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EXPLAINING THE CHANGING DYNAMICS OF UNEMPLOYMENT: EVIDENCE FROM CIVIL WAR PENSION RECORDS

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ABSTRACT

I investigate why workers' probability of leaving unemployment has fallen since 1900 by estimating the impact of a large government transfer, the first major pension program in the United States, covering Union Army veterans of the Civil War. The pension, because of the program's rules, was a strict income transfer and these rules create a natural experiment to identify the effects of pensions and health on labor supply.

Pensions exerted a large impact on the probability of long-term, but not of short-term unemployment. Estimated hazards suggest that, consistent with a job search model, pensions affected the probability of both entering and exiting unemployment. But, pensions mainly lowered the probability of leaving unemployment. The findings suggest that explanations for the secular rise in long-term unemployment should focus on factors such as the secular increase in wealth and the increased availability and generosity of unemployment benefits.

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1 The Changing Dynamics of Unemployment

The dynamics of unemployment have changed since 1900. Two-thirds of unemployment can no longer be termed seasonal (Douglas 1930). Turnover rates no longer average approximately 100% in moderately prosperous years (Slichter 1919). Lengthy job tenure is no longer uncommon (Jacoby and Sharma 1992; Carter 1988). The chance of the average non-farm worker becoming unemployed has fallen, but so has his chance of becoming re-employed. Workers in 1910 faced a probability of entering unemployment that was 37% higher than that faced by workers in the 1970s, but their probability of leaving unemployment was 32% higher (Margo 1990b).

Many explanations can account for this change. Seasonality has declined (Engerman and Goldin 1991). In fact, adjusting for the shift towards the service sector and white-collar jobs yields a probability of entering unemployment that is only 7% higher than that faced by workers in the 1970s, but cannot account for differences in the probability of exiting unemployment (Margo 1990b). Models of the "natural" rate of unemployment have focused on rigidities associated with fixed length contracts, "hysteresis" (Blanchard and Summers 1986), and mobility across sectors (Lucas and Prescott 1974). Unemployment insurance now decreases the probability of leaving unemployment (Meyer 1990; Katz and Meyer 1988).[1] The secular rise in incomes, would, in a simple search model (Lippman and McCall 1976a and 1976b) induce both higher entry into and exit from unemployment.

This paper focuses on the impact of income on unemployment by using a new data set of white Union Army veterans receiving Civil War pensions. The Union Army pension program stipulated no work disincentives, and pensions did not depend upon past wages. Therefore, Union Army pensions can be used to estimate the effect of a pure income transfer

[1] Unemployment insurance might also increase the probability of entry into unemployment by leading firms to reduce their labor force through layoff (Feldstein 1978; Topel 1983 and 1985).

on employment. The Civil War pension program is thus a unique natural experiment. The generosity of Union Army pensions was determined by the pensioner's health. Because the amount received depended on whether the veteran could trace his disability to the war, I can disentangle the effect of pensions from that of health on labor supply. My findings therefore reveal the effect of income growth on the probability of leaving unemployment.

The Union Army records allow us to investigate unemployment at a time when unemployment was becoming a great social concern. For many men wage premia covered only half of income lost because of layoffs (Fishback and Kantor 1992; Hatton and Williamson 1991). Contemporaries cited unemployment as the single most common cause of poverty (Dubofsky 1975: 22; Lauck and Sydenstricker 1917: 76). Unemployed men faced the danger of gradually drifting into the casual laboring class as their health and skill deteriorated. Unemployment of the head of the household frequently resulted in sending children to work (Lauck and Sydensticker 1917: 170-171; Goldin 1979, 1981).

The Union Army records also permit us to analyze unemployment of the old. The difficulties faced by older workers at the end of the nineteenth century were widely recognized by contemporaries. Slichter (1917: 155) noted that "the loss of his job by a semi-skilled worker over 40 or 45 is likely to mean a permanent reduction of his earnings capacity, for he will have great difficulty in obtaining a job as good as his previous one." As more firm-specific skills were required of workers, firms grew unwilling to invest in older workers.[2] Age discrimination was becoming widespread. Machinery was operated at speeds too high for older workers. It was claimed that older workers lacked adaptability. Scientists argued that there was a "work life" during which men used up their allotment of "nervous energy."

[2]These changes in production helped semi-skilled workers and put skilled and unskilled workers at a disadvantage. Margo (1990a) finds that only when demand increased with the Second World War did firms begin to invest in the human capital of the unskilled.

2 The Nature of Nineteenth Century Unemployment

At the turn of the century, common laborers could be hired one day and replaced the next without any great loss in efficiency.[3] Firms relied on inside employee contractors who ran departments autonomously for a set price per unit of output and even bid amongst themselves.[4] Instead of transferring workers from slack to busy departments, one department within a firm would lay workers off while another department would hire workers (Schatz 1983). In general only 30% of all new hires were men who had previously been laid-off.[5]

With the exception of some highly seasonal industries resignations were the most common cause of turnover.[6] Approximately half of all resignations were due to either the worker obtaining a better job or his dissatisfaction with the wage rate or with the nature of the work. (In fact, resignations in the hot summer months among workers employed in hard, unpleasant work, such as foundry work, were relatively common.) About 10% of all resignations were due to ill health. Turnover was concentrated among new employees, employees in relatively unattractive jobs, common laborers and less skilled men, and among boys, young men, and girls. (Slichter 1919: 43-44, 74-75, 180-182; Brissenden and Frankel

[3]Paul H. Douglas stated in 1921 in *American Apprenticeship and Industrial Education* that "The very process of machinery which makes work more specialized, made the worker less specialized. He was now transferable. ... He is really an interchangable part in the industrial mechanism" (Jacoby 1985: 186).

[4]The foreman of the department hired, disciplined, fired, and trained workers and set individual wage rates (Brody 1980: 9-10).

[5]The extent of layoffs varied by industry. In machinery manufacturing the rate of layoff per full-year worker was 0.22 and in mercantile establishments 0.11 (Brissenden and Frankel 1922: 88). In sugar beet factories and in ship yards, both highly seasonal industries, layoffs represented approximately 80% of all turnovers, but in rubber goods layoffs were only 8.8% of all turnovers (Slichter 1919: 86, 101).

[6]In rubber goods, resignations constituted 80% of all turnovers. In sugar and beet factories and in ship yards resignations were 15% of all turnovers. The rate of resignations per full year workers was 0.35 in machinery manufacturing and 0.19 in mercantile establishments (Slichter 1919: 86, 101; Brissenden and Frankel 1922: 88-89).

1922: 96).

Turnover rates did not fall until the 1920s. Reductions in turnover arose because the rise of scientific management lead to the close scrutiny of all types of costs, including training and turnover, and because the introduction of new production processes increased the firm-specifity of the skills required of workers and thus increased the cost of production disruptions. Firms reduced quit rates by screening for workers who were most likely to be steady employees, introducing pension and welfare plans, transfering workers from slack to busy departments, producing for inventories, and instituting work-sharing in depressions (Owen 1991). They also started to base pay upon seniority and to introduce seniority as a criterion in rehiring and layoff decisions, thus lowering the prevalence of unemployment among older workers. However, these policies and benefits did not become prevalent until after the Second World War (Slichter 1919: 241; Schatz 1983: 18-19).

