explanatory variables that influence the choice of marriage. It is also assumed that u and ε are correlated. The identification of the wealth equation parameters, in particular the coefficient of marital selection (β), requires this marital selection equation to include at least one exclusive variable in Z that is not contained in the wealth equation. For the variable, I include the ratio of females to males in the 1860 state who share the veteran's state or country of birth. A higher sex ratio would have increased a single veteran's probability of getting married to a woman with the similar ethnic and cultural background.¹⁰

The estimation procedure goes through two stages. At the first stage, I run a maximum likelihood probit of marital selection on 1860 wealth and other explanatory variables Z . After obtaining the estimated inverse Mills ratios (λ), at the second stage, I run the OLS regression of $\ln W_7$ on $\ln W_6$, M , X and λ (Maddala, 1983; Wooldridge, 2002).

farm manager or farm laborer. This explanation is partly supported by the fact that 64% of men in the unemployed category in 1860 are denoted as farmers, farm managers, or farm laborers in the 1870 census. Second, veterans' occupations are biased toward the farmer group. For example, the proportions of occupations in 1870 are 55% of farmers, 6% of white collar workers, 30% of blue collar workers, and 9% of unemployed groups. This is reinforced by the regional distribution of the sample. First, the sample over-represents the West North Central region where a larger share of the population would be engaged in agriculture than in other regions. Second, 91% of veterans in 1860 and 94% in 1870 were living in rural areas.

⁹ Some studies of the Union Army veterans' dataset use the year of enlistment year, wartime experiences of illnesses and wounds, or company mortality rate to measure the level of wartime stress and health (Lee, 2005). Even though I use those variables instead of the years of military service, I find similar implications with what Table 2 reports. It is because the years of military service are highly correlated with other measures of wartime experiences as seen in Table 3.

¹⁰ For native-born veterans, I use the U.S. state of birth. For foreign-born veterans, I use the countries where they were born. The correlation coefficient between the sex-ratio variable and the 1870 total wealth is estimated 0.0355 with the p-value of 0.4239; it is thought that the exclusive variable is little related to wealth accumulation.

[Table 2] Selection of Marriage and Wealth Accumulation among Union Army Veterans

Variables	Mean	2SPLS				OLS	
		Stage 1: Probit		Stage 2: OLS		ln(1870 Total Wealth)	
		Dummy=1 if Married in 1860-1870		ln(1870 Total Wealth)		Estimate	S.E.
		dp/dx	S.E.	Estimate	S.E.	Estimate	S.E.
Dummy=1 if Married in 1860-1870	0.7785			5.5955 ***	1.8114	2.3277 ***	0.3185
Personal Characteristics							
1860 Age	18.91	0.0649 ***	0.0190	-0.0134	0.1815	0.2092	0.1353
1860 Age ² ×10 ⁻²	3.7773	-0.1291 ***	0.0398	0.1766	0.3744	-0.2589	0.2901
Dummy=1 if Illiterate	0.0685	0.1245 **	0.0511	-0.9288 *	0.5331	-0.5585	0.4947
Dummy=1 if U.S. Born	0.9269	0.2016 **	0.0973	-0.3070	0.5992	0.3130	0.4960
ln(1860 Total Wealth)	0.6836	0.0153	0.0132	0.0724	0.0733	0.1001	0.0719
ln(1860 Total Household Wealth)	6.8320	0.0084	0.0080	0.0275	0.0546	0.0533	0.0529
Height at Enlistment (cm)	173.6	0.0010	0.0032	0.0431 **	0.0204	0.0476 **	0.0203
Dummy of Mobility (1860, 1870)							
Moved to Another State	0.1187	0.0199	0.0601	-0.7116 *	0.3846	-0.6617 *	0.3847
Rural, Rural	0.9384	-0.1528 **	0.0678	1.8143	1.1518	1.0573	1.0782
Rural, Urban	0.0251	-0.1227	0.2709	-1.8786	1.3260	-2.1818 *	1.3194
Urban, Rural	0.0205	-0.5377 **	0.2735	1.4102	1.6024	-0.1188	1.3718
Urban, Urban	0.0160	Omitted		Omitted		Omitted	
Dummy of Occupation (1860, 1870)							
Employed, Farmer	0.0571	0.1008	0.0644	0.0045	0.7304	0.4861	0.6834
Employed, White Collar Worker	0.0137	-0.2283	0.2273	0.6995	1.2093	-0.0332	1.1445
Employed, Blue Collar Worker	0.0274	-0.0137	0.1322	-2.8656 ***	0.8701	-2.7775 ***	0.8712
Employed, Unemployed	0.0091	0.0661	0.1551	-2.0296	1.4844	-1.6630	1.4750
Unemployed, Farmer	0.4863	0.2305 ***	0.0653	0.4526	0.6528	1.2744 ***	0.4757
Unemployed, White Collar Worker	0.0594	0.0312	0.0848	0.0009	0.6734	0.2560	0.6607
Unemployed, Blue Collar Worker	0.2648	0.0541	0.0628	-1.3582 ***	0.5109	-1.0987 **	0.4923
Unemployed, Unemployed	0.0822	Omitted		Omitted		Omitted	
Experience in Military Service							
Years of Military Service	3.4041	0.0467 ***	0.0154	-0.2229 *	0.1249	-0.0859	0.1003
State Sex Ratio of Females to Males	0.4448	0.3219 **	0.1333				
Inverse Mills Ratio				-1.9241 *	1.0500		
Intercept				-7.5568 **	3.7222	-9.3838 ***	3.5963
LR χ^2 or F (P-value)		75.92 (0.000)		13.88 (0.000)		14.32 (0.000)	
Pseudo or Adjusted R ²		0.1639		0.3823		0.3788	

Note: The sample is limited to 564 veterans who were single in 1860. 'State Sex Ratio' means the ratio of females to males in the 1860 state who share the veteran's state or county of birth. The probit regression reports the coefficients of marginal effect. Single asterisk denotes statistical significance at the 90% level of confidence, double 95%, triple 99%.

