

SURVIVING ANDERSONVILLE: THE BENEFITS OF SOCIAL NETWORKS IN POW CAMPS

by

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1 Introduction

For most of history soldiers captured by the enemy were either slaughtered or enslaved to die quickly in a mine or galley ship or other lethal place. The concept of prisoners of war developed during the seventeenth and eighteenth centuries both because of Enlightenment ideas and because the mercenaries widely used by seventeenth century armies sought to save their own lives. During the Napoleonic Wars, the first to employ mass conscription, captured troops were often kept in prison camps and later exchanged. The first total war, the American Civil War, saw the first formal code of conduct for dealing with prisoners of war, drawn up in 1863 at President Lincoln's request. It stipulated that captured troops had to be imprisoned, fed, and given medical treatment and could not be enslaved, tortured, or killed (Malkin 2001). The Civil War reality, however, did not match the ideals of the code. The death rate for imprisoned POWs was 12 percent in the North and 16 percent in the South (Rhodes 1904: 507-508). Some prison camps achieved notoriety, particularly Andersonville in the South and to a lesser extent Florence and Salisbury in the South and Elmira in the North. At Andersonville, which at its peak capacity was the fifth largest city in the south, roughly one-third of the men died within 7 months (Rhodes 1904: 404) and forty percent of the men who passed through Andersonville died there.¹

How did men survive the horrific conditions of Civil War POW camps? This paper uses a unique longitudinal database of Union Army soldiers and a cross-sectional database of the population of Andersonville to examine the role of social networks in ensuring survival in Confederate POW camps. A prison camp, with its absence of law enforcement, property rights, and formal markets and its subsistence income level is closer to a primitive society than to a civil society. Social networks are therefore particularly likely to be important. The consumption smoothing literature has emphasized that in developing countries the family plays a key role in smoothing idiosyncratic

¹See Official Records of the War of the Rebellion, II, VIII, pp. 615, 781. In the longitudinal sample that we subsequently use roughly 38 percent of the 554 men held at Andersonville died there. In the cross-sectional data that we subsequently use 40 percent of the listed men died at Andersonville.

shocks (Rosenzweig 1988; Townsend 1992, 1995; Grimard 1997; Fafchamps and Lund 2003). Social networks can play the same role and the accounts of survivors of Civil War POW camps, Nazi concentration camps, and Vietnamese POW internment mention the role of friends in addition to various psychological mechanisms, collaboration with the enemy, preying upon fellow prisoners, and pure luck (Ransom 1963; McElroy 1957; Eitinger 1964; Jones 1979; Schmolling 1984). Schmolling (1984) argued that friends were the single most important key to survival of Nazi concentration camps. Those without friends might end up with short rations and had more trouble adapting psychologically. Civil War diaries indicate that friends in POW camps provided the moral support necessary to avoid depression, provided extra food or clothing through trade of valuables or from work on prison detail such as the bakery, ensured that none strayed too close to the “dead line,” protected against the predations of other prisoners, and tended to the sick. John Ransom (1963: 93) wrote in his Andersonville diary, “I have always been blessed with friends, and friends too, of the right sort.”

This paper contributes to the growing empirical literature on the benefits of participating in a social network. Many network papers focus on information acquisition. Social networks are important sources of job tips (Ioannides and Loury 2004; Bayer, Ross, and Topa 2005) and of other types of assistance. Migrants are drawn to destinations where their peers previously moved (Munshi 2003; Moretti 1999; Costa and Kahn 2004). A recent literature has debated whether networks are an important determinant of government program participation (Bertrand, Mullainathan, and Luttmer 2000; Aizer and Currie 2004). Like these papers, we examine how the quantity and quality of social networks affects outcome indicators. A distinguishing feature of our study is that our outcome measure, death, represents “higher stakes” than the outcome measures in these other studies. Another distinguishing feature of our study is that our setting is one of unusually high stress. In such a setting, friends may be particularly valuable because there are no market substitutes but they could also be less valuable because in an environment where infectious disease is

rampant they can offer little protection.

2 Confederate POW Camps

An estimated 211,411 Union soldiers were captured during the Civil War. 16,668 were never imprisoned because they were paroled on the field, but of the remaining 194,743 men, 30,218 died while in captivity (Rhodes 1904: 507). Thus, 7 percent of all men who served were ever imprisoned compared to figures of 0.8 percent for World War II and 0.1 percent for Korea.² Until mid-1863 many POWs were exchanged immediately. Prisoner exchanges stopped as the two sides argued over the terms and because, as General Grant stated, “If we commence a system of exchange which liberates all prisoners taken, we will have to fight on until the whole South is exterminated.”³ Forty-three percent of the men in the longitudinal sample that we use were captured July or 1863 or later. The mean number of days spent in prison until death or release for men who were captured prior mid-1863 was 20 whereas it was 92 for men who were captured after mid-1863.

Men who were captured after mid-1863 faced ever worsening conditions as the crowds of prisoners increased.⁴ In our longitudinal data only 4 percent of the men captured before July of 1863 died in captivity whereas 27 percent of those captured July 1863 or later died in captivity. (In contrast, the total wartime mortality rate was 14 percent.) Men suffered from poor and meager rations, from contaminated water, from grounds covered with human excrement and with other filth, from a want of shoes, clothing, and blankets (having often been stripped of these by needy Confederate soldiers), from a lack of shelter in the open stockades that constituted camps such as Andersonville and Millen, from the risk of being robbed and murdered by fellow prisoners,

²Estimated from the figures in U.S. Department of Veterans Affairs (2004) and from <http://www.cwc.lsu.edu/cwc/other/stats/warcost.htm>.

³See Official Records of the War of the Rebellion, II, VII, p. 607.

⁴Northern complaints about Southern prisons began in 1862. For example, on February, 22 1862 *Harper's* reported that “The condition of our soldiers ... is indeed fearful ... covered with vermin, ... half-starved and nearly naked ...” See

<http://www.sonofthesouth.net/leefoundation/the-civil-war.htm>.

and from trigger-happy guards. John Ransom recounted in his diary that when taken prisoner he weighed 178 pounds and when he left Andersonville suffering from scurvy and dropsy he weighed only 95 pounds (Ransom 1963:142).

Conditions across prisons varied widely and within prisons varied widely across time. Andersonville which with a maximum capacity of 10,000 men held at one point 32,899 men was the most notorious (Speer 1997: 332). The chief causes of death were scurvy, diarrhea, and dysentery. Scorbutic ulcers became gangrenous.⁵ In contrast to Andersonville, prisoners at Savannah, for example, received better and more plentiful rations. However, at camps such as Florence and Salisbury, food was scarce and the monthly death rates rivaled those at Andersonville. Florence became notorious for the number of cases of gangrene, brought on by frostbite, that led men to cut off their own putrefying limbs with pocket knives (Speer 1997: 276).