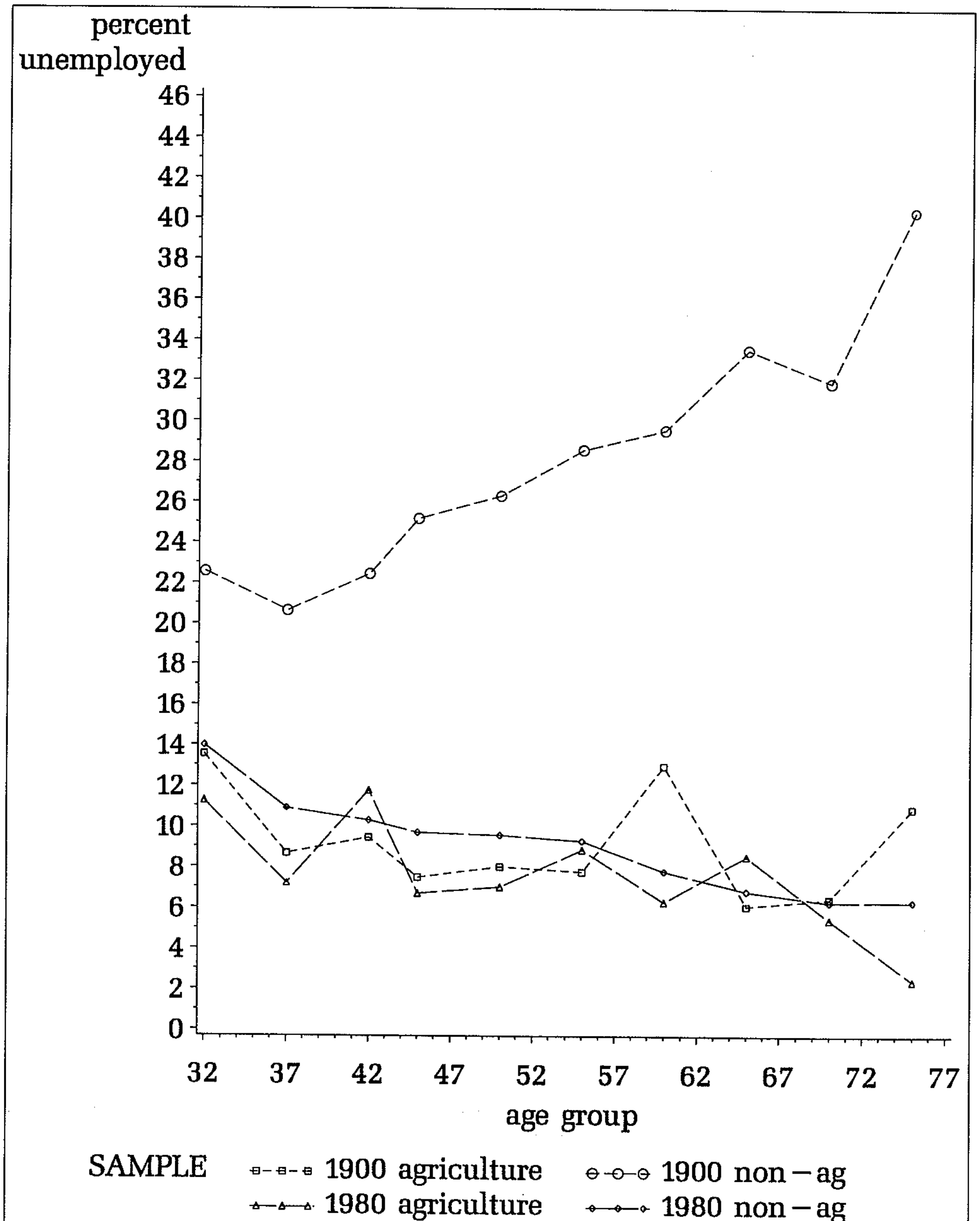
These changes partially account for the changing relationship between age and unemployment. In 1900, the incidence of unemployment rose with age among both agricultural and non-agricultural workers. But, by 1980, unemployment no longer dramatically rose with age (see Figure 1).[7] Another factor that can account for differences in unemployment status by age is the rise in retirement incomes, making withdrawal from the labor force an alternative to the continuation of job search. In the nineteenth century the probability of long-term unemployment rose with age and the older a worker was when he became unemployed, the more likely he was to subsequently retire (Margo 1993). Today unemployment remains a prelude to retirement (Rones 1983).

Men in seasonal industries were especially likely to suffer unemployment (see Fig-

[7]Prior to the late 1960s, unemployment rates were slightly higher for men 55 years of age and older than for younger workers. This relation reversed in the early 1970s (Rones 1983; Murphy and Topel 1987). The years 1900 and 1980 are compared because the 1900 census asked only the number of months of unemployment in the past year and the 1940 and 1950 census do not have a comparable question.

Figure 1:

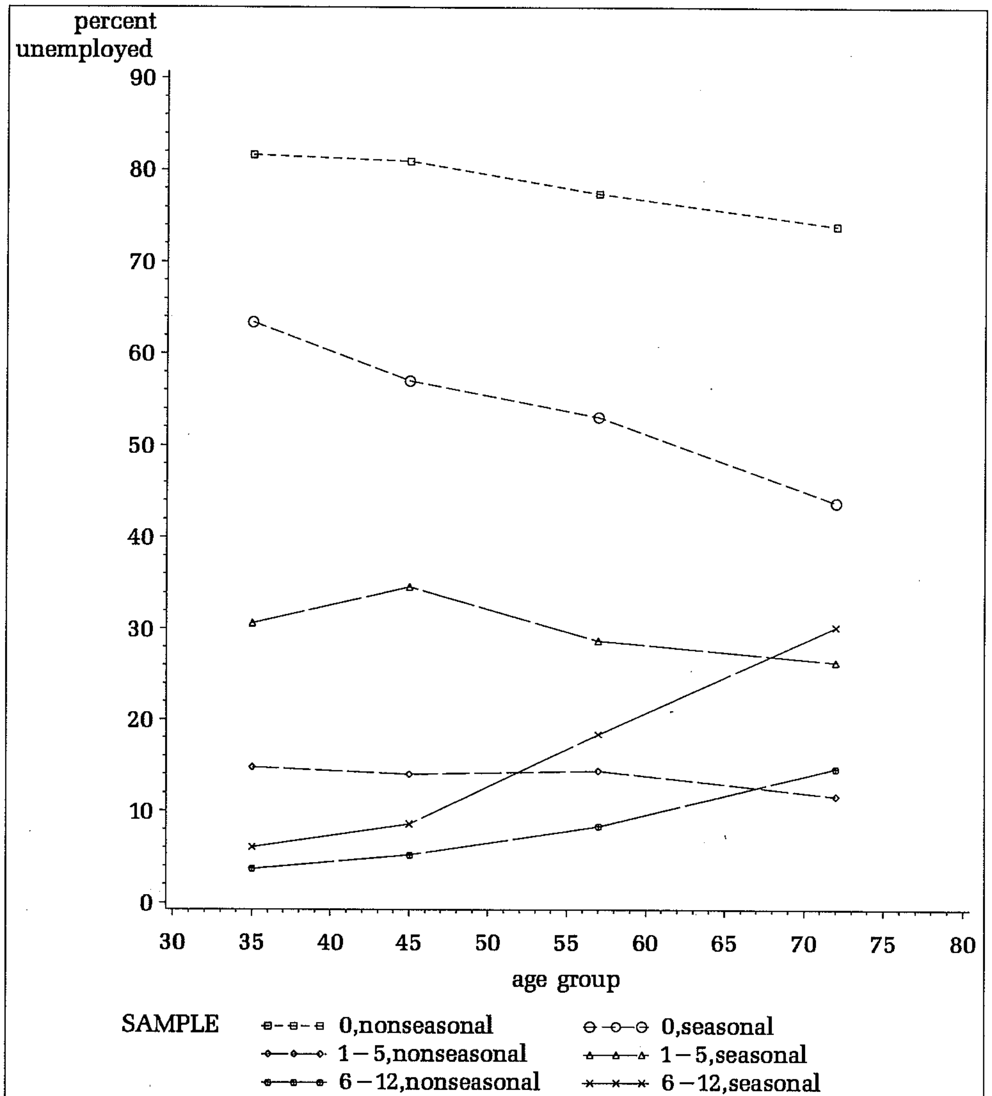
PERCENT WHITE MALES AGE 30-81 IN 1900 AND 1980 IN FARM AND NON-FARM OCCUPATIONS UNEMPLOYED AT LEAST 1 MONTH



Source: U.S. Bureau of the Census (1983); Preston and Higgs (1983).

Figure 2:

PERCENT WHITE MALES 30-81 IN 1900 UNEMPLOYED 0, 1-5, 12-6 MONTHS IN SEASONAL AND NON-SEASONAL OCCUPATIONS



Note: Seasonal occupations comprised agricultural laborers; men in building trades; clay, glass, and stone workers; fishermen; foodcurers, packers, canners, and picklers; confectioners, butter and cheese makers, and millers; steam boiler and stove makers; workers in the shoe industry; lumber yard and lumber mill workers; and textile workers (Kuznets 1933).
Source: Preston and Higgs (1983).

ure 2). Among trade union members, pavers and rammers were unemployed an average of 6 months per year, masons and bricklayers 5 months,and marine workers 4 months. In contrast, retail clerks, electrical workers, and letter carriers and post office clerks were employed for the full year (Lauck and Sydenstricker 1917: 96). [8] Note that although most seasonal unemployment appears to be concentrated among men unemployed 1-5 months, as men aged the extent of seasonal unemployment among those unemployed 6 months or more grew.

While "involuntary" unemployment due to age and seasonality was obviously important, early census data alone can tell us nothing about "voluntary" unemployment arising from income effects. To learn about that we must turn to the Union Army records.

3 Unemployment in the Union Army Sample

In 1900 Union Army veterans were eligible for a pension equivalent, on average, to over 36% of the income of laborers.[9] The dollar pension amount received depended upon the degree of disability, determined by the applicant's capacity to perform manual labor as judged by three examining surgeons employed by the Pension Bureau. The pension award did not depend upon the health of the individual, his ability to earn a living by other than manual means, or his participation in the labor force.[10] Nor did receipt of a pension depend upon

[8] Even when men were employed the number of hours that they worked was longer in the summer than in the winter (Atack and Bateman 1992).

[9] The average pension was equivalent to 55% of per capita GNP, which in relative terms is greater than the average Social Security payment which is only 35% of per capita GNP.

[10] Application was through a pension attorney whose fee was set by law. The lawyer through whom the veteran applied did not predict pension amount. Neither did demographic or occupational characteristics. For 80 men qualitative information is available that allows me to identify the poor, the middle class, and the wealthy. There was no relation between income category and pension amount. Similarly, the ratings of the surgeons did not did not depend upon the lawyer or upon income category. These findings suggest that fraud is not biasing my results.

whether the disability could be traced to wartime service, but an applicant who could relate his disability to military service received substantially more for the same disability than his counterpart who could not. Thus, men who could not claim a disability of service origin received from \$6 to \$12 per month, while men who could claim a war-related disability received a pension ranging from \$6 to \$100 per month.[11] In 1900, 58% of all veterans were receiving a pension for a disability that was not related to wartime service (U.S. Bureau of Pensions 1900). Pensions were granted for old age alone, but an applicant who could claim a disability received a bigger sum.[12] Since individuals of the same age and health status received different amounts, controlling for both health and age, I can identify the effect of pension income on unemployment.

Union Army records are being collected as part of a project to study early indicators of later work levels, disease, and death.[13] Information on the enlisted men in a random sample of 331 Union Army infantry companies has been gathered from their regimental records. This research is based upon a sample of 20 companies linked to the 1850, 1860, 1900, and 1910 censuses, military service records, army medical records, pension records, and the successive medical reports of the examining surgeons of the Pension

[11]In 1900, the pensioner who could trace his disability to the war was entitled to \$30 for incapacity to perform any manual labor, \$24 for a disability equivalent to the loss of a hand or foot, \$17 for the loss of one eye, and \$6 to \$10 for a single hernia. His counterpart who could not trace his disability to the war received \$12, \$10, \$6, and \$6 for each respective ailment. Veterans who could trace their disabilities to the war received, by Congressional decree, up to \$100 for loss of both hands, feet, or eyes. However, a veteran blinded in an industrial accident received at most \$12.00. (Men with multiple ailments did not receive a pension amount equal to the sum of the amount that would be received by men with a single disability. Instead, they received an amount that reflected their total disability.)

[12]Although old age was not recognized by statute law as sufficient cause to qualify for a pension until 1907, the Pension Bureau instructed the examining surgeons in 1890 to grant a minimum pension to all men who were at least 65 years of age, unless they were unusually vigorous. Men aged at least 75 years were entitled to an even larger pension. After 1900, the Bureau's old age provisions grew still more generous. (A detailed account of pension laws is provided in Costa 1993.)

[13]The project is sponsored by the National Institute of Aging, the National Science Foundation, the National Bureau of Economic Research, the Center for Population Economics at the University of Chicago, and Brigham Young University. Fogel *et al.* 1991 provides a detailed description of the project.