Table 2 presents the results of the 2SPLS model as well as the OLS regression. The estimation of marital selection equation in the 2SPLS model says that the association between age and marital selection is significantly described by an inverse U shape with the threshold age of 25. Literacy did not increase the likelihood of being married. Native-born veterans had a 20 percent higher chance of marriage than immigrants. Although the coefficients miss significance by a small margin, wealth variables—individual wealth in 1860 and family's financial background—have positive correlations with marital selection, and taller veterans seem to have been more attractive in the marriage market. The veterans who settled down in urban areas in 1870 were more likely to be married than those in rural areas. The veterans who became farmers had a 23 percent higher probability of being married than otherwise. This means that occupation is a key factor in marriage market, reflecting the significance of socioeconomic status.

The marginal effect of the years of military service suggests that one more year in military camps increased the likelihood of being married by 5 percent. There are three possible explanations. First, those who served more years in the war might have had a high enough level of human capital and health status to conduct hazardous military tasks, and the able veterans were more likely to be married. Second, a large fraction of the early Union Army enlistees were volunteers, while the late enlistees who entered the Union Army in 1864 or 1865 were usually substitutes and bounty hunters (Costa and Khan, 2008). Thus, the early enlistees—who served longer years in the war—were more likely from high socioeconomic backgrounds than the late enlistees who served shorter years. Third, Union Army recruits were paid higher than general populations in the wartime period.¹¹ Thus, the recruits who served longer years and survived the war could have saved a substantial amount of wealth by the time of being discharged. This might explain to some extent the difference in the probability of marriage by the length of military service.

¹¹ The average military annual pay—including allowances—for all personnel was \$510 in 1865, and the average annual earnings of nonfarm employees in 1865 was \$512 (source: U.S. Bureau of the Census, 1975, Series D924 and D 736). Considering that Union Army soldiers were much younger than general populations in labor market, this implies that the recruits were highly paid.

For the exclusive variable, finally, one percentage point higher level in the 1860 state sex ratio of females to males who shared the veteran's birthplace increased the probability of marriage by about 0.3 percent.

At the second stage, whether we accept the assumption of endogeneity depends on the significance of the coefficient of inverse Mills ratio (λ)—the selectivity term. Although both 2SPLS and OLS regression results show the significant positive effect of marital selection on veterans' wealth accumulation, the coefficient of λ in the 2SPLS model justifies that the OLS estimate is biased. In particular, Table 2 suggests that the OLS regression estimate without controlling for the endogeneity problem underestimates the effect of marriage on wealth accumulation. This means that individual ability worked in the opposite direction in marriage market and wealth accumulation.

[Table 3] Comparison of Wartime Experience by Marital Status

Wartime Experience	Mean of Entire Union Army Sample	Group of Marital Status Change (1860-1870)		Two-Sample t Test: P-value for H_0 : (1)-(2)<0
		(1)	(2)	
		Single-Single	Single-Married	
Years of Military Service	2.7481	2.9478	3.3646	0.0018
Probability of Illness	0.6440	0.7217	0.7342	0.3958
Probability of Wounds	0.2708	0.1826	0.3013	0.0060
Company Mortality Rate	0.1015	0.1378	0.1627	0.0275
Probability of POW	0.0916	0.0522	0.0911	0.0908

Note: The sample is limited to 564 veterans who were single in 1860.

One possible explanation for this result can be found in the difference of wartime experiences between the single-single and the single-married groups. As discussed above, those with ability at enlistment—in terms of human capital and health—served more years in the Civil War and had a higher chance of marriage by 1870. This also implies that those veterans had more hazardous experiences throughout the Civil War. Table 3 compares the wartime experience by marital status. Except the probability of illness in the war, the single-married group had significantly higher chances of wounds and being a prisoner of war than the single-single

group. In terms of wartime mortality rate among the company members, the single-married group had more stressful and unhealthy experiences during the Civil War. Lee (2005) reveals that those unhealthy wartime experiences had significant adverse impacts on later wealth accumulation; it is believed that the war-related health problems among the single-married group deteriorated the positive effect of marriage on wealth accumulation.

Wartime experience is represented by the years of military service in Table 2. In particular, the coefficient in the 2SPLS estimation suggests that additional year in military service led to wealth accumulation about 20 percent less than did the average year. Those who served longer years in the war were more frequently infected and wounded during the wartime; they would be less productive in wealth accumulation over the life time. Another possible explanation of the above result is the crowding-out effect of pensions, i.e. the reduction in individual savings or accumulation of non-pension wealth due to pension wealth. This argument is plausible because a positive correlation between military service duration and pension amount is found in the data. According to the Civil War pension laws, pensions were given to only the veterans who were severely injured in the war until the pension laws were relaxed to provide pensions for almost all Union Army veterans in 1890. Thus, the amount of pensions in the 1860-1870 period represent adverse health-related experiences in the wartime as well as additional wealth.¹² But without additional information on veterans' savings and consumption behaviors, it is difficult to identify whether pensions worked as compensation for impaired health or as extra income.¹³

¹² In the data, the average monthly pension amount as of 1870 (including non-recipients) increases with service year: \$0.15 for one year, \$1.06 for two years, \$1.56 for three years, \$1.52 for four years, and \$2.11 for five years. Additionally the ratio of pension recipients is higher for the longer-year-service group: 4.3% for one year, 22.1% for two years, 29.7% for three years, 31.3% for four years, and 33.9% for five years. These imply that those who served more years in the war had a higher chance of severely being infected or wounded.