Captured men were transferred to a prison by rail, tightly packed in cattle cars, with the choice of prison camp determined largely by time and place of capture. Prisoners were subsequently transferred, 400 to 700 per day, when the Union Army threatened a location (Hesseltine 1930; Speer 1997). In 1863 the majority of prisoners were held at Richmond but prisoners were rapidly moved out of Richmond in February and March of 1864 in response to prison escapes to nearby Union lines and to a (failed) Union raid to free prisoners. Andersonville was emptied of men in September of 1864 when Sherman's army threatened. Prisoners were then moved to Charleston, Florence (SC), Millen (GA), and Savannah, among others. When a November raid by Sherman forced the abandonment of the prison at Millen, prisoners were sent to Blackshear and Thomasville, GA. The choice of prison appears to have largely depended upon when the prisoners were moved; for example, prisoners could not be sent to Millen until the stockade had been constructed (Hesseltine 1930).

Once within a prison camp, the prisoners were responsible for scavenging their own living

⁵Testimony from the trial of Captain Wirtz, reprinted in Ransom (1963).

quarters and at Andersonville for policing themselves.⁶ Officers, except those commanding colored troops, received preferential treatment and were either kept in separate quarters within the same prison or in prisons reserved for officers (Speer 1997: 58).

3 Survival and Social Networks

A prisoner's objective is to survive a POW camp. His survival probability, S , is a function of his consumption, C , and of the disease environment, D ,

$$S = f(C, D). \quad (1)$$

Consumption in turn is a function of individual characteristics (I) such as initial health endowment, human capital, and physical capital; the social network (N); macro camp conditions (M), and random shocks, ϵ_1 . The disease environment is a function of macro camp conditions, of the social network because of local contagion effects, and of random shocks, ϵ_2 .

$$C = g(I, N, M, \epsilon_1) \quad (2)$$

$$D = h(M, N, \epsilon_2). \quad (3)$$

Unlike the typical producer who has access to input markets, each POW cannot purchase the inputs necessary for survival. He has no control over camp conditions and his individual characteristics are given.

This paper's primary focus is on the effect of N on survival probabilities. Social networks have both costs and benefits, i.e. $\frac{\partial S}{\partial N}$ could be either positive or negative. We expect both the number

⁶Although for the purpose of issuing rations and for roll calls within the camps newcomers were divided into squads (generally 100 men but 270 men at Andersonville) which in turn were subdivided into messes (generally 20 but 90 at Andersonville), units of friends were not necessarily in the same squad or mess (Hesseltine 1930: 137, 161; McElroy 1957: 249-50).

of men in a network and the strength of their ties to each other, the “quality” of the network, to affect mortality. A group member could benefit from the extra food or clothing that his friends could provide, from the care his friends provided when he was sick, from moral support, and from protection against other prisoners. But, his close physical proximity to the men in his network would increase the risk of disease transmission.

Upon entering a camp, a man could either have as his social network men he already knows such as those from the same company, regiment, or hometown or he could form new social networks. Because of the costs of learning about new people, we expect that the men he already knows would be the default network.⁷

The theoretical literature has advanced several hypotheses concerning who forms cohesive groups. Social identity theory predicts that a prisoner would know those of his own kind (e.g. members of the same ethnic group or same town) best because individual utility depends upon being in a group with members of own’s own type (Alesina and La Ferrara 2000; Akerlof and Kranton 2000, 2005). One’s own kind would be more likely to inspire trust and altruism and to spur group members to exert greater efforts on each others’ behalf. McElroy (1957: 81-82) described how at Andersonville the POWs “were strangers to each other and distrustful of all outside their own little circles,” sticking with comrades from the same state or group of states. They also formed their own ethnic ghettos (Marvel 1994: 111).

Even with no preference for one’s own type, it may be optimal to transact with members of one’s own kind when there are market imperfections (Greif 1993). Contracts in POW camps could not be legally enforced. Intertemporal trade, not just of valuables but also of care in sickness, could be possible within a group because the group would have full information on its members and could impose sanctions on violaters (Ellickson 1991; Dixit 2004). In addition, if the group existed in civilian life, a prisoner would be concerned about reputation effects once he returned

⁷Because a POW has relatively little choice over his community, this reduces selection problems inherent in estimating neighborhood effects (Durlauf 2004).

home. Of course, once “Nearly all of us had given up all hopes of being exchanged or seeing our homes again ... everyone was for himself regardless of consequences ...” (Snedden 2000: 229).⁸

Although the costs of getting to know new people, tastes, and strategic considerations would lead prisoners to turn to their own kind, a successful group might need members with complementary skills in production (Alesina, Spolaore, and Wacziarg 2000). A group with a good trader, a good gambler, and a good baker who could steal food from his prison detail might be more successful than a group of good farmers. Physical capital would also matter. Snedden (2000: 222) described how he took a new “chum” into his Andersonville shanty who because he had “two poles and two pieces of board, with a blanket and two half canteens and knife for cutting large sticks, made it quite an object for me to have to share my shanty.” But, there is a tradeoff between the benefits of heterogeneous skills in production and the costs that arise from difficulties in communications or in agreement on basic behavioral norms (Lazear 1999a,b). McElroy (1957: 82) reported that at Andersonville because the men from Ohio, Indiana, Illinois, Iowa, and Kansas “spoke the same dialect, read the same newspapers, had studied *McGuffey’s Readers*, *Mitchell’s Geography* and *Ray’s Arithmetics* at school, admired the same great men and generally held the same opinions on any given subject, [i]t was never difficult to get them to act in unison. They did it spontaneously, while it required an effort to bring about harmony of action with those of other sections.”

4 Data and Empirical Framework

We use both longitudinal data on Union Army soldiers and cross-sectional data on the population of Andersonville to investigate the role of friends in ensuring survival. Our longitudinal data allow us to sample from multiple prisons at different points in time and provide a rich set of covariates that permit us to examine many of the observable dimensions of heterogeneity in who enters a POW

⁸The expectation that group interactions in a POW camp are not an infinitely repeated game implies that reciprocity between strangers is unlikely.

camp, what shape a soldier was in when he entered a POW camp, and how a soldier reacted to camp life. These longitudinal data consist of a full sample of all men within 303 randomly chosen companies (with roughly 100 men in each company).⁹ Complete military records are available for these men and these provide information on wartime service and on demographic and socioeconomic characteristics at enlistment. The data are also linked to the 1860 census which provides additional information on demographic and socioeconomic characteristics. Within these data we have 3,175 cases of captivity with known dates of capture and of release or death for 3,040 men.¹⁰ We know which prison a man entered and on what date, whether he survived or whether he died, and how many men from his company were in the prison with him on any given day. In our analysis we exclude one company (Company I of the 16th Illinois regiment) as an outlier, leaving us with 3026 cases of captivity for 2972 men.¹¹ We are not assuming that POWs are a random subset of soldiers. If a subset of men “fight to the death” we would never see them in a POW camp. We assume that unobserved ideology is uncorrelated with the random shocks in Equations 2 and 3.

We use the longitudinal data to estimate a hazard model of days until death, censoring on release from captivity.¹² That is, we estimate an exponential hazard function such that the hazard at time t is

$$h(t) = \exp(\beta_1 F + \beta_2 I + \beta_3 \text{COD} + \beta_4 \text{CC}) \quad (4)$$

where F is the number of friends (defined as members of the same company in the same camp in the same month) and the remaining control variables are a vector of individual characteristics (I), the fraction of friends who died in the previous month (COD), and an indicator of camp conditions

⁹The data are available at <http://www.cpe.uchicago.edu> and were collected by a team of researchers led by Robert Fogel.