Bureau.[14] Out of 1036 men at risk to be found in the 1900 census, 712 men were found. Among the information that the 1900 census provides is occupation and months of unemployment in the past census year. Virtually all men found in the 1900 census were on the pension rolls by 1900.[15] An examining surgeons' report is available for 88% of these men and these provide many health variables. Wages, incomes, and wealth are not explicitly reported, but there is information that makes it possible to estimate the income categories into which pension applicants belonged.[16]

Searches in the 1900 and 1910 censuses were limited to men found in the pension records because address information is required for linkage and this information is available only from the pension records and because the pension records provide death dates and hence avoid searches for men not at risk of being found. An analysis of the selection biases arising from linkage failure indicates that the only significant factor in explaining linkage failure is if the recruit was a deserter and hence ineligible for a pension (Fogel 1991; Fogel *et al.* 1991). Futhermore, the sample appears to be representative of the Northern population in terms of mortality and wealth.[17]

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[14]The 20 companies were not chosen randomly from the sample of 331 companies and are a geographically biased sample. However, when I examined a random sample of 4,554 white, non-institutionalized men drawn from the 1900 census (Preston and Higgs 1983), a subsample chosen to have the same geographic distribution as the 20 company sample resembled men in the rest of the country in terms of home ownership, marital status, literacy, occupational distribution, foreign-birth, and age.

[15]Men who were rejected would have a pension record. Men not yet on the rolls would frequently provide retrospective information. Pension applications included not only the original application, but also applications for increases, which could be filed at any time. Not all claims for pensions or for pension increases were accepted. Out of an average of 12 complaints filed, about 2 were rejected. Causes of rejection are known for 195 out of 557 rejections. Twenty-four percent of all men for whom causes of rejection are known were rejected because their disabilities were judged to be unrelated to the war.

[16]Although not yet available, information is being collected which makes it possible to classify pension applicants as poor, of average means, and well off. Occupation can also be used to estimate expected income.

[17]Life tables were constructed for the men found in the 1900 census and compared with mortality schedules constructed for states that kept death registration records. The two life tables are similar. Also, the distribution of causes of death of veterans who died circa 1910 and were in the pension records is not

The research in this paper is based upon the sample of men linked to the 1900 census who were in the labor force and who reported months of unemployment.[18] Men who did not report months of unemployment were disproportionately older, southerners, from rural counties, and foreign-born.[19] Restricting the sample to men in the labor force omits men collecting larger pensions and men in worse health and implies that there are only two possible states, employment and unemployment. Retirement is not an option.[20] Therefore, the findings are conditional on current labor force participation.

Pensions will increase quit rates among Union Army veterans and will increase the probability that once Union Army veterans become unemployed, they remain unemployed for longer periods of time. A man who becomes unemployed would accept a job if the offered wage, w_o was greater than or equal to his reservation wage, w_r, or if his assets, i, are less than the cost of an additional search, c. He continues to search if $i > c$ and $w_o < w_r$. By increasing assets, pensions allow for more time until "bankruptcy" and hence increase search. A man who is currently employed will quit his job if the discounted present value of working forever at his present wage is less than the expected value of quitting. Because pensions permit longer searches the expected wage offer is likely to be greater than the

significantly different from the distribution of causes of death reported by the death registration states. Recruits' households were neither disproportionately rich nor poor in 1860 (Fogel 1991; Fogel *et al.* 1991) and using height as a proxy for wealth, I find that wealth does not predict war survivorship.

[18]Total sample size is 379. Note that men who reported 6 or more months of unemployment are not considered retired. Ransom and Sutch (1986a) argue that men who reported 6 or more months of unemployment in 1900 were retired. Margo (1993) finds that the long-term unemployed had different characteristics from the retired and hence cannot be classified as retired. My results (Costa 1993) support those of Margo.

[19]The veteran sample was compared with a random sample of 3,110 white, non-institutionalized men aged 50-81 drawn from the public use sample of the 1900 census (Preston and Higgs 1983). They were statistically distinguishable from men who reported 0, 1-5, and 6-12 months of unemployment.

[20]Margo (1993) finds that men who were unemployed for 6 or more months were more likely to retire than men employed all year or unemployed for short periods of time. He was able to reach this conclusion because the enumerators mistakenly wrote down the number of months of unemployment for some of the retired. Unfortunately, the number of months of unemployment is known for only 14 retired men or 13% of the retired men in the veteran sample.

Table 1:

COMPARISON OF PERCENTAGE MEN UNEMPLOYED 0 MONTHS, 1-5 MONTHS, 6 MONTHS OR MORE IN 1899 AMONG VETERANS AND RANDOM SAMPLE, JUNE 1, 1899 - MAY 31, 1900

	random sample[a]		union random sample[b]		age-adjusted union random sample[c]		veteran sample	
months unemployed	% un-employed	obs	% un-employed	obs	% un-employed	obs	% un-employed	obs
ages 50-64		2378		1538		1538		304
0	79.9	1899	80.4	1237	81.8	1258	67.1	204
1-5	12.7	301	12.1	186	11.6	178	15.5	47
6-12	7.5	178	7.5	115	6.7	102	17.4	53
ages 65-81		732		551		551		75
0	78.6	575	77.1	425	81.4	449	64.0	48
1-5	9.6	70	10.2	56	7.6	42	14.7	11
6-12	11.9	87	12.7	70	11.0	60	21.3	16

[a]The random sample consists of all white, non-institutionalized men in the labor force and reporting months of unemployment in the public use sample of the 1900 census (Preston and Higgs 1983).

[b]The random sample was restricted to men either born in a Union state or who, if foreign-born, immigrated prior to the Civil War.

[c]The Union random sample was adjusted to have the same age distribution as the veteran sample.

current wage, thus increasing the expected value of quitting.

In this analysis months of unemployment is divided into "short-term" (1-5 months) and "long-term" (6-12 months). Long-term unemployment is more likely to be prevalent among the unskilled, among workers in the building trades, and among the old (Margo 1993).

Table 1 compares unemployment in the veteran sample with a random sample of men drawn from the public use sample of the 1900 census (Preston and Higgs 1983), and containing both veterans and non-veterans.[21] Compared to the general population veterans were more likely to be unemployed and when they did experience unemployment, they experienced more of it. Greater unemployment among veterans does not arise from veterans'

[21]Approximately 17% of all white men aged 50-64 were on the pension rolls and about 11% of all men aged 65-81.

being in more seasonal jobs than the general population. Within 24 non-farm occupational categories veterans experienced more unemployment than non-veterans.[22] Note that the difference between the fraction of veterans and of men in the random sample unemployed for 6 or more months was greater than the difference between the fractions unemployed for 1-5 months. These differences are not so pronounced when the sample is restricted to non-farmers.[23]

Months of unemployment was lower among men who were receiving higher pensions and among men who were rated by the examining surgeons as being in poor health (Table 2 and Table 3). When the sample is grouped by health, men collecting larger pensions were unemployed for a greater length of time, but the difference in mean months of unemployment between men collecting large pensions and men collecting small pensions is not statistically significant (Table 4). However, Table 4 is inconclusive, because other characteristics are not controlled for. As previously noted, months of unemployment differed by age. Also, men with war-related disabilities were eligible for larger pensions, but were employed in different occupations and differed in terms of marital and head of household status (Costa 1993).