¹³ The identification between wartime health effect and crowding-out effect can be partially examined by adding the numbers of wartime illness and wounds and the 1870 monthly pension amount in the 2SPLS model of Table 2. Their coefficients and p-values are estimated -0.7945 (0.013) for illness, -0.0268 (0.825) for wounds, and 0.0069 (0.891) for pensions without any significant changes for the other coefficients. This suggests that wartime health effect seems more substantial than crowding-out effect. However, after 1890 when the pension laws were relaxed and the number of pensioners dramatically increased, the crowding-out effect would become more

[Table 4] Marital Wealth Premium on Married Men by Marital Duration and Occupation

Dependent Variable: ln(1870 Total Wealth)	
Key Control Variables	Estimate (S.E.)
<i>Panel A: Marital Duration and Wealth Accumulation (Longitudinal Analysis Using UA Sample)</i>	
Duration of Marriage (Years)	0.6019 *** (0.1320)
Adjusted R ²	0.3479
n	405
<i>Panel B: Wealth Premium by Occupation (Cross-sectional Analysis Using the 1870 IPUMS sample)</i>	
D(Married)	2.1180 *** (0.0354)
D(Married) × D(Farmer)	0.1931 *** (0.0618)
D(Married) × D(Craftsman)	0.6576 *** (0.0620)
D(Married) × D(Labor Worker)	-0.6789 *** (0.0557)
D(Married) × D(Other Occupations)	Omitted
D(Farmer)	1.6850 *** (0.0565)
D(Craftsman)	-0.2182 *** (0.0510)
D(Labor Worker)	-0.3259 *** (0.0423)
D(Other Occupations)	Omitted
Adjusted R ²	0.4055
n	76,146

Note: Panel A reports the result of 2SLS regression that was conducted for the single-single veterans and the single-married veterans whose years of marriage are known. I use the same control and exclusive variables that appear in Table 2. Panel B reports the result of OLS regression conducted for males aged 20-65 in the 1870 IPUMS. Besides the variables reported, I controlled for age, its squared value, number of children, race and literacy. 'D(Married)' denotes the dummy variable that gives the value of one if the sample were married in 1870. 'D(*Name of Occupation*)' is the dummy variable indicating each type of occupation named in parenthesis. Single asterisk denotes statistical significance at the 90% level of confidence, double 95%, triple 99%.

substantial because pensions were given to old veterans without proving their health relevance to the war. In this aspect, Costa (1998) shows that monthly pensions well explain old veterans' early retirement decision in c. 1900 and discusses the evolution of American pension and retirement over the twentieth century.

From the result of the 2SPLS model, the single-married veterans accumulated total wealth in 1870 more than 5 times than did the single-single veterans, considering initial wealth, personal characteristics and endogeneity issues.¹⁴ This huge wealth premium on married veterans is also well supported by the analysis of marital duration. In panel A of Table 4, I choose the single-single veterans and the single-married veterans whose years of marriage are known, use the years of married life instead of an indicator of marriage in equation (1), and keep the other control and exclusive variables. I then employ a two-stage least squares (2SLS) model to control for the possible endogeneity problem. Panel A of Table 4 reports only the coefficients and standard errors of key control variables in the wealth equation of 2SLS regression.¹⁵ The result suggests that one more marital year increased the 1870 total wealth by 60 percent. The average marital duration—assuming that the marital duration of the single-single is zero—is 3.9 years. This implies that a representative married veteran accumulated total wealth over the average marital years by 625% ($= (1+0.6)^{3.9} \times 100$) than the single-single veterans, which is similar with what is found in the 2SPLS regression of Table 2.

Where did this huge marital wealth premium come from? Before paying attention to the productivity change of married men (wage or income premium) and the role of wives in household production, it is necessary to review the role of inheritance and wives' dowries and earnings in men's wealth accumulation, which are related with marriage.¹⁶

¹⁴ Regarding other control variables, illiterate veterans accumulated a half level of wealth that literate veterans did. Taller veterans accumulated more wealth, which suggests a positive influence on later productivity of nutritional status in early life (Fogel, 1994; Strauss and Thomas, 1998; Schultz, 2002). Those who moved to another state between 1860 and 1870 had a disadvantage in wealth accumulation. It is partially because people at the low socioeconomic status moved to get better economic opportunities in mid-nineteenth-century America (Ferrie, 1997). Those who were blue collar workers in 1870 accumulated less wealth than other occupational groups.

¹⁵ The significance of endogeneity can be checked out in the 2SLS model by containing the OLS regression residuals of the marital equation in the wealth equation. The 2SLS result also suggests that the OLS result underestimates the effect of marital duration on wealth accumulation. The implications of other control variables are much similar with those found in Table 2.

¹⁶ Soltow (1975) estimates that the average personal wealth level was around 3.5 times as large as annual personal income in the mid-nineteenth century. This implies that most wealth consisted of savings, capital gains and asset holdings, which were strongly affected by the amounts of inheritances as well as income. Additionally, if women's property rights were not well established, wives' dowries and earnings might influence married men's wealth.

Assuming that men inherited family assets only when their parents passed away, Soltow (1982) estimated the amount of inheritance by ages of sons, using the 1870 census data. According to his estimate, the average amount of inheritance of males aged 20-29 in 1870 was \$311; the difference in inheritance by age is estimated as \$10 per additional year. Considering the similar age distribution between the single-single and the single-married group, and assuming that the probability of parents' death was identical between two groups, I surmise that the amount of inheritance at parents' death and its effect on wealth accumulation were similar between two groups, on average.¹⁷ On the other hand, married men could have received a part of their inheritance when they got married. But this seems to have not been a major factor of the wealth premium on married men. From the Union Army veterans' data, the average total wealth of other household members in the single-married group is \$2,980, while that of the single-single group is \$3,475 in 1860 dollars. Moreover, the coefficient of household wealth in explaining individual wealth accumulation in Table 2 is insignificant.