¹⁰Because of the system of prisoner exchange (and the hope that it would be revived), the South had an incentive to record information on men who were captured.

¹¹This company was not an outlier in terms of other observable characteristics.

¹²We use an exponential hazard model because when we used a Weibull hazard we found that the hazard was constant.

(CC). The variables F, COD, and CC vary by month. The number of friends could either reduce ($\beta_1 < 0$) or increase mortality rates ($\beta_1 > 0$) because although friends provide assistance, they are also sources of local contagion, particularly since men slept huddled together for warmth. We control for this using the fraction of friends who died during the previous month. As a measure of camp conditions we will primarily be using camp and month dummies.¹³ However, we can also proxy for camp congestion (macro contagion) by using the number of prisoners in camp in each month for a subset of the data.

Our estimate of β_1 in Equation 4 is an underestimate of the true effect of friends on survival probabilities. We cannot observe idiosyncratic networks outside of the company. Men who are in a POW camp with no one else from the same company have the greatest incentive to seek out new friends, leading to a downward bias on β_1 .

We interpret the estimate of β_1 in Equation 4 as reflecting both exogenous and endogenous social interactions (Manski 1993; Moffitt 2001). A POW may become depressed if all of his friends die (an endogenous social interaction). The characteristics of his friends (e.g. their skills or other endowments) could also affect his survival probabilities (an exogenous social interaction).

Our first estimation strategy initially assumes that the number of friends is uncorrelated with a POW's unobserved health or with his will to live. We can control for a rich set of pre-war covariates and also for war experience prior to entering the camp. We control for company death rates prior to capture as a measure of hardships endured prior to capture. Individual characteristics that we control for include age, whether or not the soldier was wounded 10 days before capture, whether the soldier enlisted in a large city (a measure of prior disease exposure), the soldier's occupation at enlistment since artisans and professionals had may have skills that were either marketable in the camp or that were needed by the Confederacy, his family income (a soldier who could hide money or other valuables could buy food and clothing from the guards or from other prisoners),

¹³Unfortunately climate data are unavailable because weather stations in the south were shut during the Civil War.

and his height, both an indicator of his health during his growing years and of his caloric needs while in the POW camp. In Section 5 we will examine how the observable characteristics of POWs with many friends differed from those with few friends. We will also later discuss some instrumental variables results where we use prison transfers as one plausible source of exogenous within company variation in friend counts at a particular prison.

What is novel and unusual about our mortality specification is examining the impact of friends; unfortunately, our longitudinal sample is too small to examine the effect of the quality of the network (e.g. how close individuals are to each other) on survivorship and our longitudinal data do not allow us to examine networks outside of the company. However, we can augment our analysis with cross-sectional data on the single largest POW camp – Andersonville, which held roughly 17 percent of all men who were ever POWs.

The National Park Service’s Andersonville database contains 35,323 men and was drawn from such disparate sources as the lists of the dead and published state muster rolls. While the sample does not cover the entire population of Andersonville (and probably never can given the lack of complete records), it comes close. An estimated 45,000 men passed through Andersonville (Official Records of the War of the Rebellion, II, VIII, p. 789). The data provide information on the soldier’s name, rank, regiment, and company. We collected company information for 3,110 of the men from the National Park Service’s on-line Soldiers and Sailors system, giving us a total of 31,688 men with complete company information in 1,570 regiments and 7,451 companies. We inferred ethnicity from the soldier’s last name and infer town or county of origin from where the regiment was organized. (Details are available in the data Appendix.) In our analysis we exclude two companies in the Andersonville data as outliers. The two excluded companies in the Andersonville data were from two regiments of Massachusetts Heavy Artillery and were part of the “Plymouth Pilgrims” (so called because they were guarding Plymouth, SC). The entire companies were captured and suffered unusually high mortality. According to McElroy (1954: 41), “They

gave up the moment the gates were closed upon them and began pining away.”¹⁴

The Andersonville data provide us with a rich set of social network measures. We use as measures of social networks the number of men in the company, the number of men in the regiment, the number of men of the same ethnicity in the company, the number of men with the same last name in the regiment (a measure of kinship), and the fraction of men in the same company with a rank of sergeant or higher (a measure of how well the company’s command structure was preserved).

We use the cross-sectional Andersonville data to estimate a probit model of the probability of death as a function of the number of friends and of demographic characteristics. That is, we estimate the probability of death, D , as

$$\Pr(D = 1) = \Phi(\beta_1 F + \beta_2 I) \quad (5)$$

where F is a vector of the number of friends and I is a vector of individual characteristics. We examine the quality of the network by running regressions of the form

$$\Pr(D = 1) = \Phi(\beta_1 F + \beta_2 F_j + \beta_3 I | \text{ethnicity} = i) \quad (6)$$

These static regressions underestimate the effect of friends on mortality rates because we can only observe the total number of friends who were ever in the camp, but the network varies over time. By using the total number of friends who were ever in the camp we are using a measure of the maximum possible number of friends.¹⁵

¹⁴These two companies were captured in April of 1864. The proportion of company that had died by the end of July, August, and September was 9, 25, and 38 percent respectively, for a total mortality rate of 48 percent.

¹⁵Only in 62 percent of all cases do we observe that two or more men from the same company have the same capture year and month. A simple numerical example provides some intuition for why we underestimate the effect of friends on mortality. Suppose the true relationship between the probability of death and the number of friends is $\Pr(D = 1) = .8 - .01 \times F$. A man with no friends would have an 80 percent chance of dying. Suppose also that men who really have 5 friends are coded as having 10 friends we will recover a slope of -0.005 rather than -0.01. (There were no mortality differences between companies where all the men were captured together and companies where they were not all captured together.)

5 POW Characteristics

Our longitudinal data allow us to examine heterogeneity in who became a POW. Table 1 shows that men who were POWs were more likely to be volunteers, to have enlisted earlier (1862), to be slightly better off, and to be from companies that experienced higher death rates, as might be expected from men who were captured in the field. When we run a probit in which the dependent variable is POW status and the independent variables are individual economic and demographic characteristics and the number of men in the company who were ever wounded or who ever died we find that these two company characteristics were the main predictors of POW status. The derivative on the number of men in the company who ever died was 0.257 (robust $\hat{\sigma} = 0.257$) and the derivative on the number of men who were ever wounded was 0.139 (robust $\hat{\sigma} = 0.042$).

Why did some POWs have many friends and others few? Men who were caught on scouting missions and men who became lost on the battlefield in the haze and smoke were more likely to be caught singly whereas those who surrendered were more likely to be caught together (and the surrender decision would be made by the commanding officers). Friends would then be lost to transfers. While we do not know how most men were caught, we can compare those caught with several friends with those caught with few friends. Table 2 shows that men who had three or more friends (men from the same company) in the same camp in their first 2 weeks of captivity were more likely to be US-born, came from wealthier households, and were less likely to have been wounded 10 days before capture (we expect that men who were wounded on the day of captivity are most likely undernourished). The companies that these men came from did not differ in battlefield experience from the companies of men with few friends nor did they differ in terms of birth place or occupational heterogeneity. When we ran a probit in which the covariates were all of the characteristics in Table 2, we found that the only statistically significant predictors of having 3 or more friends were being German-born (which decreased the number of friends relative to the US-born) and age (the young had more friends). We also compared the characteristics of men

with many friends and those with few by capture date. Men who were captured in 1864 or 1865 would have no hope of a quick exchange. However, we did not find that there was any difference in company characteristics nor in whether a POW was wounded 10 days before capture between men with 3 or more friends and men with less than 3 friends by a late capture date.

