Preliminary Thesis Defence

Supervisor: Jean-Louis Arcand[1]
Second Reader:

Bastiaan Quast[2]

November 14, 2013

1. Professor of Economics, The Graduate Institute, Geneva; Director, Centre for Finance and Development; jean-louis.arcand@graduateinstitute.ch
2. PhD Student, The Graduate Institute, Geneva; bastiaan.quast@graduateinstitute.ch / bquast@gmail.com

Contents

Introduction

jade

Chapter 1

Pensions and Child Growth in South Africa

Abstract

In this paper I look at the effect of the gender of pension recipients on the growth of children in the same households.

I do this by comparing z-scores of anthropometrics of South African children living in the same household as state pension recipients. This paper exploits the fact that the data set consists of two surveys which were done before and after the lowering of the pension eligibility age for men to the same age as women.

The main preliminary finding is that the household effect was only significant in 2012.

1.1 Introduction

This paper looks at the effect of the gender of pension recipients on the growth of children in their household in South Africa. The approach is very similar to Duflo (2000, 2003). The deviation from international standards (Onis et al. 2006) for weight-for-height and length-for-age are computed as z-scores. These are then compared for different pension recipient status and gender.

The anthropometrics are useful for computing z-scores. These z-scores are considered a good representation of short-term or long-term malnutrition respectively, especially for children between 6 and 60 months old.

The South African pension is a interesting variable to measure income because of its criteria. Besides a maximum level of income, the only criterium is the age of a person. Because of this the status as a recipient is quite exogenous and there are few selection bias issues. The problematic difference between the eligibility age of men and women was eliminated between the two surveys which creates an interesting natural experiment.

Duflo finds evidence in South Africa's 1993 Integrated Household Survey that girls' short term nutrition (weight-for-height) was positively influence by living with the maternal grandmother if the grandmother was eligible for a state pension. This is directly after the significant increase in the pension sum for blacks. The pension-eligibility age at this time was 60 for women and 65 for men.

This study deviates from the Duflo study in several ways. In 2008 and 2012 the first and second wave of the Southern Africa Labour and Development Research Unit (2008, 2012) have gathered similar data. In the period 2008-2010, the government lowered the eligibility age for men from 65 to 60 (Announcement).

This happened in a few steps. As of July 16th 2008 men aged 63 and 64 were eligible for a pension. Men aged 61 and 62 became eligible in April 2009. Finally in January 2010, pension eligibility age was at 60 for all citizens.

Another deviation is the usage of Onis et al. (2006) in stead of CDC's, since these have superseded the CDC charts, however this should not be of any consequence.

The main preliminary result is that the household effect (i.e. having one or more recipients in the household) is very insignificant in the 2008 estimate. But in the 2012 estimate it is very significant.

1.2 Data

In this paper I use data from two sources. The first is the South African National Income Dynamics Survey (Southern Africa Labour and Development Research Unit 2008, 2012) and the second is the World Health Organization's Child Growth Standards Onis et al. (2006).

The main source of data is the NIDS. This survey collects data on a representative set of appproximately 10,000 South African households. The primary information types I use are, the child anthropometrics, the age and gender of household members, and the status as state pension recipients.

For adults several variables measure the different amounts and sources of income. Among those, a variable if the adult receives a state pension, and if so, how much. This is a numeric variable, the values of which lie very close together. For simplicity I have temporarily used this variable as a dummy.

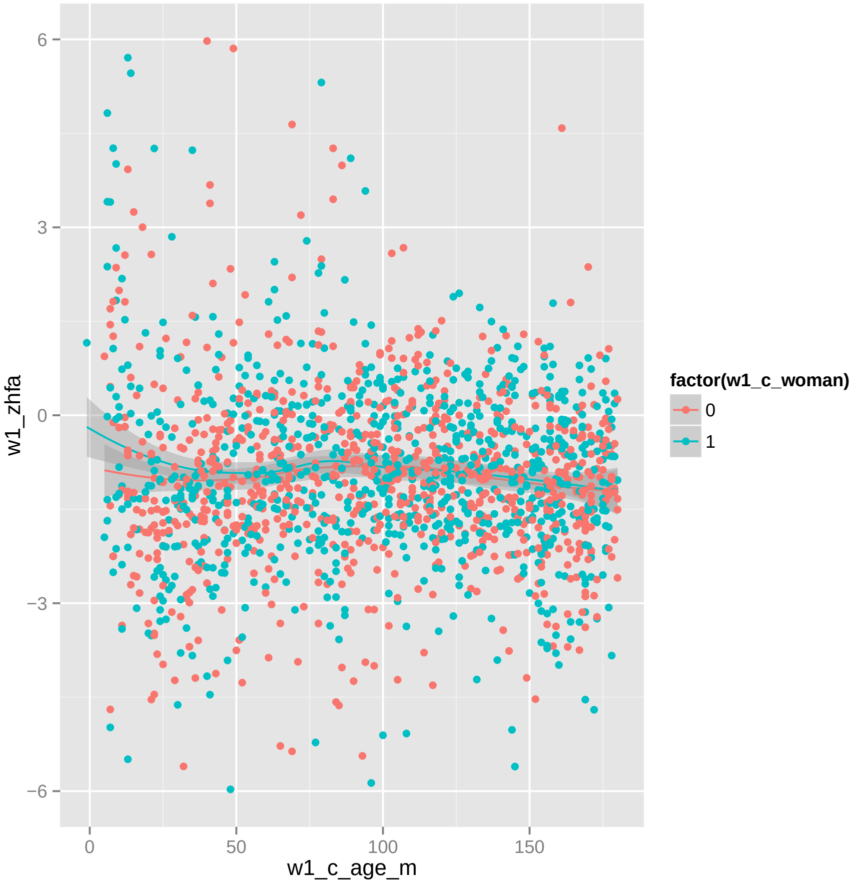
Children's anthropometrics are taken, these are length/height, weight, and waist. Using these anthropometics and WHO growth standards, z-scores have been calculated. Unfortunately wave 2 (2012) accidentally omitted the z-scores, so that these cannot be evaluated until an updated version is published. However, I have computed the length-for-age z-scores manually.