Parents transfer wealth to their daughters primarily in the form of dowries, which are a kind of inheritance to the bride. The custom of dowries was prevalent in some European countries, Latin America, and China in the nineteenth century. The dowries are thought to have played a substantial role in married men's wealth accumulation in these countries. In my knowledge, however, dowries were not used in nineteenth-century America. This is supported by some studies on European emigration to America in the mid-nineteenth century. According to Schrier (1958) and Jackson (1984), a loss of dowries was a factor encouraging Irish female emigration to America.¹⁸ I thus conclude that American married men's wealth was little affected by their wives' inheritance in the form of dowries in the 1860-1870 period.

Finally, if veterans' wives worked outside for earnings, but their property rights were poorly established, married men could take

¹⁷ The average age of the single-married veterans was 29 in 1870, and that of the single-single group was 27.

¹⁸ Schrier (1958) provides a letter from an emigrant woman in America to her brother back in Ireland: "Over in Ireland, people marry for riches, but here in America, we marry for love and work for riches."

possession of their wives' earnings or income. Upon marriage, in the eighteenth and early nineteenth century, a woman did not have any right to control property that was hers prior to the marriage, nor did she have rights to acquire any property during marriage. A married woman could not make contracts, keep or control her own wages or any rents, transfer property, sell property or bring any lawsuit. Married women's property rights were not well established until 1848, when New York State passed the Married Women's Property Act. This act was a model for many other states that passed similar acts during 1848-1895 (Hoff-Wilson, 1991). Therefore, the 1860-1870 period was a transition period in terms of women's property. Some married veterans might possess their wives' property while others could not. Regardless, women's labor force participation rate was very low in nineteenth-century America. For instance, less than 1 percent of wives of married veterans were working for pay in 1870.¹⁹ This implies that the effect of wives' earnings on married men's wealth was negligible.

In sum, there is little evidence that married veterans benefited from their inheritance or their wives' dowries and earnings. It is more likely that the wealth premium on married men mainly resulted from the income or wage premium associated with marriage. The higher earnings allowed married men to save more and to earn more asset in come than single men. Alter, Goldin, and Rotella (1994) describe the savings behavior of ordinary Americans in the mid-nineteenth century as follows: the majority of bank account holders were male household heads, most of whom were married. Even though I cannot estimate the income or wage disparities by marital status, available evidence makes me believe that the income or wage premium for married men explains most of wealth premium for married men in the 1860-1870 period.

In the economics of marriage, several hypotheses have been considered to explain men's marital wealth premium. One argument comes from economies of scale. Married couples can share many household goods and services, so the cost to each individual is lower than if each one

¹⁹ In 1890, only 4.6 % of married females were working for being paid, while 40.5% of single females 15 years old and over were. (*source*: U.S. Census Bureau, 1975, Series D 58-62, p.133). Since the marital status was not surveyed in the 1870 census, we do not know the rate of married females' labor force participation in 1870. But it is thought to be lower than that in 1890.

purchased and used the same items individually (Waite, 1995). Another argument is that married men earn a wage premium because marriage makes men more productive, so allows them to earn higher wage, because their wives specialize in household production (Becker, 1991). This wage premium leads to higher wealth for men if possibly married men are encouraged to save more, for the household, for children's education and bequests or to buy more goods, services and assets for like land, house, and furniture (Rindfuss and VadenHeuvel, 1990).

Because mid-nineteenth-century America was characterized by low labor force participation of women,²⁰ one can surmise that they were more dedicated to motherhood and housekeeping. Under this social environment, married men could be more productive in their working activities than single men.²¹

On the other hand, although women's labor force participation rate was very low throughout the nineteenth century, their unpaid labor was essential in family-owned businesses like farming. Craig's (1991) study on the value of household labor in antebellum northern agriculture show that the contribution of adult females to agricultural output in 1860 was at the 67 percent of the level of adult males aged 19 to 54. In panel B of Table 4, I compare the marital wealth premium by occupation, using the 1870 IPUMS (Integrated Public Use Micro data Series) samples and including the interaction terms between two indicators of marital status (married or single) and occupation (farmer, craftsman, laborer or other occupational groups). Although the regression uses a cross-sectional dataset and so does not fix the endogeneity problem, the estimates suggest that married men engaged in farming or crafts business—in which unpaid

²⁰ Women's labor force participation rate has substantially increased over the past two centuries: 4.6% in 1800, 9.7% in 1860, 18.8% in 1900, 30.9% in 1950, and 60.2% in 2000 (*Sources*: Weiss, 1986; U.S. Census Bureau, 1975 and 2003).

²¹ It is difficult to identify the hypotheses—cost sharing or productivity improvement—of marital wealth premium on married men without additional information. But the Union Army data also show that productivity might have been improved along with marriage in various aspects of human capital accumulation. One aspect is the improvement in lifetime health outcomes. For example, the single-married group died at the age of about 71 on average, while the average death age of the single-single group was about 68. Similarly, the married-married group died at the age of about 72 on average, while the average death age of the married-dissolved group was about 70. Although their idiosyncratic experiences over the life time need to be examined more, the difference in death age by marital status suggests that marital stability could be beneficial to human capital accumulation measured by life expectancy.

labor forces of family members were contributable—had higher levels of wealth in 1870 than did married laborers or those in other occupations.²²

IV. MARITAL DISSOLUTION AND REMARRIAGE

Marital dissolution—which is classified by one of three types: being divorced, separated or widowed—can be endogenously determined by individual characteristics that also affect wealth accumulation.²³ The economic impact of marital instability will be analyzed with a similar framework that used in the previous section except that the variable M in equations (1)-(3) denotes an indicator of marital dissolution, not marriage, in this section.