6 Results

6.1 Longitudinal Evidence

The longitudinal data show that the number of friends reduced mortality, with an additional friend leading to a mortality hazard that is 0.98 times lower (see Table 3 which presents three different specifications of Equation 4, which differ in their controls for local and camp level contagion effects and for state fixed effects). Table 3. As the number of friends increases from 0 to 5 the predicted probability of death, using the second specification in Table 3, decreases from 0.31 to 0.28 and as the number of friends increases to 10 the predicted mortality probability falls to 0.26. (The mean number of friends in each month was 5.6 with a standard deviation of 9.2 and the median was 2.) Even when we included state of regiment fixed effects in the third specification, the hazard ratio on the number of friends remained statistically significant at the 1 percent level.

We found that both local and camp level contagion increased mortality. Using the second specification in Table 3 a one unit increase in the logarithm of the number of men in the camp increased the mortality hazard 1.5 times and a one unit increase in the fraction of friends dying in the previous month increased the mortality hazard 5.9 times. An increase in the number of men from 7500 to 15,000 and then to 30,000, as happened at Andersonville, increased the predicted probability of death from 0.17 to 0.21 and then to 0.26. As the fraction of friends who died in the past month rose from 0 to 0.1 and to 0.2 predicted probability of death rose from 0.15 to 0.17 and then to 0.20. How many friends were needed to compensate for these mortality increases? As

the number of men in the camp rose from 7,500 to 15,000, the number of friends needed to keep mortality rates constant was 15, far above the median number. As the fraction of friends who died rose from 0 to 0.05, more than 50 friends were needed to keep mortality rates constant.

The regressions also show that individual characteristics affected survival. A corporal, sergeant, or officer faced an odds of death that was 0.5 times that of a private, a professional or proprietor faced an odds of death that was 0.5 to 0.6 times that of a farmer, and a laborer faced an odds of death that was 1.3 to 1.5 times higher than that of a farmer. The US-born and the German-born were more likely to die than those born in foreign countries other than Germany. Age increased mortality rates. When we controlled for state fixed effects we found that the tall were more likely to die. We did not find that company-level stress, as measured by the fraction of the company dying before captivity mattered. Our other covariates, including wealth, marital status, literacy, whether or not the soldier was wounded 10 days before capture, and size of city of enlistment, were not statistically significant predictors of mortality (not shown).

When we use a Weibull rather than an exponential specification, we found no evidence of duration dependence – the survivors did not toughen up and become less likely to die after their initial time in the POW camps nor did they become weaker and more likely to die after their time in the camps. We found no evidence of individual level heterogeneity when we re-estimated our specifications modelling unobserved heterogeneity by introducing an unobserved multiplicative effect on the hazard function. We therefore suspect that in an environment where infectious diseases that are not immunity dependent are endemic, past experiences may have provided very little protection.

Throughout this section we have assumed that the number of friends is an exogenous variable and is uncorrelated with the unobserved characteristics of the prisoner. However, we recognize that *within a company* the number of friends may merely reflect mortality conditions in the camp and therefore an individual's unobserved health.¹⁶ Fortunately, we have a set of within company

¹⁶The number of friends (F) at time t can be written as $F_t = (1 - \phi)F_{t-1} + \Delta T$ where ϕ is the fraction of friends who died in the previous month and ΔT is net transfers into the camp.

instruments and are able to estimate an equation similar to the second specification of Table 3 augmented with company specific fixed effects. We instrumented using a control function approach (Newey, Powell, and Vella 1999) and instrumented for the number of friends in each month with new transfers into the camp and with a dummy variable equal to one if the POW was transferred. Newly captured men and previously captured men who were transferred because the Union Army was threatening a location arguably provide a source of exogenous within company variation in the number of friends.¹⁷

Table 4 shows that the number of friends in a company continues to have a positive and statistically significant effect on mortality even when we control for company fixed effects and when we instrument using transfers. When we do not instrument but control for company fixed effects, we obtain a hazard ratio of 0.98 on the number of friends. When we instrument we find that in our first stage regression our R^2 was greater than 0.5 and in our second stage regression the hazard ratio on the number of friends was 0.89.

6.2 Cross-Sectional Andersonville Data

A weakness of our longitudinal data is that because it does not provide a census of a POW camp, we may miss networks such as those based on hometown. The Andersonville data show that various networks reduced mortality with the biggest declines coming from the measures of social networks that suggest a close bond between the men (see Table 5). An additional POW from the same regiment reduced a POW's own mortality probability by only 0.0004 in a sample where the overall probability of death was 0.41. An additional POW from the same company reduced a POW's own mortality by 0.003 and an additional POW of the same last name within the same regiment, a measure of kinship, lowered mortality by 0.034. Our results are robust to including

¹⁷We recognize that the characteristics of "friends" who were transferred in may differ from those of friends who were already there if only those who could walk could be transferred.

state of origin fixed effects.¹⁸ We also find that among men from smaller towns mortality was lower the greater the number of POWs from the same town. When we restricted the sample to exclude deaths after September of 1864 and captures prior to October of 1864 because only the dying may have been left at Andersonville once men were transferred out, our results remained unchanged. The derivative of the coefficient on the number of men in the company was -0.003 ($\hat{\sigma} = 0.001$) and the derivative of the coefficient on the number of men in the regiment with the same last name was -0.035 ($\hat{\sigma} = 0.007$).

Ethnic similarity between men within the same company reduced mortality, suggesting again that the quality of social networks matters (see Table 6). Among the Irish, the Germans, and the French (or French Canadian) an additional POW from the same company reduced mortality by roughly 0.002 to 0.003. But, an additional POW in the same regiment who was Irish reduced the mortality of the Irish by 0.030; an additional POW in the same regiment who was German reduced the mortality of the Germans by 0.030; and, an additional POW in the same regiment who was French reduced the mortality of the French by 0.019.¹⁹

The Andersonville data also show that officers had a distinct mortality advantage.²⁰ Those with a rank of lieutenant or higher had a death probability that was 0.31 to 0.35 lower than that of privates. Even sergeants and corporals had a mortality probability that was lower by 0.08 and 0.05, respectively, than that of privates. The presence of sergeants and higher of the same company

¹⁸When we include regiment fixed effects our coefficient on the number of men in the company falls to -0.0002 ($\hat{\sigma} = 0.0004$) and our coefficient on the number of men with the same last name falls slightly to -0.0221 ($\hat{\sigma} = 0.0047$). However, when we use the logarithm of the number of men in the company rather than the number of men, we obtain a statistically significant coefficient. If we include fixed effects for the state and the unit type (e.g. infantry, cavalry, or artillery) we obtain a coefficient of -0.0020 ($\hat{\sigma} = 0.0001$) on the number of men in the company and a coefficient of -0.0291 ($\hat{\sigma} = 0.0048$) on the number of men with the same last name in the regiment.