In 2006 the WHO published its standards for child growth (). These standards are based on the scores of children from different ethnic populations in households which observed a healthy lifestyle. The standards provide the means and standards deviations used. These are on a monthly basis for height-for-age, and on a semi-centimeter level for weight-for-height scores.

```
p1 <- ggplot(subset(w1_child, w1_woman_60 == 1))
p1 <- p1 + aes(w1_c_age_m, w1_zhfa, colour = factor(w1_c_woman))
p1 <- p1 + stat_smooth(method = "loess") + geom_point()
p1

## Warning:  Removed 324 rows containing missing values (stat_smooth).
## Warning:  Removed 263 rows containing missing values (stat_smooth).
```

```
## Warning:  Removed 51 rows containing missing values (stat_smooth).
## Warning:  Removed 638 rows containing missing values (geom_point).
```



1.3 Results

Basic HAZ (2008)

```
summary(w1_haz0)

##
## Call:
## lm(formula = w1_zhfa ~ w1_spen_w + w1_spen_m + w1_h_tinc + w1_best_edu +
##     w1_best_age_yrs, data = w1_child, subset = w1_c_age_m >=
##     6 & w1_c_age_m <= 60)
##
## Residuals:
##    Min     1Q Median     3Q    Max
## -4.779 -1.036 -0.169  0.834  7.060
##
```

```
## Coefficients:
##                  Estimate Std. Error t value Pr(>|t|)
## (Intercept)     -1.43e+00   1.44e-01   -9.87   <2e-16 ***
## w1_spen_w        2.32e-02   1.15e-01    0.20   0.8402
## w1_spen_m        1.36e-01   1.72e-01    0.79   0.4281
## w1_h_tinc        3.62e-05   9.99e-06    3.62   0.0003 ***
## w1_best_edu      1.63e-03   7.84e-03    0.21   0.8355
## w1_best_age_yrs  7.61e-03   3.64e-03    2.09   0.0369 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.77 on 1436 degrees of freedom
##   (1936 observations deleted due to missingness)
## Multiple R-squared:  0.0134,Adjusted R-squared:  0.00994
## F-statistic: 3.89 on 5 and 1436 DF,  p-value: 0.00164
```

HAZ 2008, with 2012 eligiblity as an IV

```
summary(tsls_w1w2_haz0)

##
##  2SLS Estimates
##
## Model Formula: w1_zhfa ~ w1_spen_w + w1_spen_m + w1_h_tinc + w1_best_edu + w1_best
##
## Instruments: ~w2_spen_w + w2_spen_m + w1_h_tinc + w1_best_edu + w1_best_age_yrs
##
## Residuals:
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  -4.990  -0.835  -0.050   0.000   0.788   7.070
##
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)     -1.172e+00  7.388e-02 -15.861  < 2e-16 ***
## w1_spen_w        1.748e-02  9.477e-02   0.184   0.8536
## w1_spen_m       -1.374e-01  1.444e-01  -0.952   0.3414
## w1_h_tinc        2.995e-05  5.606e-06   5.342 9.69e-08 ***
## w1_best_edu      2.410e-03  3.532e-03   0.682   0.4951
## w1_best_age_yrs  4.127e-03  1.863e-03   2.215   0.0268 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.4889 on 4227 degrees of freedom
```

HAZ 2008, with 2012 eligiblity as an IV (men over 65 only)

```
summary(tsls_w1w2_haz1)

##
##  2SLS Estimates
##
```

```
## Model Formula: w1_zhfa ~ w1_spen_w + w1_spen_m + w1_h_tinc + w1_best_edu + w1_best_age_yrs
##
## Instruments: ~w2_spen_w + w2_spen_m_65 + w1_h_tinc + w1_best_edu + w1_best_age_yrs
##
## Residuals:
##    Min. 1st Qu.  Median    Mean 3rd Qu.    Max.
##  -4.990  -0.836  -0.050   0.000   0.786   7.040
##
##                   Estimate Std. Error t value Pr(>|t|)
## (Intercept)     -1.173e+00  7.387e-02 -15.880  < 2e-16 ***
## w1_spen_w        8.576e-03  9.541e-02   0.090   0.9284
## w1_spen_m       -9.189e-02  1.348e-01  -0.681   0.4956
## w1_h_tinc        2.992e-05  5.605e-06   5.339 9.85e-08 ***
## w1_best_edu      2.443e-03  3.531e-03   0.692   0.4890
## w1_best_age_yrs  4.092e-03  1.860e-03   2.200   0.0278 *
## ---
## Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
##
## Residual standard error: 1.4885 on 4227 degrees of freedom
```

Bibliography

Duflo, Esther. 2000. "Child health and household resources in South Africa: Evidence from the Old Age Pension program." *The American Economic Review* 90 (2): 393–398. http://www.jstor.org/discover/10.2307/117257.

———. 2003. "Grandmothers and Granddaughters: Old-Age Pensions and Intrahousehold Allocation in South Africa." *The World Bank Economic Review* 17 (1): 1–25. doi:10.1093/wber/lhg013.

Onis, Mercedes de, et al. 2006. "WHO Child Growth Standards: Length/height-for-age, weight-for-age, weight-for-length, weight-for-height and body mass index-for-age: Methods and development." http://www.who.int/childgrowth.

Southern Africa Labour and Development Research Unit. 2008. *National Income Dynamics Study, Wave 1.* Version 4.1. http://www.nids.uct.ac.za/home/.

———. 2012. *National Income Dynamics Study, Wave 2.* Version 1. http://www.nids.uct.ac.za/home/.