For 390 veterans who were married in 1860, Table 5 presents the results of the 2SPLS model and the OLS regression. Many of the control variables used in the previous section are also shown, but there are some differences. Since there is no variation of marital status by the type of geographical mobility due to the low frequency of marital dissolution, I dropped those indicators of mobility. For the same reason, I controlled for occupation in 1870 rather than occupational change over the decade. The inclusion of number of children by age group shows the role of children in marital dissolution and wealth accumulation. Finally, as an exclusive variable for identifying the coefficient of marital dissolution in the 2SPLS model, I include the divorce rate of counties where veterans resided in 1860.²⁴

From the probit estimates, no selective variable accounts for the behavior of marital dissolution; the endogeneity is not significantly justified so that the OLS estimates are believed to be unbiased. The OLS estimates predict that the effect of divorce on wealth accumulation was significantly negative. Assuming that other characteristics are constant,

²² In spite of cross-sectional dataset, I use the IPUMS samples here because the size of Union Army veteran sample is not extensive enough to look into the marital wealth premium by various occupational groups.

²³ Wife's death is considered to be more exogenously determined than other types of marital dissolution.

²⁴ Divorce rate by county was calculated from the 1860 IPUMS dataset. County divorce rate is thought to have shown the difference in divorce law and divorce practice by state and the religious and cultural influence on divorce prevailing across county and state (Riley, 1991).

veterans who were married in 1860, but dissolved by 1870 accumulated only about a third level of the wealth that continuously-married veterans did.²⁵

[Table 5] Marital Dissolution and Wealth Accumulation among Union Army Veterans in 1860-1870

Variables	Mean	2SPLS				OLS	
		Stage 1: Probit Dummy=1 if Divorced in 1860-1870		Stage 2: OLS ln(1870 Total Wealth)		ln(1870 Total Wealth)	
		dp/dx	S.E.	Estimate	S.E.	Estimate	S.E.
Dummy=1 if Dissolved in 1860-1870	0.0516			-3.2361	4.0275	-1.9633 ***	0.5331
1860 Age	32.00	-0.0057	0.0091	0.0177	0.1329	0.0419	0.1091
1860 Age ² ×10 ⁻²	10.82	0.0110	0.0114	-0.0403	0.1934	-0.0802	0.1471
Dummy=1 if Illiterate	0.1194	-0.0023	0.0318	-0.7737 **	0.3622	-0.7780 **	0.3614
Dummy=1 if U.S. Born	0.8903	-0.0226	0.0425	0.1497	0.4210	0.1845	0.4060
ln(1860 Total Wealth)	5.8723	0.0016	0.0055	0.2949 ***	0.0588	0.2917 ***	0.0579
Number of Children in 1860							
Age≤10	2.1645	0.0086	0.0072	-0.0608	0.0957	-0.0747	0.0851
Age>10	0.3355	-0.0229	0.0182	0.2007	0.2284	0.2391	0.1940
Height at Enlistment (cm)	174.8	-0.0014	0.0017	0.0112	0.0202	0.0133	0.0191
Dummy=1 if Moved to Another State	0.0839	-0.0177	0.0288	-0.3175	0.4353	-0.2870	0.4241
Dummy=1 if Farmer in 1870	0.6097	-0.0089	0.0230	1.3044 ***	0.2474	1.3142 ***	0.2452
Years of Military Service	3.1806	0.0137	0.0091	-0.0151	0.1116	-0.0317	0.0987
County Divorce Rate in 1860	0.0396	0.2634	0.2387				
Inverse Mills Ratio				0.6086	1.9087		
Intercept				2.2426	4.4673	1.5222 ***	3.8490
LR χ^2 or F (P-value)		11.03 (0.527)		7.91 (0.000)		8.58 (0.000)	
Pseudo or Adjusted R ²		0.0774		0.2024		0.2045	

Note: The sample is limited to 390 veterans who were married in 1860. The probit regression reports the coefficient of marginal effect. Single asterisk denotes statistical significance at the 90% level of confidence, double 95%, triple 99%.

With the help of the pension records of veterans, I could figure out whether absence of a wife initially inferred from the census data is a result of death or divorce. But the sample of the married group in 1860

²⁵ On the other hand, an age effect is not found because most veterans in this subsample are old. Those who were literate and initially richer accumulated more wealth. Farmers in 1870 accumulated 130 percent more wealth than did other occupational groups.

can not be used to properly estimate the effect of the wife's death on men's wealth because only there are only a few observations where the wife died between 1860-1870. Therefore, I choose 869 veterans who had ever been married by 1870, out of whom 52 and 22 had experienced divorce and death of the wife, respectively. Among the latter two subgroups, 36 veterans were remarried in 1870, and so the effect remarriage on wealth also can be estimated.

First, panel A of Table 6 employs two indicator variables that indicate the experience of divorce and wife's death, regardless of remarriage. Since the endogeneity of divorce and wealth is not justified, I run an OLS regression of 1870 wealth on these two indicator variables and other control variables. Although both experiences of divorce and wife's death had significant negative effects on men's wealth accumulation, the effect of wife's death is much more substantial than that of divorce.²⁶ The relatively small effect of divorce can be explained by two possibilities. Although the endogeneity of divorce or wife's death is statistically rejected in the given data, divorce could be more endogenously determined than wife's death. For example, veterans who would be less adversely affected from divorce would more likely choose to divorce. Similarly, while death of the wife would leave most responsibility of raising younger children on the widower, an ex-wife might be able to live with younger children after divorce. These cases suggest that the effect of divorce on men's wealth accumulation after marital dissolution could be relatively smaller than that of wife's death.

Second, panel B of Table 6 shows that veterans who were ever divorced or widowed before 1870, but not remarried by 1870, had a significant disadvantage in wealth accumulation; the coefficient of remarried veterans is also significantly negative, but its absolute value is slightly lower than that of non-remarried veterans. This partially shows the positive aspect of remarriage in men's wealth accumulation, but even remarried veterans accumulated much less wealth than did those who had never experienced marital splits (the omitted group in panel B of Table 6). Some studies argue that the remarried have traits that make them more

²⁶ The hypothesis that two coefficients are statistically identical is rejected with the p-value of 0.0377.

susceptible to a future divorce and decrease their gains from marriage (Becker, 1991). But there may also be a learning effect: a failed marriage may provide an experience that increases the chances of success in a future union (Lehrer, 2003). However, the results of this study support the first argument.