¹⁹There were too few colored troops at Andersonville to examine their social networks. We found no mortality difference between the non-officers of the colored troops and the rest of the Andersonville population.

²⁰According to Marvel (1994: 112), most of the officers in the Andersonville stockade, except for the officers of the few colored troops who were there, “still wore sergeants’ stripes, either because their commissions had arrived at regimental headquarters after they were captured or because they had not yet been mustered in.” Other officers were kept in a nearby pen called Castle Reed (Speer 1997: 261). Only one officer in the Andersonville data was listed as being kept at Castle Reed.

lowered mortality probabilities for all, with a 10 percentage point increase in the fraction of higher ranked men lowering mortality by 1.2. The fraction of sergeants or higher is not a reflection of own officer mortality. When we restricted the sample to privates we found that the derivative of this coefficient rose to -0.115 ($\hat{\sigma} = 0.054$). We hypothesize that in these companies the organizational capital was preserved through the chain of command.

7 Costs of Social Networks

We have stressed that social networks assisted survival in POW camps because of the care that friends provided. But, there could be a “dark” side to this care if the most effective groups were gangs who robbed and murdered their fellow prisoners.²¹ Sneden (2000: 235) described the Andersonville Raiders as being “all strong, as they bought food from the sutler and other dealers with stolen money, or robbed some poor prisoner of his whole stock of food.” Although we cannot observe how friends assisted survival, we do not observe a decline in deaths in the Andersonville data after July 11, 1864 when 6 of the Raiders were hanged.

Social networks may have imposed costs on their members. One way to survive was to collaborate with the enemy. In the extreme case this meant joining the Confederate Army. Sneden (2000: 190) commented on one recruitment effort that “If any of us had showed any symptoms of recruiting to the Rebels, he would have been murdered at once by his comrades.” Out of our 3175 cases of captivity in the longitudinal data we observe only 17 enlistments in the Confederate Army (all out of Salisbury). A probit regression that controls for individual characteristics shows that men who enlisted were more likely to be foreign-born, to be married, to be wealthier, to be non-farmers, and to have been caught with fewer men. The derivative of the coefficient on number of comrades originally captured with was -0.00015, ($\hat{\sigma} = .00001$). Given the small numbers these

²¹Throughout this paper we have focused on a network’s absolute size but it is conceivable that relative size matters. Unfortunately we cannot test this hypothesis because we do not have a census of the camp at different points in time.

results can only be suggestive. Also suggestive of friends not always helping survival is that among the men at Andersonville we find no evidence that the number of friends predicted whether or not an individual was one of the 140 who escaped.

8 Conclusion

In Civil War camps such as Andersonville starving men were crowded into a space where “[t]here was hardly any room for all to lie down at night, and to walk a few hundred feet in any direction would require an hour’s patient threading of the mass of men and tents” (McElroy 1957: 98). “The dead and dying lie alongside each other” and each day the corpses “piled up near the dead line ... nearly all naked, black as crows, festering in the hot sun all day, covered with lice and maggots” until they were “loaded up in the ration wagon like cordwood.” “The ground in the thickest part settled in the camp is fairly alive and moves with maggots or lice” (Snedden 2000: 229). Such horrific conditions made a mockery of most survival strategies. In two independent data sets we found that friends had a statistically significant positive effect on survival probabilities and that the closer the ties between friends as measured such identifiers as ethnicity, kinship, and the same hometown the bigger the effect. However, the impact of friends could not outweigh the effects of contagion. Nonetheless, it is striking that even under such duress, friends continued to have a positive effect on survival probabilities.

Data Appendix

Longitudinal Data

Our longitudinal data consist of the POWs in a sample of 35,570 men in 303 companies.²² The sample of 35,570 represents roughly 1.3 percent of all whites mustered into the Union Army and 8 percent of all regiments that comprised the Union Army and are available as the dataset *Aging of Veterans of the Union Army*, Robert W. Fogel, Principal Investigator, <http://www.cpe.uchicago.edu>. Ninety-one percent of the sample consists of volunteers, with the remainder evenly divided between draftees and substitutes. The primary data source that we use consists of men's military service records. These records provide such basic information as year of muster, age, birthplace, and height in inches, and also information on what happened to the soldier during his military service. Men were linked to the manuscript schedules of the 1860 census which provides information on the value of personal property for all individuals in the household and on illiteracy and allows us to infer marital status. This linkage allows us to determine that the sample is representative of the Northern population of military age in terms of 1860 real estate and personal property wealth and in terms of literacy rates.

Dependent Variable

We calculated days from capture until death. We allowed for censoring by calculating days from capture until exchange, escape, or release. When day (but not month or year) of death, exchange, escape, or release is unknown we set it equal to 15.

Independent Variables

1. **Number of friends.** Number of company members in the camp at the same time. When

²²The data are based upon a 100 percent sample of all enlisted men in 331 randomly chosen companies. Our sample is limited to 303 companies because complete data have not yet been collected on all 331 companies. Among the original 331 companies, New England is under-represented and the Midwest over-represented relative to the army as a whole. The companies that have not yet been collected are from Indiana and Wisconsin, states that were very committed to the Union cause.

the number of friends is unknown either because the camp is unknown or the dates when the POW was in the camp are unknown the number of friends is set equal to 0 and a dummy variable indicating whether or not the number of friends is unknown is set equal to one. The number of friends was more likely to be unknown if the POW was captured before July of 1863 – men who were exchanged in the field immediately after capture would never have seen a POW camp.

2. **Number of friends dying in the previous month.** The number of friends in the camp dying in the previous month. If a POW had no friends in the camp in previous month the number of friends dying in the previous month is set equal to 0 and a dummy variable indicating that the variable is unknown is set equal to 1.
3. **Log(total number of men in the camp).** The logarithm of the total number of men in the camp by month, as found in *Official Records of the War of the Rebellion*. When the total number of men in the camp is unknown the variable is set equal to the logarithm of 40 and a dummy variable indicating that the total number of men in the camp is unknown is set equal to 1.
4. **Fraction company dying before capture.** The fraction of the company dying before the POW's capture.
5. **Camp dummies** Eleven camp dummies indicating if the camp was Andersonville, Salisbury, Richmond, Danville, one of the Texas camps, one of the Arkansas, Florida, Mississippi, Louisiana, or Alabama camps, one of the other North Carolina or Georgia camps, Charleston or Columbia, Florence, one of the Tennessee or other Virginia camps, and other or unknown.
6. **Year dummies** Dummy variables indicating the year.
7. **Month dummies** Dummy variables indicating the month.