Chapter 2

Replication of: Surviving Andersonville

2.1 Summary of the paper

Costa and Kahn (2007) tries to estimate the effect of quality and size of social networks on ensuring the survival of prisoners of war (POW) in POW camps. To examine the relationship the authors combine two datasets, a longitudinal dataset of Union Army soldiers and a cross-sectional dataset of the POW camp in Andersonville.

The empirical specification for the longitudinal data that measures the effect of the size of the network is as follows:

$$h(t) = \exp(\beta_1 F + \beta_2 I + \beta_3 M) \tag{2.1}$$

where h is hazard at time t, F is the number of friends (=social network), I are individual characteristics and M macro camp conditions. The number of friends is measured as the number of POWs of the same company and varies by month due to deaths or camp transfers. As it might capture the lagged mortality of the group, the authors use as second strategy the initial number of friends as a time-invariant proxy. In addition, they instrument for the number of friends using the number of net camp transfers combined with a dummy indicating whether the POW was transferred to account for omitted variables. The specification for the Andersonville data in turn is a probit model:

$$Pr(S = 1) = \Phi(\beta_1 F + \beta_2 F) \tag{2.2}$$

$$Pr(S = 1) = \Phi(\beta_1 F_i + \beta_2 F_{ij} + \beta_3 I | ethnicity = j) \tag{2.3}$$

where Equation 2.2 examines quantity and Equation 2.3 quality of the social network. The measure for number of friends here is the number of POWs from the same company in Andersonville.

The longitudinal data indicates that POWs had special characteristics. For instance, they were likely to be volunteers, and from companies with more wounded or dead. POWs with more friends were typically US-born and wealthier while Irish and older men had less friends. Concerning survival rates, Kaplan-Meier hazard rates show that POWs captured later (after 1963 when the Union and the Confederate Army stopped exchanging POWs) have lower survival rates. They also show that survival rates were higher for POWs with 10 or more friends. In addition, the rates show that it takes 50 days until there is a divergence in survival between POWs with and without friends. The exponential function estimates that an additional friend leads to a 0.98 times lower mortality hazard. An increase in the number of friends from 0 to 5 (5 to 10), decreases the predicted probability of death from 0.31 to 0.28 (0.26) while a spline specification provides evidence that the effect is greatest for the first two friends. In addition, survival is more likely for POWs that had survived at least one or two months. Factors increasing mortality are the number of men in the camp, low rank, high age, and height among others. Insignificant variables are for instance wealth and marital status. There is no evidence for individual heterogeneity. The use of a Weibull specification indicates no duration dependence (toughen up effects). Interestingly though, a Cox model gives no significant effect of friends which the authors interpret as a result of their loss of power due to the small sample size. Robustness checks, including the IV approach and the effect of friends transferred in, confirms the significant effect of friends. Finally, the cross-sectional results provide evidence that having the same last name, being from the same town for smaller towns, ethnic similarity and having a sergeant or a higher rank in one's network are all important factors in raising survival probabilities which in turn shows that the quality of social networks matters.

In summary, Costa and Kahn are able to show that quantity and quality of social networks mattered for survival in civil war POW camps. Potential explanations for this are the sharing of scarce resources, moral support and protection from other prisoners.

2.2 Data

The raw data for the first part of the paper is extracted from the Union Army dataset readily accessible at `http://www.cpe.uchicago.edu`. This dataset draws information from censuses, medical records and military pension records linking military, socioeconomic and health information for nearly $40,000$ white males that served in the Union Army during the Civil War. For the second part, the Andersonville database is available at `http://www.itd.nps.gov/cwss` but only as a "searchable version", which allows viewing the information for one soldier at a time, and more convenient formats are not readily available.

The datasets provided for the estimations alongside with the publication are already partially processed parts of the raw data available online. No clear guidance is given as to what steps were taken to go from the raw data to the files provided, and matching both things proved to be less than straightforward. In view of this, we decided to proceed with the replication using the files provided by the authors, pointing out along the way the cases where potential problems in them seemed likely given the raw data we observed. Taking those files as starting points, it is possible to reproduce the tables and graphs published in the paper, so in this sense we can say that the data set is complete. Originally, some of the data required by the published .do files was not included in the published data files, but the authors provided it promptly upon our request and added it subsequently to the online files of the publishing journal.

The data and .do files provided do not describe or label many of the variables used, nor does the limited variable description in the Appendix cover all of them. A very thorough description of the variables in the raw data set can be found at its online source, but the match between this and the variables in the files provided is not straightforward or complete, since some of them are already created by the authors from the raw data. The description of the data itself, mainly of the variables that are used most often, is succinct but adequate, with Table 1 and Table 2 presenting some relevant descriptive traits. Despite this, some attention should be drawn to the fact that some of the variables have a relevant share of missing values (only the highest number of observations is reported), a point that will be commented in detail later on.

2.3 Stata code and interpretation

All codes run to their full extent, and produce the estimations presented in the paper, with minor differences that we describe in detail below. The codes themselves are not commented at all and include plenty of estimations and specifications not included in the published paper, as well as unexplained data processing steps. No exporting commands were set up, or log files kept, which might be the root of some of the rounding and significance discrepancies we have found.

In what follows, all reproduced tables are presented with a comment on the differences found (in bold), whenever there were any.

2.3.1 Tables

Table 1: This table presents the means of most variables later used for estimation, dividing observations in POWs and NON POWs, to illustrate ex ante differences in observables between them.