I use a multinomial logit model to control for other characteristics. Months of unemployment is divided into 3 classes: 0 months, 1-5 months, and 6-12 months. I separated the unemployed into the long-term and the short-term unemployed, since the chance of

[22]The occupational classes were agricultural workers; professional service; low domestic and personal service; high domestic and personal service; high social status trade and transport; medium status trade and transport; low status trade and transport; building trades; chemical workers; clay, glass, and stone workers; mining; food products; iron and steel; leather products; liquors and beverages; lumber products; metal products; printers and pressman; textiles; builders and contractors; high social status miscellaneous; average social status miscellaneous; and low social status miscellaneous.

[23]In the veteran sample, farmers are more likely to be long-term rather than short-term unemployed. Note that the fraction of farmers who faced any kind of unemployment is small, so sample size may be a problem.

Table 2:

MEAN MONTHS OF UNEMPLOYMENT

	mean months unemployed	sample size	t	Prob
receiving $\leq$ \$8/month	0.81	96		
receiving $>$ \$8/month	1.68	165	248.5	0.00
health good	0.76	135		
health poor	1.60	171	303.7	0.00

Table 3:

FRACTION UNEMPLOYED 0, 1-5, 6-12 MONTHS

	% unemployed 0 mos	1-5 mos	6-12 mos	χ^2	Prob
receiving $\leq$ \$8/month	70.8	18.8	10.4		
receiving $>$ \$8/month	58.8	15.8	25.5	8.6	0.01
health good	79.3	9.6	11.1		
health poor	56.7	19.9	23.4	17.2	0.00

Table 4:

MEAN MONTHS OF UNEMPLOYMENT BY HEALTH STATUS

health status	pension amount	mean months unemployed	sample size	t	Prob
good	$\leq$ \$8/month	2.05	38		
	$>$ \$8/month	3.16	71	1.5	0.14
poor	$\leq$ \$8/month	1.10	49		
	$>$ \$8/month	1.30	43	0.36	0.71

short-term unemployment may depend predominately upon factors other than pension income, such as occupation. The use of a multinomial logit model allows me to distinguish between short-term and long-term unemployment without imposing too many assumptions on the data. I later estimate entry and exit hazards, but can do so only under very strong assumptions.[24]

The variables used in the analysis, together with definitions, means, and standard deviations, are listed in Table 5. Both farmers and non-farmers are included in the sample. Farmers who became unemployed were more likely than non-farmers to be retired in 1910. When the sample was restricted to non-farmers, the magnitude and the sign of the coefficients remained unchanged, but most of the variables were no longer significant.[25]

The health variable that I use was constructed from the ratings of the examining surgeons. The examining surgeons rated each specific disability and I added the ratings to construct an index. Dummies were then created indicating if the veterans was in "good" or "poor" health. Claims of heart disease, rheumatism, musculo-skeletal diseases, and diarrhea were more prevalent among men in "poor" health. Although the health variable used in the regressions is based upon health circa 1900, the results do not change substantially when an earlier health index is used, suggesting that poor health leads to unemployment, and not vice-versa.

I control for seasonality in the regression by using mean months of unemployment within job classifications calculated from the public use sample of the 1900 census (Preston and Higgs 1983) as one of my independent variables. A better proxy for seasonality would be the coefficient of variation around the mean of monthly employment by industry. Although

[24] I use an unordered logit model rather than an ordered logit model because if long-term unemployment does indeed differ from short-term unemployment, then the slope parameters will not be equal. In fact, I rejected the hypothesis that the slope parameters were equal.

[25] A larger sample will enable researchers to run separate regressions for farmers and non-farmers.

Table 5:

DEFINITIONS AND MEANS OF VARIABLES

Variable	Mean	Std Dev	Definition
			Dependent Variable
MONTHS			dummy=0 if unemployed 0 months
			dummy=1 if unemployed 1-5 months
			dummy=1 if unemployed 6-12 months
			Pension Variables
PEN6	0.26	0.44	dummy=1 if monthly pension $\leq$ \$8
PEN8	0.38	0.49	dummy=1 if \$8 $<$ monthly pension $<$ \$18
PEN18	0.06	0.24	dummy=1 if monthly pension $\geq$ \$18
PENMISS	0.31	0.46	dummy=1 if monthly pension unknown
			Health Variables
GOODHLTH	0.36	0.48	dummy=1 if not rated in poor health
POORHLTH	0.50	0.50	dummy=1 if rated in poor health
POORMISS	0.19	0.39	dummy=1 if health rating unknown
			Occupation and Characteristics Occupation
FARMER	0.35	0.48	dummy=1 if farmer
PP	0.21	0.41	dummy=1 if professional or proprietor
ARTISAN	0.19	0.39	dummy=1 if artisan
LABORER	0.24	0.43	dummy=1 if laborer
OCCUNEMP	0.66	0.68	mean months unemployment in 1899 white males 25-49 by occupation[a]

[a]Mean months of unemployment within job categories was computed from the public use sample of the 1900 census (Preston and Higgs 1983) using the 1900 census job classifications.

Table 6:

DEFINITIONS AND MEANS OF VARIABLES, CONTINUED

Variable	Mean	Std Dev	Definition
			Home Ownership
FARMFREE	0.20	0.40	dummy=1 if owns farm and farm not mortaged
HOUSFREE	0.21	0.41	dummy=1 if owns house and house not mortaged
MORTPROP	0.25	0.44	dummy=1 if owns mortaged property
NOPROP	0.34	0.48	dummy=1 if owns no property
			Household and Demographic Characteristics
DEPKID	0.81	1.27	number of dependent children in the household
MARRIED	0.87	0.34	dummy=1 if married
AGE55	0.53	0.50	dummy=1 if aged 50-59 in 1900
AGE65	0.38	0.48	dummy=1 if aged 60-69 in 1900
AGE75	0.09	0.29	dummy=1 if aged 70-79 in 1900
FOREIGN	0.13	0.34	dummy=1 if foreign-born
			Education
ILLIT	0.03	0.18	dummy=1 if either could not read or could not write
			Region and Characteristics Residence
MIDWEST	0.68	0.47	dummy=1 if resided in the Midwest
REGOTHER	0.32	0.47	dummy=1 if resided in another region
URBANCO	0.44	0.50	dummy=1 if city of 10,000 or more in county of residence
STUNEMP	3.60	0.14	mean duration of unemployment for manufacturing workers by state[a]

[a]The numbers are taken from Table A.13 in Keyssar (1986: 340-341) and are from published census records.

monthly employment information is available in the 1900 census of manufacturing, I have many occupations, including that of farmer, for which I do not have information on monthly employment.[26] Therefore, I prefer to use mean months of unemployment within a job classification.