8. **Occupation.** Dummy variables indicating whether at enlistment the recruit reported his occupation as farmer, artisan, professional or proprietor, or laborer. Farmers' sons who were not yet farmers in their own right would generally report themselves as farmers.
9. **Birth place** Dummy variables indicating whether at enlistment the recruit reported his birth place as the US, Germany, Ireland, Great Britain, or other.
10. **Corporal, sergeant, or officer.** A dummy equal to one if the POW's rank before capture was corporal, sergeant, or officer.
11. **Age at captivity.** Age when captured.
12. **Height in inches.** Height in inches at enlistment preceding capture.
13. **Wounded 10 days before capture.** A dummy set equal to one if the POW was wounded 10 days before capture.
14. **Enlisted in large city.** A dummy equal to one if the POW enlisted in a city of 50,000 or more (one of the 13 largest cities in the United States).
15. **Married in 1860.** This variable is inferred from family member order and age in the 1860 census. This variable was set equal to 0 if the recruit was not linked to the 1860 census.
16. **Log(total household personal property) in 1860.** This variable is the sum of personal property wealth of everyone in the recruits' 1860 household. This variable is set equal to 0 if the recruit was not linked to the 1860 census.
17. **Missing census information.** A dummy equal to one if the recruit was not linked to the 1860 census. Linkage rates from the military service records to the 1860 census were 57 percent. The main characteristic that predicted linkage failure was foreign birth.

18. **Illiterate.** This variable is from the 1860 census and provides illiteracy information only for those age 20 and older.
19. **Missing illiteracy information.** A dummy equal to one if we do not know whether the recruits was illiterate, either because he was not linked to the 1860 census or because he was less than age 20 in 1860.

8.1 Andersonville Database

We obtained the Andersonville database from the National Park Service. A searchable version of the database is available on-line as part of the Soldiers and Sailors system at <http://www.itd.nps.gov/cwss>. Because company information was missing for some POWs we collected this information for 3,110 men using the soldiers database that is part of the Soldiers and Sailors system. We obtained information on what town a regiment was organized in from Frederick Dyer's *Compendium of the War of the Rebellion*.

Dependent Variable

Our dependent variable is a dummy equal to one if the POW died.

Independent Variables

1. **Number of men in the regiment.** The number of men in the regiment excluding the POW's own company.
2. **Number of men in company.** The number of men in the POW's own company.
3. **Fraction of company with rank sergeant or higher.** The fraction of men in the company with rank of sergeant or higher.
4. **Number of men with same last name in the regiment.** The number of men in the regiment with the same last name. Because regiments were formed locally, we interpret this variable

as a measure of kinship.

5. **Log(Number of men in camp from same town).** The logarithm of the number of men in the camp from the same town, where same town refers to the town where the regiment was formed.
6. **Dummy if town population < 9552.** A dummy equal to one if the regiment was not organized in one a town that was not one of the 100 most populous towns.
7. **Rank.** Dummies indicating if the POW was a private, officer, sergeant, corporal, or other rank (e.g. support position or musician).
8. **Irish, German, French, and Continental surnames.** Dummies equal to one if the POW's last name was an Irish, German, French, or Continental surname. We determined the nationality of a surname by looking at the entire 1880 census. We called a surname Irish, for example, if only individuals born in Ireland and not in other European countries had that surname.
9. **Year of capture dummies.** Year of capture, including year of capture unknown, dummies.

References

- [1] Aizer, Anna and Janet Currie. 2004. "Networks or Neighborhoods? Correlations in the Use of Publicly-Funded Maternity Care in California." *Journal of Public Economics*. 88(12): 2573-85.
- [2] Akerlof, George A. and Rachel E. Kranton. 2000. "Economics and Identity." *Quarterly Journal of Economics*. 115(3): 715-53.
- [3] Akerlof, George A. and Rachel E. Kranton. 2005. 2005. "Identity and the Economics of Organizations." *Journal of Economic Perspectives*. 19(1): 9-32.
- [4] Alesina, Alberto and Eliana La Ferrara. 2000. "Participation in Heterogeneous Communities." *Quarterly Journal of Economics*. 115(3): 847-904.
- [5] Alesina, Alberto, Enrico Spolaore, and Romain Wacziarg. 2000. "Economic Integration and Political Disintegration." *American Economic Review*. 90(4): 1276-96.
- [6] Bayer, Patrick, Stephen Ross, and Giorgio Topa. 2005. "Place of Work and Place of Residence: Informal Hiring Networks and Labor Market Outcomes." NBER Working Paper No. 11019.
- [7] Bertrand, Marianne, Erzo Luttmer, and Sendhil Mullainathan. 2000. "Network Effects and Welfare Culture." *Quarterly Journal of Economics*. 115(3): 1019-55.
- [8] Costa, Dora L. and Matthew E. Kahn. 2004. "Forging a New Identity: The Costs and Benefits of Diversity in Civil War Combat Units for Black Slaves and Freemen." NBER Working Paper No. 11013.
- [9] Dixit, Avinash. 2004. *Lawlessness and Economics: Alternative Modes of Governance*. Princeton, NJ: Princeton University Press.
- [10] Durlauf, Steven N. "Neighborhood Effects." In J.V. Henderson and J.-F. Thisse, Eds., *Handbook of Regional and Urban Economics*. Vol 4, Economics. Amsterdam: North-Holland.
- [11] Eitinger, Leo. 1964. *Concentration Camp Survivors in Norway and Israel*. Oslo: Universitetsforlaget.
- [12] Ellickson, Robert C. 1991. *Order without Law: How Neighbors Settle Disputes*. Cambridge, MA: Harvard University Press.
- [13] Fafchamps, Marcel and Susan Lund. 2003. "Risk-sharing networks in rural Philippines." *Journal of Development Economics*. 71(2): 261-87.
- [14] Greif, Avner. 1993. "Contract Enforceability and Economic Institutions in Early Trade: The Maghribi Traders' Coalition." *American Economic Review*. 83(3): 525-48.

- [15] Grimard, Franque. 1997. "Household Consumption Smoothing Through Ethnic Ties: Evidence from Côte d'Ivoire." *Journal of Development Economics*. 53(2): 391-422.
- [16] Hesselstine, William Best. 1930. *Civil War Prisons: A Study in War Psychology*. Columbus, Ohio: The Ohio State University Press.
- [17] Ioannides, Yannis M. and Linda Datcher Loury. 2004. "Job Information Networks, Neighborhood Effects, and Inequality." *Journal of Economic Literature*. 42(4): 1056-93.
- [18] Jones, DR. 1979. "What the POWs write about themselves." In *Proceedings of the Twenty-Sixth Annual Conference of Air Force Behavioral Scientists*, RA Levy, Ed. Brooks Air Force Base Texas: USAF School of Aerospace Medical Division.
- [19] Lazear, Edward P. 1999a. "Globalization and the Market for Team-Mates." *Economic Journal*. 109(454): 15-40.
- [20] Lazear, Edward P. 1999b. "Culture and Language." *Journal of Political Economy*. Supplement. 107(S6): 95-126.
- [21] Malkin, Lawrence. 2001. "Prisoners of War." In Robert Cowley and Geoffrey Parker, Eds., *Reader's Companion to Military History*. Boston-New York: Houghton Mifflin.
http://college.hmco.com/history/readerscomp/mil/html/mh_000101_publicationd.htm
- [22] Manski, Charles. 1993. "Identification of Endogenous Social Effects: The Reflection Problem." *Review of Economic Studies*. 60(July): 531-42.
- [23] Marvel, William. 1994. *Andersonville: The Last Depot*. Chapel Hill and London: The University of North Carolina Press.
- [24] McElroy, John. 1957. *This Was Andersonville*. New York: McDowell, Obolensky, Inc.
- [25] Moffitt, Robert A. 2001. "Policy Interventions, Low-Level Equilibria, and Social Interactions." In Steven Durlauf and Payton Young, Eds., *Social Dynamics*. Cambridge, MA: MIT Press.
- [26] Moretti, Enrico. 1999. "Social Migrations and Networks: Italy 1889-1913." *International Migration Review*.
- [27] Munshi, Kaivan. 2003. "Networks in the Modern Economy: Mexican Migrants in the U.S. Labor Market." *Quarterly Journal of Economics*. 118(2): 549-99.
- [28] Newey, Whitney K, James L Powell, and Francis Vella. 1999. "Nonparametric Estimation of Triangular Simultaneous Equations Models." *Econometrica*. 67(3): 565-603.
- [29] Ransom, John. 1963. *John Ransoms Andersonville Diary*. New York: Berkley Books.
- [30] Rhodes, James Ford. 1904. *History of the United States of America: From the Compromise of 1850 to the McKinley-Bryan Campaign of 1896*, Vol. 5, 1864-1866. New York: Macmillan.