We have added to Table 2.1 the number of observations per variable, not originally included in the paper, in order to highlight the fact that some of them have significant amounts of missing values, something that should be kept in mind later at the estimation stage. In this table, the case in point is Household property income in 1860, which is used in most of the specifications proposed, but as will be discussed for later tables, this is a pattern common to all the variables imported from census data. Additionally, considering the number of observations for each of the variables leads to the suggestion of a small correction for three of the dummy variables describing categories: US born, farmer and enlisted in 1861. The initial data file is missing these variables, which are likely to have been dropped as the basis category for estimation purposes in some other use of the data. They were then rebuilt in the .do file from the remaining categories in such a way that generated zeroes for some observations that should have been missing (except for farmer, which is not included at all in the file). For example: as provided by the code, US born has $35,007$ observations, whereas other nationality dummies, all built from the same original variable, have $34,941$. The correction proposed then, is to set these dummies to missing whenever the other categories of their class are missing, which slightly changes their descriptive statistics (for example the mean of US born goes from 0.745 to 0.747 when this correction is implemented).

Table 2.1: Characteristics of Soldiers by POW Status

	All	Obs.	Never POW	Obs.	POW	Obs.
US born	0.745	35007	0.745	31967	0.743	3040
US born corrected	0.747	34941	0.745	31966	0.759	2975
Irish	0.087	34941	0.086	31966	0.102	2975
German	0.074	34941	0.075	31966	0.062	2975
British	0.039	34941	0.039	31966	0.033	2975
Other	0.054	34941	0.055	31966	0.043	2975
Artisan	0.2	34941	0.199	31966	0.211	2975
Farmer corrected	0.505	34941	0.505	31966	0.508	2975
Professional or proprietor	0.075	34941	0.077	31966	0.061	2975
Laborer	0.212	34941	0.212	31966	0.212	2975
Unknown	0.007	34941	0.007	31966	0.008	2975
Enlisted in 1861	0.21	35007	0.205	31967	0.263	3040
Enlisted in 1861 corrected	0.21	34878	0.205	31906	0.269	2972
Enlisted in 1862	0.344	34878	0.331	31906	0.487	2972
Enlisted in 1863	0.068	34878	0.066	31906	0.087	2972
Enlisted in 1864	0.256	34878	0.266	31906	0.147	2972
Enlisted in 1865	0.122	34878	0.132	31906	0.009	2972
Volunteer	0.909	34941	0.905	31966	0.951	2975
Height in inches	67.599	34941	67.589	31966	67.709	2975
Household property income in 1860	534.155	13769	531.734	12509	558.2	1260
Company birthplace fragmentation	0.642	34941	0.644	31966	0.62	2975
Company occupation fragmentation	0.559	34941	0.558	31966	0.57	2975
Fraction company died as non-POWs	0.135	34941	0.131	31966	0.182	2975

Remaining discrepancies are minor and could be due to some kind of rounding difference. An alternative explanation for these differences is that the table was produced from a slightly different dataset. Considering that even the most populous variables present over 500 observations less than the amount declared in the paper, and the fact that one of the variables (farmer) is not included in the data file at all, we consider the second option to be more likely, which would also explain the minor differences in the means of Artisan, British, Height in inches, etc.

A last and minor comment is that the inclusion of the variable volunteer is surprising, since by sample design the Union Army dataset was restricted to white volunteer infantry regiments. The inclusion of this variable when comparing POWs and non POWs probably responds to the point raised in the paper about POWs not being representative of all soldiers, for example in ideology (p.1471). A variable that reflects that both POWs and non POWs volunteered in similar proportions would suggest homogeneity between POWs and non POWs in this dimension and, hence, increase external validity. The similarities observed in Table 1 between POWs and non POWs in their mean of volunteer do not reflect that, since they are both close to one by construction. Any individuals not listed as volunteers, either correspond to the very few drafted men, or are actually soldiers that re-enlisted as commissioned officers, but were originally volunteers, as explained in the codebooks for the source data.

Table 2.2: This table describes the variables later used in the main regres-

sions, focusing in this case only on POWs. It also presents separately their mean and standard errors for the subsamples of POWs with few (less than 3) and many friends (three or more).

This table is almost exactly reproduced, except for the minor differences set in bold, which appear to be rounding differences (and a typo in the case of Laborer). The number of observations stated on the table in the paper (1923) corresponds to the last variable in this case as well, even though, as mentioned for the previous table, it is relevant to keep in mind that some of the other variables of interest show a considerably lower count of observations, as can be seen in the added columns. For this table, this is the case of variables Married in 1860 and Household property income in 1860, which are both variables from the 1860 census. The main concern regarding this table is the process of organizing the data, particularly one step in which a merge to the file "transfer.dta" is conducted. This file contains the prisoner identifier variable, month, year, and a dummy variable reflecting whether the prisoner was transferred (transferin). This variable is not needed for Table 2.2, and we can only speculate that it was incorporated, as some other steps were, in an attempt to exactly reproduce the dataset used in Table 2.3. The problem in this case is that the file "transfer.dta" contains duplicate observations, which in turn duplicates observations in the main data set via the merge, artificially inflating the number of observations in the data used for Table 2.2[1].

If these duplicate observations are eliminated from the "transfer.dta" file before the merge, the statistics presented do not seem to defer significantly, and certainly neither do the conclusions drawn from them, but the number of observations in the subsample considered is significantly lower. This exercise is presented in the table below.

Two additional remarks related to this are: a) whenever month was larger than 12, it is set to missing, b) all observations marked as having occurred in 1861 are shifted to 1862. Neither month nor year are directly used for this table, but they are the matching points for the merge to the "transfer.dta" file discussed above. The file transfer.dta also contains month¿12 and observations for 1861, and they are not replaced in a similar fashion, introducing some additional artificial matching problems into the merge operation.3 Besides the potential distortions in the merge that these asymmetric replacements may cause, the switch of 1861 to 1862 seems particularly surprising given that no explanation for it is offered.

Additionally, if the aim of this table is to have a general impression of the variables used in the main regressions (Table 2.3), the same observations should have been considered in both accounts. This is not the case, since the observations with an unknown number of friends are dropped for this table, but not for the next one.