Although some family variables are controlled for, the veteran sample is too small to analyse the effect of labor force participation of family members on long-term and short-term unemployment. Even in the random sample, it is not possible to examine both farmers and non-farmers. But, among farmers, the presence of a wife or the labor force participation of children has no significant impact on the probability of some unemployment. Among non-farmers aged 30-49, a wife who worked compared to no wife at all was not a significant predictor of months of unemployment. However, when children of either sex were employed, the head was more likely to be unemployed 6-12 months instead of 0 or 1-5 months. Among non-farmers aged 50-81, a different pattern prevailed. The presence of employed children in the household did not exert a significant positive effect on the number of months of unemployment, but, compared to no wife at all, a working wife increased the probability of long-term unemployment rather than short-term or no unemployment.[27]

The regression of months of unemployment on the dependent variables is given in Table 7. The probability of unemployment of 0 months, 1-5 months, and 6-12 months is indicated by the symbols P_0, P_1, and P_6, respectively. Too see how to interpret the coefficients, consider the parameter estimates for POORHLTH. The negative coefficients in the equations $log(\frac{P_0}{P_6})$ and $(log\frac{P_1}{P_6})$ indicate that poor health increases the probability that a man will be unemployed for 6-12 months rather than 0 or 1-5 months. The positive

[26]See Engerman and Goldin (1991) for an analysis of seasonality using monthly employment data.

[27]This reversal of the pattern with age may arise because during the child-bearing and child-rearing years, the family whose head experienced unemployment might send the children into the labor force, instead of the mother.

Table 7:

MULTINOMIAL LOGIT REGRESSION OF CORRELATES OF UNEMPLOYMENT OF 0 MONTHS, 1-5 MONTHS, 6-12 MONTHS FOR VETERANS, JUNE 1, 1899 - MAY 31, 1900

	$log(\frac{P_0}{P_6})$		$log(\frac{P_1}{P_6})$		$log(\frac{P_1}{P_0})$	
Variable	β^a	e^β	β	e^β	β	e^β
INTERCEPT[b]	5.56	.	8.81	.	3.25	.
PEN8	-0.89*	2.44	-0.98*	0.28	-0.08	0.92
PEN18	-1.62*	5.05	-1.86*	6.42	-0.24	0.79
PENMISS[c]	-0.35	0.70	-0.50	0.61	-0.15	1.16
POORHLTH	-0.99‡	0.37	-0.27	0.76	0.72*	2.05
POORMISS	-0.17	0.84	0.44	1.55	0.61	1.84
FARMER	-1.02	0.36	-1.30	0.27	-0.28	0.76
ARTISAN	-1.92‡	0.15	-0.53	0.59	1.39†	4.01
LABORER	-1.43†	0.24	-0.15	0.86	1.29†	3.63
OCCUNEMP	-1.23‡	0.29	0.05	1.05	1.28‡	3.60
FARMFREE	0.19	1.21	-0.38	0.68	-0.57	0.57
HOUSFREE	-0.58	0.56	0.54	1.72	1.12†	3.06
MORTPROP	1.69‡	5.42	2.04‡	7.69	0.35	1.42
DEPKID	-0.10	0.90	-0.11	0.90	-0.01	0.99
MARRIED	1.14†	3.13	1.12*	3.06	-0.01	0.99
AGE65	-0.31	0.73	-0.79*	0.45	-0.49	0.61
AGE75	-0.53	0.59	-0.44	0.64	0.09	1.09
FOREIGN	0.74	2.10	0.55	1.73	-0.19	0.83
ILLIT	-0.91	0.40	-0.76	0.47	0.15	1.16
MIDWEST	-0.56	0.57	-0.56	0.57	0.00	1.00
URBANCO	0.88†	2.41	0.08	1.08	-0.80†	0.45
STUNEMP	-0.51	0.60	-2.34	0.10	-1.83	0.16

379 observations, log-likelihood ratio=190.42 (p=0.00)

[a]The symbols *, †, and ‡ indicate significance at the 10%, 5%, and 1% levels, respectively.

[b]The omitted dummies are PEN6, GOODHLTH, PP, NOPROP, AGE55, and REGOTHER.

[c]The log-likelihood ratio for the test that the pension distribution is jointly significant is 7.44. The probability is 0.06.

coefficient in the equation $log(\frac{P_1}{P_0})$ means that a man in poor health is more likely to be unemployed 1-5 rather than 0 months. Exponentiating the coefficients gives the change in the odds ratio. Thus poor health doubles the odds of short-term relative to no unemployment and cuts by two-thirds the odds of no unemployment relative to long-term unemployment.

The effect of seasonality is similar to that of poor health. The greater mean months of unemployment within an occupation the more probable either short-term or long-term unemployment instead of no unemployment, but not of short-term instead of long-term unemployment. The effect of seasonality is substantial, increasing the odds of either short-term or long-term unemployment relative to no unemployment three and a half times. Occupation also has a similar effect. Compared to professionals and proprietors, artisans and laborers were more likely to experience either long-term or short-term unemployment relative to no unemployment, but not short-term unemployment relative to long-term unemployment. But, when artisans and laborers are compared to farmers, significant differences in unemployment experience are found only in short-term unemployment relative to no unemployment.

Pensions exerted a large impact on relative unemployment probabilities. Relative to a monthly pension less than or equal to \$8, a pension between \$8 and \$18 increased the odds of long-term relative to short-term and to no unemployment about two and a half times and a pension greater than \$18 increased the odds more than five times. But, pensions did not significantly affect the probability of short-term versus long-term unemployment.

Another way to interpret the results is to examine the effect of a change in characteristics on the probability of unemployment of 0, 1-5, and 6-12 months (see Table 8 and Table 9). Note that large pensions and poor health significantly increase the probability of long-term, but not of short-term unemployment. Seasonality increases the probability of both short-term and long-term unemployment. Occupation captures some of the effects of

Table 8:

SELECTED DERIVATIVES OF PROBABILITY OF UNEMPLOYMENT OF 0 MONTHS, 1-5 MONTHS, 6-12 MONTHS FOR VETERANS, JUNE 1, 1899 - MAY 31, 1900

variable[a]	$\frac{\partial L}{\partial x}$ [b]	$\frac{\partial L}{\partial x}$	$\frac{\partial L}{\partial x}$
PEN8	-0.095	-0.004	0.100*
PEN18	-0.153	-0.010	0.163
POORHLTH	-0.146†	0.051	0.095*
PP	0.038	0.072	-0.110
ARTISAN	-0.239*	0.166†	0.072
LABORER	-0.201	0.169†	0.032
OCCUNEMP	-0.210‡	0.102†	0.107†
AGE	-0.002	-0.002	0.003

[a] Additional variables included in the regression were marital status, property ownership, health unknown, pension unknown, urban county, midwest, number of dependent children, foreign-born, and state unemployment. The omitted dummies are PEN6, GOODHLTH, PP, NOPROP, and REGOTHER.