- [31] Rosenzweig, Mark R. 1988. "Risk, Implicit Contracts and the Family in Rural Areas of Low Income Countries." *Economic Journal*. 98(393): 1148-70.
- [32] Schmolling, Paul. 1984. "Human Reactions to the Nazi Concentration Camps: A Summing Up." *Journal of Human Stress*. 10(3): 108-20.
- [33] Sneden, Robert Knox. 2000. *Eye of the Storm*. Edited by Charles E. Bryan and Nelson D. Lankford. New York: The Free Press.
- [34] Speer, Lonnie R. *Portals to Hell: Military Prisons of the Civil War*. Mechanicsburg, PA: Stackpole Books.
- [35] Townsend, Robert M. 1995. "Consumption Insurance: An Evaluation of Risk-Bearing Systems in Low Income Economies." *Journal of Economic Perspectives*. 9(3): 83-102.
- [36] U.S. Department of Veterans Affairs. Office of Policy. 2004. *Former American Prisoners of War (POWs)*.
<http://www.vba.va.gov/bln/21/Benefits/POW/DOCS/POW6-29-04.doc>.

Table 1: Characteristics of Soldiers by POW and Deserter Status

	All	Died and Never POW	Never POW	POW	Non- deserter	Deserter
US Born	0.745	0.815	0.746	0.743	0.764	0.606
Irish	0.087	0.064	0.086	0.102	0.077	0.165
German	0.074	0.055	0.075	0.062	0.073	0.083
British	0.039	0.025	0.039	0.034	0.035	0.065
Other	0.054	0.040	0.055	0.043	0.050	0.080
Artisan	0.200	0.165	0.199	0.212	0.194	0.250
Farmer						
Professional or proprietor	0.075	0.053	0.077	0.061	0.073	0.090
Laborer	0.212	0.148	0.212	0.212	0.197	0.326
Unknown	0.007	0.005	0.007	0.008	0.007	0.006
Enlisted in 1861	0.210	0.281	0.205	0.263	0.206	0.236
Enlisted in 1862	0.344	0.455	0.331	0.487	0.343	0.353
Enlisted in 1863	0.068	0.055	0.066	0.087	0.062	0.110
Enlisted in 1864	0.256	0.167	0.266	0.147	0.266	0.182
Enlisted in 1865	0.122	0.042	0.132	0.009	0.122	0.118
Volunteer	0.909	0.945	0.905	0.951	0.915	0.859
Height in Inches	67.600	67.920	67.589	67.708	67.646	67.258
Household Property Income in 1860	533.913	496.061	531.468	558.200	541.193	437.905
Company Occupation Fragmentation	0.559	0.525	0.558	0.570	0.550	0.626
Company Birthplace Fragmentation	0.642	0.639	0.644	0.620	0.638	0.676
Fraction company died	0.135	0.185	0.131	0.182	0.136	0.131
Sample Size	34594	3933	31977	3042	30849	4170

All tabulations are from our longitudinal data.

Table 2: Characteristics of POWs by Number of Friends in First Two Weeks of Captivity

	No. of friends		
	All	< 3	≥ 3
US born	0.731	0.708	0.754
Irish	0.120	0.115	0.125
German	0.063	0.081	0.045
British	0.034	0.042	0.026
Other	0.050	0.053	0.047
Artisan	0.209	0.214	0.204
Farmer	0.421	0.440	0.401
Professional or proprietor	0.070	0.077	0.064
Laborer	0.266	0.243	0.288
Unknown occupation	0.034	0.025	0.044
Enlisted in city of over 50,000	0.475	0.493	0.457
Household property income in 1860	576.475	483.609	661.771
Age when captured	25.960	26.645	25.265
Height when captured	171.576	171.790	171.356
Married in 1860	0.257	0.276	0.239
Wounded 10 days before capture	0.118	0.148	0.088
Fraction company dead before capture	0.089	0.093	0.085
Fraction company wounded in war	0.238	0.241	0.236
Fraction company dying in war	0.168	0.163	0.175
Company Birthplace Fragmentation	0.542	0.547	0.536
Company Occupational Fragmentation	0.596	0.586	0.607

All tabulations are from our longitudinal data. The number of friends refers to the number of friends who were in the camp with the POW in the first 2 weeks of captivity. The data are for the subset of POWs for whom we know the POW camp and exclude the one outlier company. The total number of observations is 1923.

Table 3: Effect of Social Networks, Contagion, and Individual Characteristics on Mortality

	(1)		(2)		(3)	
	Haz. Rat.	Std. Err.	Haz. Rat.	Std. Err.	Haz. Rat.	Std. Err.
Number of friends	0.983 [†]	0.008	0.977 [‡]	0.009	0.977 [‡]	0.009
Fraction of company dying in previous month			6.748 [‡]	2.893	5.863 [‡]	2.704
Log(total number of men in the camp)			1.512 [‡]	0.137	1.514 [‡]	0.138
Fraction company dying before capture	1.091	0.782	0.938	0.671	1.268	1.085
Dummy=1 if occupation at enlistment						
Farmer						
Professional or proprietor	0.567 [†]	0.146	0.568 [†]	0.145	0.513 [‡]	0.133
Artisan	0.944	0.119	0.944	0.119	0.860	0.114
Laborer	1.298 [†]	0.154	1.282 [†]	0.152	1.146	0.146
Dummy=1 if born in						
US						
Germany	1.197	0.215	1.175	0.214	1.129	0.214
Ireland	0.768 [*]	0.121	0.761 [*]	0.118	0.725 [†]	0.116
Great Britain	0.641 [*]	0.171	0.662	0.176	0.640 [*]	0.173
Other foreign country	0.658 [*]	0.154	0.623 [†]	0.150	0.584 [†]	0.143
Dummy=1 if sergeant, corporal, or officer	0.549 [‡]	0.115	0.538 [‡]	0.111	0.559 [‡]	0.113
Age at captivity	1.045 [‡]	0.007	1.043 [‡]	0.007	1.040 [‡]	0.007
Height at enlistment	1.010	0.007	1.011	0.007	1.014 [†]	0.007
State fixed effects?	N		N		Y	
Log pseudolikelihood	-1324.607		-1300.909		-1284.888	