Table 2.3: This table shows the results of the hazard rate analysis using a set of covariates described in the previous tables and alternating two measures of friends: number of friends at the time of the observation and initial number of friends.

Table 2.3 is reproduced almost completely, except for the results in bold, for which the significance level differs from the one presented in the publication.

1. Duplicate observations per month-year-prisoner are natural in the context of Table 2.3, because in there capture time is measured per fortnight. Including additional observations because of this in a stage of data description such as this one is hardly appropriate.

Table 2.2: Characteristics of POWs by Number of Friends in First Two Weeks of Captivity

	All			Few friends (< 3)			Many friends (>= 3)		
	Mean	Std. err.	No. obs.	Mean	Std. err.	No. obs.	Mean	Std. err.	No. obs.
US born	0.731	0.444	1976	0.708	0.455	990	0.754	0.431	986
Irish	0.12	0.325	1976	0.115	0.319	990	0.125	0.331	986
German	0.063	0.243	1976	0.081	0.273	990	0.045	0.207	986
British	0.034	0.182	1976	0.042	0.202	990	0.026	0.16	986
Other	0.05	0.217	1976	0.053	0.223	990	0.047	0.211	986
Artisan	0.209	0.407	1976	0.214	0.41	990	0.204	0.403	986
Farmer	0.421	0.494	1976	0.44	0.497	990	0.401	0.49	986
Professional or propietor	0.07	0.256	1976	0.077	0.266	990	0.064	0.245	986
Laborer	0.266	0.442	1976	0.243	0.429	990	0.288	0.453	986
Unknown	0.034	0.182	1976	0.025	0.157	990	0.044	0.204	986
Enlisted in big city	0.475	0.5	1976	0.493	0.5	990	0.457	0.498	986
Household property income in 1860	576.475	1855.699	817	483.609	1084.987	391	661.711	2348.676	426
Age when captured	25.96	7.056	1966	26.645	7.415	990	25.265	6.604	976
Height when captured	171.576	6.612	1925	171.79	6.384	974	171.356	6.833	951
Commisoned or noncommisoned officer	0.076	0.266	1976	0.083	0.276	990	0.07	0.255	986
Married in 1860	0.257	0.437	817	0.276	0.448	391	0.239	0.427	426
Wounded 10 days before capture	0.118	0.323	1976	0.148	0.356	990	0.088	0.284	986
Fraction company dead before capture	0.089	0.064	1976	0.093	0.07	990	0.085	0.057	986
Company birthplace fragmentation	0.542	0.2	1923	0.547	0.193	985	0.536	0.206	938
Company occupational fragmentation	0.596	0.173	1923	0.586	0.173	985	0.607	0.172	938

Table 2.3: corrected
[a]

	Mean	Std. err.	No. obs.	Mean	Std. err.	No. obs.	Mean	Std. err.	No. obs.
US born	0.732	0.443	1470	0.715	0.452	727	0.748	0.434	743
Irish	0.122	0.327	1470	0.113	0.317	727	0.131	0.337	743
German	0.06	0.237	1470	0.074	0.262	727	0.046	0.209	743
British	0.034	0.181	1470	0.04	0.196	727	0.028	0.166	743
Other	0.05	0.219	1470	0.056	0.231	727	0.044	0.206	743
Artisan	0.212	0.409	1470	0.217	0.413	727	0.207	0.406	743
Farmer	0.427	0.495	1470	0.442	0.497	727	0.413	0.493	743
Professional or proprietor	0.065	0.247	1470	0.073	0.26	727	0.058	0.234	743
Laborer	0.265	0.441	1470	0.242	0.429	727	0.287	0.453	743
Unknown	0.031	0.172	1470	0.026	0.16	727	0.035	0.184	743
Enlisted in big city	0.48	0.5	1470	0.486	0.5	727	0.475	0.5	743
Household property income in 1860	547.314	1637.903	615	476.274	1107.659	299	614.532	2014.738	316
Age when captured	25.834	6.931	1465	26.4	7.263	727	25.276	6.544	738
Height when captured	171.526	6.624	1439	171.683	6.433	717	171.37	6.81	722
Commisioned or noncommisioned officer[b]	0.074	0.262	1470	0.078	0.269	727	0.07	0.255	743
Married in 1860	0.252	0.435	615	0.264	0.442	299	0.241	0.428	316
Wounded 10 days before capture	0.125	0.331	1470	0.155	0.363	727	0.096	0.294	743
Fraction company dead before capture	0.091	0.063	1470	0.094	0.069	727	0.089	0.056	743
Company birthplace fragmentation	0.542	0.198	1442	0.55	0.189	723	0.534	0.207	719
Company occupational fragmentation	0.593	0.175	1442	0.585	0.173	723	0.601	0.178	719

a. Company clustered standard errors are in parentheses. Symbols ++, +, and * indicate statistical significance levels of 1, 5, and 10 percent respectively.
b. Related to the point about the variable Volunteer made before, the name Commisioned or non commissioned officer may be misleading, since commissioned officers are excluded from the sample by construction.

Table 2.4: Social Networks and Individual Characteristics on Mortality

	specification I		specification II		specification III	
VARIABLES	Hazard rate	Std. err.	Hazard rate	Std. err.	Hazard rate	Std. err.
Current number of friends	0.983	-0.008	0.977++	-0.009		
Initial number of friends					0.976++	-0.009
Ln(number of prisoners in camp)			1.536++	-0.14	1.521++	-0.139
Fraction of company dying before capture	1.091	-0.782	0.892	-0.636	0.63	-0.449
Professional or proprietor	0.567	-0.146	0.563	-0.143	0.556	-0.141
Artisan	0.944	-0.119	0.947	-0.119	0.937	-0.117
Laborer	1.298	-0.154	1.295	-0.152	1.287	-0.152
[a] German	1.197	-0.215	1.166	-0.209	1.149	-0.206
Irish	0.768*	-0.121	0.762*	-0.118	0.750*	-0.117
British	0.641*	-0.171	0.654	-0.174	0.656	-0.177
Other	0.658*	-0.154	0.645*	-0.153	0.642*	-0.151
Sergeant, corporal or officer	0.549++	-0.115	0.543++	-0.111	0.541++	-0.111
Age at captivity	1.045++	-0.007	1.044++	-0.007	1.044++	-0.007
Height at enlistment	1.01	-0.007	1.01	-0.007	1.011	-0.007
Observations	23256		23256		23256	
Number of subjects	3026		3026		3026	
Log pseudo likelihood	-1324.607		-1308.229		-1307.17	

a. Company clustered standard errors are in parentheses. Symbols ++, +, and * indicate statistical significance levels of 1, 5, and 10 percent respectively.