[Table 6] Effects of Type of Marital Dissolution and Remarriage on Wealth Accumulation

Dependent Variable: ln(1870 Total Wealth)	
Key Control Variables	Estimate (S.E.)
<i>Panel A: Effect by Type of Marital Dissolution</i>	
Dummy=1 if Ever Divorced	-1.1215 *** (0.3504)
Dummy=1 if Ever Widowed	-2.4153 *** (0.5257)
Dummy=1 if Never Dissolved	Omitted
Adjusted R ²	0.2856
<i>Panel B: Effect of Remarriage</i>	
Dummy=1 if Ever Dissolved and Not Remarried	-1.8971 *** (0.4131)
Dummy=1 if Ever Dissolved and Remarried	-1.1383 *** (0.4064)
Dummy=1 if Never Dissolved	Omitted
Adjusted R ²	0.2832

Note: The table shows the OLS regression estimation results. The sample is limited to 869 veterans who were ever married by 1870. The category of 'divorced' includes the separated. The category of 'dissolved' includes the divorced, separated or widowed. Besides the key variable reported, I controlled for the same variables that appear in Table 5. Single asterisk denotes statistical significance at the 90% level of confidence, double 95%, triple 99%.

I also estimate that veterans who never experienced marital splits had about 112 and 242 percent of a wealth premium over those who experienced divorce or the death of one's wife, respectively (based on the regression coefficients in panel A of Table 6). What caused these substantial disparities? One possibility is that divorced veterans paid a large amount of alimony and child support. Even though the concerns about the position of women and children in divorce were increasing in

mid-nineteenth-century America and so various legal protections for them were addressed, still faced many disadvantages in divorce.²⁷ So it is not evident that men had to pay a substantial portion of their wealth to their ex-wife and children after divorce. Likewise, significantly change men's, I do not find any particular factors which could cause the large disturbance in men's wealth accumulation after divorce other than the absence of wife.

V. CONCLUDING REMARKS

Using Union Army veterans' sample linked to both 1860 and 1870 census manuscript schedules, this paper has presented a positive effect of marriage and the negative effect of marital splits on men's accumulation of total wealth in mid-nineteenth-century America.²⁸ It also shows that a longer marriage led to a higher level of wealth, and remarriage had some positive aspects in terms of the economic gains even if these gains were less than those from an undissolved marriage. The marital wealth premium on married men was more substantial among farmers and craftsmen.

From the historical perspective, this study explains the substantial gain from marriage in two socio-economic aspects of nineteenth-century America: the role of wives in household production and their unpaid labor in family-owned businesses. Many economists and sociologists have studied why married men receive more wages and wealth, mostly using

²⁷ Divorce was relatively rare in colonial America. In response to the liberalization of divorce laws in most states, such as the divorce act of 1857, the divorce rate increased steadily during the nineteenth century. On the other hand, in early nineteenth-century America based on the Traditional English rule of paternal preference, mothers almost never won custody of their children in divorce cases. Beginning in the first third of the nineteenth century, however, the strict paternal preference rule began to erode. American society in general became preoccupied with the 'cult of motherhood'. By the 1850s, the trend toward maternal preference was well-established. But most single mothers could not support their children without relying on local poor-relief. The concerns about women and children in divorce began to increase, and each state began to legislate for alimony and child support. However, in order to recover for child support, women had to prove not only that their ex-husband was at fault for the divorce, but also that their ex-husband was also at fault in failing to support children (Hansen, 1999).

²⁸ This paper regards only the accumulation of total wealth that sums real estate and personal property value recorded in the 1870 census. Although the results are not reported, I find the same implications for each type of wealth.

modern data. In particular, there has been a debate between the selection hypothesis (that more productive men are more likely to be married) and the productivity hypothesis (that marriage causes higher productivity and hence higher wages). Controlling for the selection hypothesis, the findings in this study well support the productivity hypothesis.

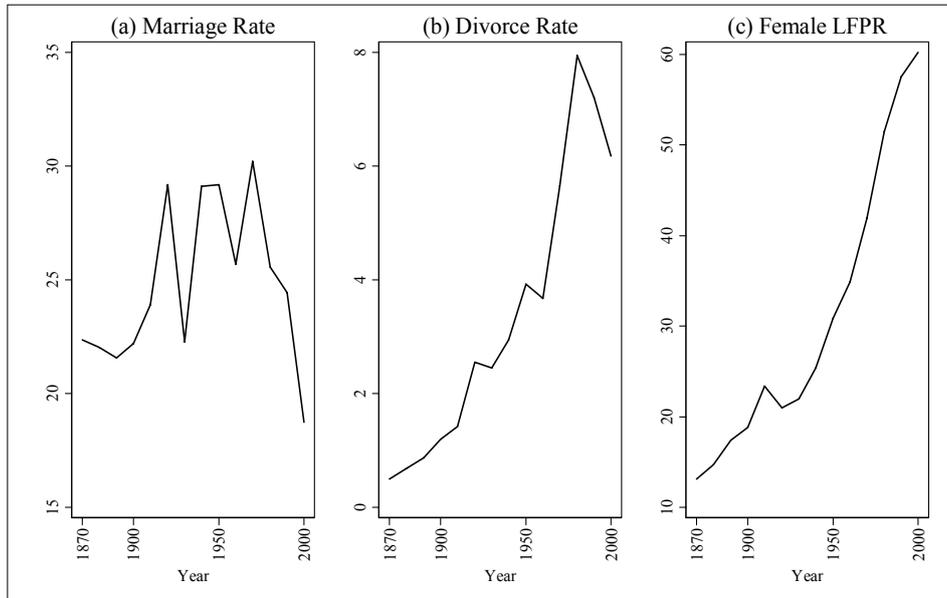
Household characteristics in the 1860-1870 period were different from those in the twentieth century. As seen in Figure 1, the divorce rate was quite low during 1860-1870 in contrast with its remarkable increase over the twentieth century; the marriage rate was low relative to the mid-twentieth century, but a bit higher than the rate in the late twentieth century; women's labor force participation rate has substantially increased, and the role of wives in household has also changed much. Following the productivity hypothesis, I expect that married men's wealth premium has been reduced much over time. In fact, the wealth and income premium on married men estimated by recent studies using modern data is much less than what this study estimates using historical data; the marital wealth premium was much higher in the mid-nineteenth century than today's.²⁹ Gary (1997) argues that 11 percent earnings premium paid to married compared with single men existed during 1976-1980, but it declined by more than 40% during the 1980s. In his study, the reason for its decline is explained largely by the decline in married men's productivity.