[b] The symbols $*$, †, and ‡ indicate significance at the 10%, 5%, and 1% level, respectively.

Table 9:

UNEMPLOYMENT PROBABILITIES

	probability unemployed[a]		
	0 mos	1-5 mos	6-12 mos
monthly pension $\leq$ \$8	0.701	0.187	0.112
\$8 $<$ monthly pension $<$ \$18	0.646	0.146	0.208
monthly pension $\geq$ \$18	0.583	0.102	0.315
rated in good health	0.741	0.128	0.132
rated in poor health	0.620	0.165	0.215
OCCUNEMP=0	0.815	0.076	0.109
OCCUNEMP=0.5	0.727	0.117	0.156
OCCUNEMP=1.0	0.618	0.169	0.212

[a]Mean probability. With the exception of the listed variables, all variables were evaluated at their actual values for every individual.

seasonality.[28] In fact, compared to farmers, laborers and artisans were more likely to face short-term, though not long-term unemployment.

To test if the estimated impact of pensions reflects poor health unaccounted for by my health variable I examined whether the residuals from a prediction of pension amount predict survivorship. They did not.[29] I also investigated the use of alternative health measures. I used dummies for low, high, and intermediate body mass index.[30] While the dummies did have the expected signs, they were not significant. I also substituted a dummy if the veteran died prior to the age of death predicted from a life table for 1900 (U.S. Bureau of the Census 1923) for my health variable. The dummy was insignificant. Other variables

[28]When occupation is omitted from the regression, the impact of seasonality is even larger.

[29]See Costa (1993) for details.

[30]Body mass index (BMI) is defined as weight in kilograms divided by height in meters squared. Mortality is highest at BMIs below 20 or 22 and at BMIs of 28 or above (Hoffmans, Kromhout, and Coulander 1989; Waaler 1984).

that I tried were dummies for specific disabilities. However, no clear pattern could be distinguished.[31]

As a final test of whether the estimated impact of pensions arises from a biased coefficient on pension amount, I examined a random sample of men aged 62-69 from the public use sample of the 1910 census (Preston 1989). One of the questions asked in the 1910 census was whether the respondent was a veteran, and, if so, whether a Confederate or Union veteran. Restricting the sample to the native-born, I divided the sample into a "Northern-born" sample, consisting of men born in a Union state, and into a "Southern-born" sample, composed of men born in a Confederate state. In 1910 Union pensioners were collecting an average pension of $171.90 per year and about 90% of all Union veterans were collecting a pension. Although some Confederate states provided pensions, the average pension amount was $47.24 per year and fewer than 30% of all Confederate veterans were collecting a pension.[32] Assuming that disability levels were the same across both types of veterans and that pensions do indeed have an impact on unemployment rates, the difference in unemployment levels among northern-born non-veterans and Union veterans should be much greater than the difference among southern-born non-veterans and Confederate veterans.[33]

Table 10 shows that in the "Northern-born" sample, being a Union Army veteran significantly increased the probability of long-term unemployment, whereas being a

[31] When these alternative health measures were used the probability that unemployment would last 6-12 months instead of 0 or 1-5 rose.

[32] See Glasson (1918a; 1918b) for mean pension amounts and the number of Civil War veterans on the pension rolls. Because of undernumeration of veterans in the 1910 census, the total number of Union Army veterans is estimated from a life table and is from Series Y 957-970 in U.S. Bureau of the Census (1975: 1145). Assuming that undernumeration of veterans did not vary among Union and Confederate veterans, the number of Confederate veterans can then be estimated from the 1910 public use sample.

[33] Although disability levels for Confederate veterans are unavailable, young men in the South were almost three times as likely to die during the Civil War as young Northern men (Vinovskis 1990), suggesting that disability rates were probably higher in the South.

Confederate veteran in the "Southern-born" sample did not. Furthermore, being a Union veteran significantly increased the probability of long-term relative to short-term and no unemployment, but not of short-term relative to no unemployment. Being a Confederate veteran had no significant impact on relative unemployment probabilities.

The previous results suggest that while much of unemployment can be explained by health and seasonality, these "involuntary" factors alone cannot explain long-term unemployment. If all men were receiving a pension of $8 per month the mean probability of long-term unemployment would be 0.112. Uniformly raising all pensions by 25-183% would increase the probability of long-term unemployment by 0.096. An increase of 125-400% would increase the probability by 0.203 (see Table 9). But, the probability of short-term unemployment would not change by a significant amount. One possible explanation is that while pensions decreased the probability of exiting unemployment, pensions did not increase the probability of entry into unemployment. This possibility is investigated in the next section.

Table 10:

DERIVATIVES UNEMPLOYMENT PROBABILITIES FOR NORTHERN-BORN AND SOUTHERN-BORN MEN AGED 62-69 IN 1910 (FROM PUBLIC USE SAMPLE)

	"Nothern-born"				"Southern-born"			
variable[a]	mean	P_0	P_1	P_6	mean	P_0	P_1	P_6
dummy=1 if Union veteran	0.19	-0.014	-0.022	0.036‡		.	.	.
dummy=1 if		.	.	.		.	.	.
Confederate veteran		.	.	.	0.31	-0.018	0.021	-0.003
age in 1910	64.86	-0.005	0.300	0.002*	65.08	-0.014	0.012	0.002
occupational unemployment[b]	2.09	-0.069‡	0.062‡	0.008‡	1.80	-0.051	0.048	0.003*
occupational dummies		.	.	.		.	.	.
farmer	0.39	.	.	.		.	.	.
professional/proprietor	0.23	0.054	-0.029	-0.025‡		.	.	.
artisan	0.22	0.035	-0.051	0.016†		.	.	.
laborer	0.16	0.082	-0.095	0.013		.	.	.
number of dependents	1.75	0.004	0.001	-0.005‡	2.33	0.014	-0.015	0.002
county population/100,000	2.60	0.006	-0.007*	0.001	0.77	0.005	0.003	-0.008
household dummies		.	.	.		.	.	.
married	0.77	-0.014	0.030	-0.016	0.79	0.001	-0.001	0.001
head household	0.80	-0.001	-0.007	0.008	0.83	-0.071	0.063	0.008
servant present	0.07	-0.016	0.014	0.003	0.05	-0.008	-0.010	0.018
boarder present	0.16	-0.017	0.020	0.003	0.15	0.070	0.050	0.021
regional dummies		.	.	.		.	.	.
northeast	0.48	.	.	.		.	.	.
midwest	0.34	0.022	-0.013	-0.009		.	.	.
west	0.07	0.142	-0.132	-0.103		.	.	.
south	0.11	-0.004	0.028	-0.024†		.	.	.

[a]Because of sample size, it was not possible to control for occupation or region residence in the "Southern-born" regression.

[b]Mean weeks unemployment in 1909 white males 25-49 by occupation.