In this case, month larger than 12 is replaced by 99, and in this case as well this might generate distortions since an equivalent change was not performed in the file to which this is merged ("Died.dta"). The observations for which the number of friends is unknown are not dropped here, but set to zero. Whenever the number of deaths in the prisoners' company before capture is unknown, it is set to zero. Whenever the number of men in camp is unknown it is set to 40. Whenever the variables imported from the 1860 census are missing (i.e. there was no match to the census) they are still included in the regression by setting their value to zero in the case of dummy variables (married and illiterate), and by taking log(1+variable) in the case of Household property. In all of these cases, dummy variables are included in the regression indicating whether the data is actually missing (e.g. a dummy variable that takes value one if the observation was not matched to the 1860 census, link60). It is understandable that in order to maintain a healthy sample size, and to use as much of the information as possible, some assumptions are made, but the trade off related to this point is that these assumptions may create artificial noise in the data that would not be fully captured by these control dummies.

Table 2.4: This table presents an alternative estimation strategy. As a benchmark, the effect of the number of friends in the camp is estimated including company fixed effects and the same covariates as before. To avoid endogeneity issues that may arise due to the potential correlation between the current number of friends and the prisoners own unobservable health (via its correlation to the lagged mortality of the group), an IV-hazard rate strategy is pursued next. The instruments chosen are the new number of friends the prisoner has in each period (the newly captured soldiers of his company) and a dummy variable that reflects whether the POW was transferred. Both variables clearly affect the number of friends a POW has, and are meant to be uncorrelated with his unobservable health, since transfers and the amount of newly captured men assigned to each camp were determined by camp needs or evolution of war events5. In the first stage, the number of friends is regressed on the instruments, as well as the whole set of covariates and fixed effects. The predicted residuals of this first stage are then included in the second stage, along with all covariates, fixed effects and the number of friends. This procedure is repeated 100 times, preserving the coefficients and standard errors of the number of friends, the number of men in the camp and the residuals, as well as the R-squared of the first stage. The final result of this Montecarlo procedure is obtained by computing the mean of those variables among the 100 repetitions.

Here, the results are replicated entirely.

A concern raised is that it is not clear how the variable that reflects transfers was constructed, since this information is not directly provided in the raw data available online. In some cases, the variable that reflects the camp contains multiple entries per individual, and we can only assume that those were used to infer that the POW was transferred between those camps. This is most likely an accurate interpretation of the data, the only problem being that there is no information about the date of transfer, which makes the instrument weaker.

In the following section, the authors use The National Park Service's cross-sectional data of the population of Andersonville and estimate probit models of the probability of survival on the number of friends and various demographic characteristics as described in the summary.

Table 2.5: This table estimates the effect of social networks on probability

Table 2.5: Effect of Social Networks on Mortality, with Company Fixed Effects and Instrumented

	Original		IV	
	Haz. Rate	Std. Err.	Haz. Rate	Std. Err.
[a] Number of friends	0.978*	-0.012	0.895	-0.055
Ln(total number of men in the camp)	1.437++	-0.122	1.537	-0.196
Residual			1.06	-0.071

a. Company clustered standard errors are in parentheses. Symbols ++, +, and * indicate statistical significance levels of 1, 5, and 10 percent respectively.

of survival controlling for a large of variables that measure existing networks outside of the company.

All figures on the table are replicated perfectly. However, the coefficients in bold are estimated with different significance levels (even though the coefficients and their standard errors are the same). For example, we find that the coefficient on Dummy=1 if town population $< 9,552$ is significant at the 5 percent level whereas the table in the original paper indicates that it is significant at the 1 percent level in specifications 1, 2, and 3. It is important to note that the difference is not always in the same direction. For instance, we find that the coefficient on French surname in specification 2 is significant at the 10 percent level whereas the original table does not show any significance. Thus, we suspect that this discrepancy might be due to rounding error.

Table 2.6: Here, the authors estimate the same equation in logs and include the two outlier companies that were excluded in Table 5 to show the resulting nonlinearity. In the .do file, the outliers are dropped early on and thus their estimations never include these outliers. We save the dataset with the outliers at an early stage so that we can include them in the estimation.

The first thing to notice is that the number of observations is different. The original paper shows a total of 31,678 observations for the first three specifications, and a total of 12,025 observations for specifications 4 and 5. We have less number of observations mostly due to the 83 observations with missing Fraction of company with rank sergeant or higher variable. We dont know how the authors included these observations in their estimation. A minor difference in the first descriptive column is the mean for Log(number of men with same last name in regiment), which is 0.113 in the paper paper and 0.112 in our data.

All the coefficients in bold are slightly different from the original table; some are different only in their magnitude but some are also different in their level of significance. For example, the coefficient on Log(number of men in regiment) in specification 1 is 0.011 with 5% significance level in the paper, whereas we find a higher and more significant effect. Despite these quantitative differences, the results are not qualitatively different.

Table 2.7: Here, the authors estimate the effect of ethnic networks on probability of survival to show that the quality of the network matters.