Regarding the effect of marital dissolution on wealth accumulation, the result of this study is also different with that of recent studies. Most recent studies have shown that men's personal incomes undergo little change after divorce (Jarvis and Jenkins, 1999; Smock, 1994). Lupton and Smith (2003) show that families after divorce decumulated wealth by 13% during 1984-1989. Using 1967-1981 PSID subsamples, Duncan and Hoffman (1985) show that most divorced or separated men are

²⁹ From the wealth statistics presented in Lupton and Smith (2003), I calculate that there were about 30 percent of wealth premium and 100 percent of income premium for households whose heads were married during 1984-1989. These calculations are based on means of family wealth and income by marital transition in Tables 6.5 and 6.6 of Lupton and Smith (2003). If initial wealth, income and other personal characteristics were controlled for, the actual wealth and income premiums can be different from those presented here. Additionally, many previous studies using modern data have shown that the wage premium at a given time between single and married men ranges from 10 to 50 percent in the late twentieth century (Chun and Lee, 2001; Duncan and Holmlund, 1983; Gary, 1997; Hill, 1979; Korenman and Neumark, 1991).

immediately better off after divorce or separation. The authors argue that these men retain most of their labor income and no longer have to provide as many resources for their former families even if alimony and child support are paid. Even though the effect of the death of the wife is less known, Lupton and Smith (2003) show that the wealth of widowers increases after the wife's death. In sum, a large, negative effect of marital dissolution on men' wealth is not supported in modern studies. This partially implies that marital wealth premium on married men and the role of wives was more substantial during 1860-1870 than today.

[Figure 1] U.S. Trends of Marriage, Divorce, and Female Labor Force Participation Rates



Note: All the rates were calculated for every decadal year in 1870-2000. Marriage rate is the number of marriages per 1,000 population aged 15 to 39. Divorce rate is the number of divorces per 1,000 population aged 15 to 64. Labor force data for 1800-1860 refer to females 10 years and over, and those 16 years and over are used for 1870-2000.

Sources: Figures (a) and (b): 1870-1960: National Center for Health Statistics (1973), Table 1, p. 22; 1970-1980: National Center for Health Statistics (1990), Table 1, p. 8; 1990-2000: U.S. Census Bureau (2003), No. 83, p. 72. Figure (c): 1870-1970: U.S. Census Bureau (1975), Series D 13, p. 128; 1980-2000: U.S. Census Bureau (2003), No. HS-30, p. 52.

Recently, marriage has been considered the major investment in human

capital in terms of both time and money (Burggraf, 2003). In other words, parental investment in children, investment in spouses, have been considered as factors of contributing to economic productivity. This study is consistent with that idea since greater productivity allows individuals to accumulate more wealth.

APPENDIX: INFERRING MARITAL STATUS

The procedure of inferring a veteran's marital status follows two steps. The first step is to find a veteran's spouse in the 1860 and 1870 census manuscript schedules, considering the age of family members and their order in the schedules. If a spouse is found, the veteran is classified as 'currently married'. In the case that the spouse is not found, I searched for children in the schedules. If children are found, the veteran is classified as 'marital dissolved'; if not, he is considered 'single'. The second step is to rectify any correctable errors and to get more marital information, based on the pension records that provide detailed information on various marital events. At this step, I can figure out veterans who were divorced without children but were classified as 'single' from the census records; the widowed can be distinguished from the divorced or separated. I also obtain marital duration for married veterans using the exact date of marriage in the pension records.

In order to test how well the inferring rule works, I applied it to the EI project veterans who are linked to the 1900 census data, which have a self-reported marital status variable. My rule inferred the correct marital status for about 90% of samples. Most of veterans whose marital status was incorrectly inferred by the above rule consist of (1) those who lived alone in their households, and (2) those who lived in households whose members had different last names from veterans'. Without additional information, it is impossible to figure out whether these persons had ever married or not. Excluding these individuals, the accuracy of inferring rule increases to 97%. However, it is a result of inferring the marital status only using the census data. When it was adjusted by the pension records, as applied to the sample used in this study, I obtained an accuracy rate of 99%.

Table A1 presents the marital status in 1860 for two Union Army samples: the sample linked only to the 1860 census and the sample linked to both 1860 and 1870 censuses. To obtain a national benchmark in terms of marital status, I took an 1860 population sample from the 1860 IPUMS, which were created at the University of Minnesota. The marital status of the persons in the IPUMS sample was also inferred, and was age-standardized according to the age distribution of the sample linked to the

1860-1870 censuses.³⁰ Each category of marital status is classified by several age groups and relationships to household head for single persons.