Estimated from the longitudinal data. The number of friends is the number of men in the company in the same POW camp in the same month. Additional controls include a dummy equal to one if married, a dummy equal to one if illiterate, a dummy equal to one if wounded 10 days before captivity, a dummy equal to one if the individual enlisted in a city of 50,000 or more, year dummies, month dummies, 11 camp dummies (including a dummy indicating that camp information was missing), dummies indicating if rank, occupation, illiteracy information, and deaths in the previous month were missing, a dummy indicating if the soldier was not linked to the 1860 census, a dummy indicating if the number of friends is unknown, and a dummy indicating if the total number of men in the camp was unknown. When the number of friends is unknown (either because the camp is unknown or because dates are unknown) the number of friends is set equal to 0. When the total number of men in the camp in the camp is unknown the value is set equal to 40. When the number of deaths in the previous month was missing the value was set to 0 (this includes the cases where the POW had no friends). 3026 observations. The symbols ‡, †, and * indicate that the hazard ratio differs from 1 at the 1, 5, and 10 percent level of statistical significance.

Table 4: Effect of Social Networks on Mortality, with Company Fixed Effects and Instrumented

					IV		IV	
	Haz. Rat.	Std. Err.	Haz. Rat.	Std. Err.	Haz. Rat.	Std. Err.	Haz. Rat.	Std. Err.
Number of friends	0.978*	0.012	0.979*	0.012	0.895 [†]	0.055	0.885 [†]	0.066
Fraction of company dying in previous month			1.534	0.776			0.939	0.781
Log(total number of men in the camp)	1.437 [‡]	0.122	1.436 [‡]	0.123	1.537 [‡]	0.196	1.547 [‡]	0.198
Residual					1.106 [†]	0.071	1.120 [†]	0.088

The instruments are time-varying and are a dummy for whether the soldier was transferred and the count of men in his company transferred into the camp. All regressions contain company fixed effects and all of the variables used in the second specification in Table 3 with the exception that instead of the full set of camp dummies only an Andersonville is used. The number of friends is the number of friends in the same POW camp in the same month. The regressions exclude observations where the number of friends is unknown because the camp is unknown or because dates within the camp are unknown. The total number of cases of captivity is 1824. Bootstrap standard errors for the IV regressions. The symbols [‡], [†], and * indicate that the hazard ratio differs from 1 at the 1, 5, and 10 percent level of statistical significance.

Table 5: Effect of Social Networks on Probability Death

	$\frac{\partial P}{\partial x}$	$\frac{\partial P}{\partial x}$	$\frac{\partial P}{\partial x}$	From Small Town	
	$\frac{\partial P}{\partial x}$	$\frac{\partial P}{\partial x}$	$\frac{\partial P}{\partial x}$	$\frac{\partial P}{\partial x}$	$\frac{\partial P}{\partial x}$
Number of men in regiment × 10	-0.004 [‡] -(0.001)				
Number of men in company		-0.003 [‡] (0.001)	-0.002 [‡] (0.001)	-0.003 [‡] (0.001)	-0.002 [‡] (0.001)
Fraction of company with rank sergeant or higher	-0.120 [‡] (0.034)	-0.128 [‡] (0.034)	-0.079 [‡] (0.032)	-0.152* (0.061)	-0.085 (0.056)
Number of men with same last name in regiment	-0.033 [‡] (0.007)	-0.033 [‡] (0.007)	-0.036 [‡] (0.006)	-0.018 [†] (0.009)	-0.023 [‡] (0.009)
log(Number of men in camp from same town)	0.003 (0.005)	0.002 (0.005)	0.000 (0.005)	-0.018 [†] (0.009)	-0.026 [‡] (0.008)
Dummy=1 if Town population < 9552	-0.037 [‡] (0.014)	-0.034 [‡] (0.014)	-0.032 [‡] (0.013)		
Private					
Officer	-0.347 [‡] (0.027)	-0.347 [‡] (0.027)	-0.354 [‡] (0.021)	-0.311 [‡] (0.038)	-0.328 [‡] (0.025)
Sergeant	-0.080 [‡] (0.011)	-0.080 [‡] (0.011)	-0.083 [‡] (0.011)	-0.084 [‡] (0.017)	-0.088 [‡] (0.018)
Corporal	-0.055 [‡] (0.011)	-0.055 [‡] (0.011)	-0.046 [‡] (0.011)	-0.064 [‡] (0.017)	-0.054 [‡] (0.018)
Other rank	-0.028 (0.030)	-0.034 (0.030)	-0.030 (0.030)	-0.067 (0.049)	-0.046 (0.050)
Irish surname	-0.020 (0.019)	-0.022 (0.019)	-0.017 (0.019)	-0.069 [†] (0.030)	-0.059* (0.030)
German surname	0.009 (0.015)	0.009* (0.015)	0.016 (0.015)	0.001 (0.024)	0.025 (0.025)
French surname	-0.028 (0.017)	-0.028 (0.017)	-0.028 (0.017)	-0.033 (0.027)	-0.032 (0.028)
Continental surname	-0.006 (0.018)	-0.007 (0.018)	0.004 (0.018)	0.021 (0.032)	0.029 (0.032)
State fixed effects?	N	N	Y	N	Y
Pseudo R ²	0.043	0.044	0.087	0.048	0.115
Observations	31,336	31,336	31,330	12,002	12,002

Estimated from the Andersonville data. Additional control variables include year of capture dummies, a dummy variable indicating whether the regiment's town of formation was unknown and a dummy variable indicating whether year of capture was unknown. Standard errors in parentheses. The symbols ‡, †, and * indicate that the coefficient is different from 0 at the 1, 5, and 10 percent level of statistical significance. A small town is defined as one of less than 9,552 persons and one that excludes the large military camps in Springfield, IL and Readville, MA.

Table 6: Effect of Ethnic Networks on Probability Death

	Irish		German		French	
	$\frac{\partial P}{\partial x}$	Std Err	$\frac{\partial P}{\partial x}$	Std Err	$\frac{\partial P}{\partial x}$	Std Err
No. of men in company	-0.003 [†]	0.002	-0.003 [†]	0.001	-0.002	0.002
No. of men of own ethnicity in company	-0.030	0.036	-0.030 [†]	0.013	-0.019	0.026
Dummy=1 if						
Private	0.046	0.049	0.078 [†]	0.037	0.093 [†]	0.043
From small town	-0.100 [‡]	0.040	-0.036	0.031	-0.054	0.036
Captured 1864 or 1865	-0.239 [‡]	0.077	-0.282 [‡]	0.049	-0.388	0.058
Pseudo R ²	0.036		0.059		0.058	
$\chi^2(2)$ test for joint significance of No. of men in company and No. of men of own ethnicity	8.60		22.01		3.20	
Observations	735		1355		869	

Estimated from the Andersonville data. The regressions include a dummy date indicating if capture date was unknown. The symbols [‡], [†], and * indicate that the coefficient is different from 0 at the 1, 5, and 10 percent level of statistical significance.