The bold coefficients in Table 2.7 are different in significance levels than what the authors report in their original table (all coefficients and standard errors are the same). The most striking one is the Captured 1864 or 1865 variable for French POWs where the authors find no significance at all and we find significance at the 1 percent level. Since this is too large of a difference to be a rounding error, we suspect that it is a typo.

2.3.2 Robustness check - Logit instead of Probit

As a robustness check, we estimate tables 5-7 with logit instead of probit and results are qualitatively similar. Bold coefficients below show differing levels of significance (only 1-level) when compared to probit.

Table 2.6: Effect of social networks on probability of survival

					From small town	
	Mean	1	2	3	4	5
Number of men in regiment10	9.157	0.004++				
	-10.358	-0.001				
Number of men in company	12.899		0.003++	0.002++	0.003++	0.002++
	-15.39		-0.001	-0.001	-0.001	-0.001
Fraction of company with rank sergeant or higher	0.073	0.120++	0.128++	0.079	0.152	0.085
		-0.034	-0.034	-0.032	-0.061	-0.056
Number of men with same last name in regiment	1.19	0.033++	0.033++	0.036++	0.018*	0.023++
	-0.599	-0.007	-0.007	-0.006	-0.009	-0.009
Log(number of men in camp from same town)	5.101	-0.003	-0.002	0	0.018*	0.026++
	-1.994	-0.005	-0.005	-0.005	-0.009	-0.008
Dummy=1 if town population¡9552	0.423	0.037+	0.034+	0.032+		
		-0.014	-0.014	-0.013		
Private	0.824					
Officer	0.003	0.347++	0.347++	0.354++	0.311++	0.328++
a		-0.027	-0.027	-0.021	-0.038	-0.025
Sergeant	0.068	0.080++	0.080++	0.083++	0.084++	0.088++
		-0.011	-0.011	-0.011	-0.017	-0.018
Other rank	0.01	0.028	0.034	0.03	0.067	0.046
		-0.03	-0.03	-0.03	-0.049	-0.05
Corporal	0.078	0.055++	0.055++	0.046++	0.064++	0.054++
		-0.011	-0.011	-0.011	-0.017	-0.018
Irish surname	0.023	0.02	0.022	0.017	0.069	0.059*
		-0.019	-0.019	-0.019	-0.03	-0.03
German surname	0.043	-0.009	-0.009	-0.016	-0.001	-0.025
		-0.015	-0.015	-0.015	-0.024	-0.025
French surname	0.028	0.028	0.028*	0.028	0.033	0.032
		-0.017	-0.017	-0.017	-0.027	-0.028
Continental surname	0.029	0.006	0.007	-0.004	-0.021	-0.029
		-0.018	-0.018	-0.018	-0.032	-0.032
State fixed effects?		N	N	Y	N	Y
Pseudo R2		0.043	0.044	0.087	0.048	0.115
Observations	31336	31336	31336	31330	12002	12002

a. Like in the paper, the estimations exclude the two outlier companies. Company clustered standard errors are in parentheses. Symbols ++, +, and * indicate statistical significance levels of 1, 5, and 10 percent respectively.

Table 2.7: Effect of social networks on probability of survival, logarithmic form

					From small town	
	Mean	1	2	3	4	5
Log(number of men in regiment)	3.865	0.014++				
	-1.29	-0.005				
Log(number of men in company)	2.052		0.021++	0.012	0.029	0.022
	-1.18		-0.007	-0.006	-0.012	-0.009
Fraction of company with rank sergeant or higher	0.072	0.134++	0.134++	0.08	0.153	0.084
	-0.127	-0.034	-0.034	-0.032	-0.061	-0.057
Log(number of men with same last name in regiment)	0.112	0.101++	0.095++	0.096++	0.061++	0.063++
	-0.305	-0.012	-0.012	-0.011	-0.018	-0.017
Log(number of men in camp from same town)	5.114	-0.004	0	0.002	0.024	0.030++
	-1.991	-0.004	-0.005	-0.005	-0.009	-0.008
State fixed effects?		N	N	Y	N	Y
Pseudo R2		0.038	0.04	0.084	0.044	0.114
Observations	31688	31605	31604	31598	12002	12002

[a]

a. Like in the paper, the estimations exclude the two outlier companies. Company clustered standard errors are in parentheses. Symbols ++, +, and * indicate statistical significance levels of 1, 5, and 10 percent respectively.

Table 2.8: Effect of ethnic network on probability of survival

	Irish		German		French	
	b	se	b	se	b	se
Number of men in company	0.003*	0.002	0.003	0.001	0.002	0.002
Number of men of own ethnicity in company	0.03	0.036	0.03	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	0.1	0.04	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 R2	0.036		0.059		0.058	
Joint significance test	8.6		22.01		3.2	
Observations	735		1355		869	

[a]

a. Company clustered standard errors. Symbols ++, +, and * indicate statistical significance levels of 1, 5, and 10 percent respectively.