4 Entry Into and Exit From Unemployment

Since information on the duration of an unemployment spell, or whether the veteran is currently unemployed, is unknown, the probabilites of entering and exiting unemployment can be estimated only under very strong assumptions. These assumptions are spelled out below. The discussion closely follows Margo (1990b; 1993).

The census enumerators reported the number of months of unemployment experienced in the year June 1, 1899 to May 31, 1900. Let $u(0)$ be the unemployment rate on June 1, 1899, p the probability than a worker employed at the beginning of the year would experience some unemployment, and f the fraction of men who had experienced some unemployment in the year. Then, $f = u(0) + (1 - u(0))p$.

Several assumptions are necessary in order to express $u(0)$ and p in terms of probabilities of entering and leaving unemployment. These are 1) that the size of the labor force did not change during the year, 2) that employment and unemployment were the only possible labor force states, 3) that the labor market was in steady-state equilibrium, and 4) that the probabilities of moving from employment to unemployment and vice-versa did not depend upon time. The steady-state unemployment rate, u, and p can then be written as

$$p = e^{-\beta}$$
$$u = u(0) = \frac{\beta}{\beta + \delta},$$

where β is the probability of entering unemployment, or the cumulative entry hazard, and δ is the probability of leaving unemployment, or the cumulative exit hazard. The steady state unemployment rate can be estimated as the average months of unemployment divided by average labor force months. Following Margo (1990b; 1993), I assume a full-time work year of 50 weeks or 11.5 months. The average monthly entry and exit hazards are $\frac{\beta}{12}$ and $\frac{\delta}{12}$.[34]

Table 11 gives the average monthly entry and exit hazards for men in the veteran sample aged 50-64 by monthly pension amount for the entire sample as well as by farm occupation and health status. The sample was restricted to men aged 50-64 because entry and exit hazards can be calculated only under the assumption that retirement is not a possible labor force state.[35] The estimated hazards suggest that pensions exerted a much larger impact on the probability of exiting instead of entering unemployment.

Note that the effect of pensions upon the probability of entering and exiting unemployment can also be deduced from the random sample of men aged 62-69 drawn from the public use sample of the 1910 census (Preston 1989). Dividing the sample into the "Nothern-born" and the "Southern-born" and comparing veterans and non-veterans within each sub-sample under the assumption that disability levels among Union veterans and Confederate veterans are the same, suggests that Union Army pensions had a larger impact on the probability of exiting than of entering unemployment (see Table 12). In the entire veteran sample, entry hazards are virtually identical among veterans and non-veterans, but exit hazards are lower among veterans relative to non-veterans in the "Northern-born" sample than in the "Southern-born" sample. Among non-farmers, entry hazards are higher among veterans than non-veterans in the "Southern-born" sample. But exit hazards among

[34]Note that this methodology does not give us a multivariate framework for identifying factors that might cause entry and exit rates to differ across people. Using data from recent Current Population Surveys, Coleman (1989) finds that entry rates into unemployment and differences in entry rates across people are more important than spell exit rates for explaining unemployment during the year and levels of unemployment.

[35]The fraction of men who were retired slowly rises with age and increases considerably by age 70. Examining men under age 65 rather than age 70 is more cautious, but, the results are not materially affected when men of all ages are examined. (Seventy-seven percent of all men were under age 65.)

Table 11:

COMPARISON OF AVERAGE MONTHLY ENTRY AND EXIT HAZARDS AMONG VETERANS AGED 50-64 BY MONTHLY PENSION AMOUNT, JUNE 1, 1899 - MAY 31, 1900

	monthly pension $\leq$ \$8			monthly pension $>$ \$8			age-adjusted[a] monthly pension $>$ \$8	
	obs	entry	exit	obs	entry	exit	entry	exit
whole sample	88	0.020	0.135	117	0.021	0.070	0.024	0.043
farmers	32	0.005	0.161	38	0.006	0.036	0.005	0.061
non-farmers	56	0.032	0.140	79	0.031	0.083	0.037	0.044
poor health	19	0.025	0.093	49	0.026	0.067	0.020	0.073
not poor health	50	0.019	0.130	44	0.017	0.114	0.028	0.045

[a]I used the age distribution of men receiving monthly pensions of \$8 or less to calculate an age-adjusted mean months of unemployment and an age-adjusted fraction of men unemployed and hence age-adjusted entry and exit hazards.

Table 12:

COMPARISON OF AVERAGE MONTHLY ENTRY AND EXIT HAZARDS AMONG VETERANS AND NON-VETERANS AGED 62-69 IN NOTHERN-BORN AND SOUTHERN-BORN SAMPLES, 1900

	Nothern-born		Southern-born	
	Union veteran	age-adjusted[a] non-veteran	Confederate veteran	age-adjusted non-veteran
observations	186	800	64	136
entry hazard	0.0029	0.0030	0.0030	0.0030
exit hazard	0.0208	0.0367	0.0392	0.0378
non-farmers				
observations	166	736	52	112
entry hazard	0.0033	0.0032	0.0034	0.0022
exit hazard	0.0207	0.0366	0.0370	0.0462

[a]Adjusted to have the same age-distribution as the previous column.

veterans in the "Northern-born" sample are 43% lower than among non-veterans, whereas they are only 20% lower among veterans in the "Southern-born" sample.

Hazards estimated from both the veterans and the random sample suggest that, as predicted by a search model, an income transfer increases quit rates and increases search time. But, the major impact of Union Army pensions was to increase search time. The effect on quit rates was minimal.

5 Concluding Remarks

The main finding is that Union Army pensions increased the probability of long-term, but not of short-term unemployment. Pensions appear to have mainly decreased the probability of leaving unemployment, but they also slightly increased the probability of entering unemployment. The findings are consistent with a job search model. Union Army pensions were a pure income transfer and, therefore, led men to search longer. They may also have led men to try searching for better employment instead of continuing to work in their current jobs. If so, pensions increased the already high quit rates characteristic of nineteenth-century labor markets. Also, by increasing the prevalence of long-term unemployment in an aging population, pensions may have been a causal factor behind early retirement, because older workers who became unemployed were more likely to retire (Margo 1990b).

The findings do not pertain to the Union Army pension program alone. They suggest that the primary impact of the secular rise in incomes has been to lower the probability of leaving unemployment. Recall that while the secular fall in the probability of entering unemployment can largely be explained by the shift from manufacturing to white-collar jobs, the secular increase in the probability of leaving unemployment cannot. This probability has fallen by 32% (Margo 1990) and among workers 60 years of age or older by 48%.[36] Because a 100% increase in pension income led to a 69% fall in the probability of leaving unemployment, and because wealth has risen by more than 100% since 1900, the secular rise in incomes could account for more than the actual fall in the probability of leaving unemployment. Explanations for the secular rise in long-term unemployment should therefore focus on "voluntary" unemployment arising from the secular increase in wealth and the increased availability and generosity of unemployment benefits.

[36]See Margo (1993) and Rones (1983).

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