[Table A1] Marital Status in 1860: The UA Samples and the 1860 IPUMS Male, %

Data Set (Sample Size)	Marital Status	Age Intervals						
		All	10-19	20-24	25-29	30-34	35-39	40-69
UA sample linked to the 1860 census (n=11,357)	Age Distribution	100	42.07	20.65	14.60	9.88	6.89	5.91
	Single	62.95	98.64	73.69	27.20	13.01	7.41	7.90
	Household Head	13.78	9.34	17.30	30.60	36.30	39.66	60.38
	Residing in Father's Household	64.75	74.86	53.47	31.04	20.55	8.62	3.77
	Residing in Other's Household	21.47	15.81	29.23	38.36	43.15	51.72	35.85
	Dissolved	2.32	0.29	2.09	4.28	4.19	3.58	8.20
	Married	34.73	1.07	24.22	68.52	82.80	89.02	83.91
UA sample linked to the 1860 and 1870 censuses (n=992)	Age Distribution	100	38.00	20.97	16.53	11.19	7.16	6.15
	Single	58.27	98.67	71.15	25.00	9.91	5.63	3.28
	Household Head	10.73	6.99	8.11	43.90	27.27	50.00	50.00
	Residing in Father's Household	74.74	82.80	70.27	34.15	45.46	25.00	0.00
	Residing in Other's Household	14.53	10.22	21.62	21.95	27.27	25.00	50.00
	Dissolved	2.42	0.53	2.88	3.05	4.50	1.41	8.20
	Married	39.32	0.80	25.96	71.95	85.59	92.96	88.53
1860 IPUMS male sample (n=140,195)	Single	65.51	98.84	77.00	43.14	24.66	17.19	11.10
	Household Head	3.88	0.34	3.93	11.85	18.22	20.68	25.67
	Residing in Father's Household	65.31	83.12	53.50	30.62	19.43	13.95	5.58
	Residing in Other's Household	30.81	16.54	42.58	57.53	62.35	65.38	68.75
	Dissolved	1.52	0.26	1.38	1.60	2.19	2.58	7.08
	Married	32.97	0.89	21.63	55.26	73.15	80.24	81.81

Note: The proportions in the IPUMS are age-standardized according to the age distribution of the UA sample linked to the 1860 and 1870 censuses. The percentage proportion of each marital group is the ratio to total sample size in the given age interval. The percentage proportion of single men who were household heads, residing in father's household, and in other's household is the ratio to the size of single samples. 'Dissolved' in the marital status denotes persons who were divorced, separated or widowed.

The main feature of Table A1 is that the selected Union Army samples

³⁰ The 1860 IPUMS sample already has the following inferred variables: (1) the location of spouse in the household, (2) the number of own-children, and (3) the relationship to household head. In addition, the 1860 census data, on which the IPUMS are based, has a variable to indicate if each sample married within last one year. Using these variables, I inferred the marital status of the persons in the IPUMS sample.

contain more married persons than the IPUMS male sample. In particular, the UA samples are seriously biased toward married persons, especially for the group aged 25 and older. This resulted from a bias which occurred when the veterans were linked to the 1860 census data. According to Fogel (2000b), locating veterans in the 1860 census was based on an index listing the last names of household heads in the 1860 census. Thus, if veterans were household heads in each census, they were more likely linked to the census than veterans who were not household heads. For non-household heads, additional family information, especially father's position in the household and name, was examined. If there were many possibilities, these men could not be searched for. This is supported by the fact that the selected UA samples contain more single heads of the households than does the IPUMS male sample.³¹ In addition, since men over the age of 25 are more likely to be married and heads of the households, more married veterans could be searched for in this group. Contrarily, young men under the age of 25 are less likely to be married, and so this group is less biased toward married persons.³² Moreover,

³¹ For the dissolved and married groups, the distribution of relationship to household head is similar to that seen in the IPUMS sample. The following table shows the overall proportion of relationship to household head. Note that the proportions in the IPUMS male sample is age-standardized according to the age distribution of the UA sample linked to the 1860 and 1870 censuses, as Table A1 is.

Data Set	Dissolved Group			Married Group		
	Head of Household (%)			Head of Household (%)		
	Self	Father	Other	Self	Father	Other
Male in the 1860 IPUMS	50.7	17.6	31.7	93.2	0.9	5.9
Sample Linked Only to 1860	58.3	18.1	23.6	95.5	0.5	4.0
Sample Linked to Both 1860 and 1870	58.8	11.8	29.4	95.9	1.0	3.1

³² However, this does not imply that the entire UA sample in the EI project is biased toward married persons. It is difficult to estimate the marital status of the entire sample because many samples are not linked to the census or pension records. But I can roughly estimate it. When I calculate the marital status of the sample linked to the 1860-1870 censuses only with the pension records, the proportions of single men are 92% for the under-25 age group and 41% for the group aged 25 and over. While calculated with both 1860 census and pension records, the proportions of single men are 90% for the under-25 age group and 15% for the group aged 25 and over. This implies that the pension records overestimate the proportion of single males by 26% for the group aged 25 and over. Now assume that this overestimation occurs over the entire EI project sample. The proportion of single males in the entire EI sample is 53% when the calculation is based on the pension records. Roughly speaking, the actual proportion of single veterans would be 27%=53%-26%, which is close to 21%, the proportion of single males in the IPUMS for the group aged 25 and over.

since this also occurred when the veterans were linked to the 1870 census, the bias toward married persons is stronger in the UA sample linked to the 1860 and 1870 censuses.

As a result of this bias, each UA sample has a little higher proportion of divorced persons than does the IPUMS male sample. In spite of these biases, however, all the samples have the same trend in marital status by age. Most young men under the age of 20 are single, and the proportion of singles rapidly decreases after the age of 20. The proportion of divorced, separated or widowed men is very low for all the samples, but it increases with age.

In sum, the sample used in the paper over-represents married persons for the old age group and household heads for the single group. This may lead to a biased result for the effects of marital status on wealth accumulation. However, the important factor is not current marital status, but change in marital status between two periods. The sample provides enough observations to figure out the effects of various marital status changes. These sample biases are not likely to seriously impair the purpose of this study.

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