Table 2.9: Effect of social networks on probability of survival, logit

					From small town	
	Mean	1	2	3	4	5
Number of men in regiment 10	9.157	0.018++				
	-10.358	-0.003				
Number of men in company	12.899		0.013++	0.009++	0.014++	0.010++
	-15.39		-0.003	-0.002	-0.004	-0.003
Fraction of company with rank sergeant or higher	0.073	0.495++	0.526++	0.336	0.647	0.387
		-0.145	-0.144	-0.139	-0.266	-0.251
Number of men with same last name in regiment	1.19	0.149++	0.147++	0.158++	0.081*	0.101++
	-0.599	-0.03	-0.03	-0.028	-0.042	-0.038
Log(number of men in camp from same town)	5.101	-0.012	-0.01	0	0.075	0.114++
	-1.994	-0.019	-0.019	-0.019	-0.038	-0.034
Dummy=1 if town population¡9552	0.423	0.154	0.145	0.133		
		-0.06	-0.056	-0.054		
Private	0.824					
Officer	0.003	2.342++	2.339++	2.481++	2.043++	2.342++
a		-0.454	-0.455	-0.426	-0.562	-0.502
Sergeant	0.068	0.344++	0.344++	0.367++	0.377++	0.407++
		-0.05	-0.05	-0.053	-0.081	-0.087
Other rank	0.01	0.109	0.135	0.12	0.295	0.2
		-0.128	-0.128	-0.132	-0.232	-0.231
Corporal	0.078	0.236++	0.235++	0.201++	0.283++	0.244++
		-0.046	-0.046	-0.048	-0.077	-0.084
Irish surname	0.023	0.086	0.095	0.072	0.31	0.264*
		-0.081	-0.081	-0.082	-0.14	-0.146
German surname	0.043	-0.039	-0.036	-0.07	-0.003	-0.111
		-0.061	-0.06	-0.061	-0.103	-0.106
French surname	0.028	0.113	0.117	0.119	0.14	0.152
		-0.073	-0.073	-0.075	-0.12	-0.127
Continental surname	0.029	0.026	0.031	-0.015	-0.093	-0.126
		-0.075	-0.075	-0.076	-0.134	-0.135
State fixed effects?		N	N	Y	N	Y
Pseudo R2		0.043	0.044	0.086	0.047	0.114
Observations	31336	31336	31336	31330	12002	12002

a. There is no explanation in the paper as to why probit was preferred to logit.

Table 2.10: Effect of social networks on probability of survival, logarithmic form, logit

					From small town	
	Mean	1	2	3	4	5
Log(number of men in regiment)	3.865	0.057				
	-1.29	-0.022				
Log(number of men in company)	2.052		0.088++	0.047	0.124	0.085
	-1.18		-0.028	-0.024	-0.051	-0.04
Fraction of company with rank sergeant or higher	0.072	0.559++	0.552++	0.342	0.652	0.383
[a]	-0.127	-0.147	-0.145	-0.139	-0.266	-0.251
Log(number of men with same last name in regiment)	0.112	0.438++	0.409++	0.416++	0.267++	0.277++
	-0.305	-0.052	-0.052	-0.049	-0.078	-0.074
Log(number of men in camp from same town)	5.114	-0.018	0	0.006	0.100++	0.131++
	-1.991	-0.018	-0.019	-0.019	-0.039	-0.036
State fixed effects?		N	N	Y	N	Y
Pseudo R2		0.038	0.04	0.084	0.044	0.113
Observations	31688	31605	31604	31598	12002	

a. Company clustered standard errors are in parentheses. The number of observations for the Fraction of company with rank sergeant or higher variable in the first column is 31605. Symbols ++, +, and * indicate statistical significance levels of 1, 5, and 10 percent respectively.

Table 2.11: Effect of ethnic networks on probability of survival, logit

	Irish		German		French	
	b	se	b	se	b	se
Number of men in company	0.009	0.007	0.011*	0.006	-0.001	0.007
Number of men of own ethnicity in company	0.011	0.11	0.139	0.06	0.154	0.116
Dummy =1 if Private	-0.228	0.214	-0.337+	0.162	-0.445+	0.2
From small town	0.417	0.173	0.154	0.131	0.23	0.154
Captured 1864 or 1865	1.082++	0.347	1.223++	0.227	1.826++	0.307
Pseudo R2	0.032		0.058		0.055	
Joint significance test	3.81		18.22		2.16	
Observations	752		1357		874	

[a]

a. Standard errors are clustered on the company. Symbols ++, +, and * indicate statistical significance levels of 1, 5, and 10 percent respectively.

2.4 Conclusion

To sum up our replication, our key message is that while we do find small differences between our results and the published results of Costa and Kahn (2007), we find no evidence that would call their conclusions into question, either qualitatively or quantitatively.

Furthermore, the interpretation of the results seems convincing to us. While they cannot test for how friends ensured survival the mentioned explanations from the supply of food to moral support are very comprehensible. In addition, their study is clearly and quite literally made for survival analysis so we do not see space to improve upon the results by applying a different estimation technique. Costa and Kahn (2007) also apply a wide set of survival analysis tools (e.g. from non-parametric to parametric estimation) so we did not come up with many ideas for robustifying their paper in this direction. Potential future extensions could build on the use of different data sets. A weakness of the paper is clearly that external validity is limited because the authors look at a civil war of the 19th century. For instance, looking at World War I or II data could prove to be fruitful and lead to further insight. While we tried to start with such an extension, we were not able to find a sufficient dataset within this period of time.

To come back to the differences between our replication and the original paper, we consider the most relevant issue the difference in significance levels. Interestingly, when looking into this matter in more detail we find that in almost all cases the p-values are at the margin which clearly points in the direction of a rounding error. We can only speculate that given the lack of exporting commands the reason for this is a certain degree of carelessness and, therefore, would like to emphasize the need of these very exporting commands. Nevertheless, and as mentioned before, the differences do not affect the general message of the paper.

2.5 In-text estimation

Most in-text estimations are not included in the .do files provided, therefore some of the results to follow do not exactly reproduce the ones published, probably due to differences in specifications. They can nonetheless generally be replicated in terms of signs and significance.

Probit statement page 1474, line 21 "When we run a Probit, in which the dependent variable is POW status and the independent variables are economic and geographic 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 were ever wounded or who ever died, was 0.257 (robust = 0.257) and the derivative on the number of men who were ever wounded was 0.139 (robust = 0.042)."

Comment on late capture page 1474, line 77 "We also found no evidence of group surrender to become a POW - men who were captured in 1864 and

Table 2.12: Determinants of POW Status

	Marginal Effect	Marginal Effect
% in comp who died	0.359***	0.430***
	-0.021	-0.0331
% in comp who wounded	0.123***	0.140***
	-0.0136	-0.022
Includes property in 1860	No	Yes
Observations	34878	13754

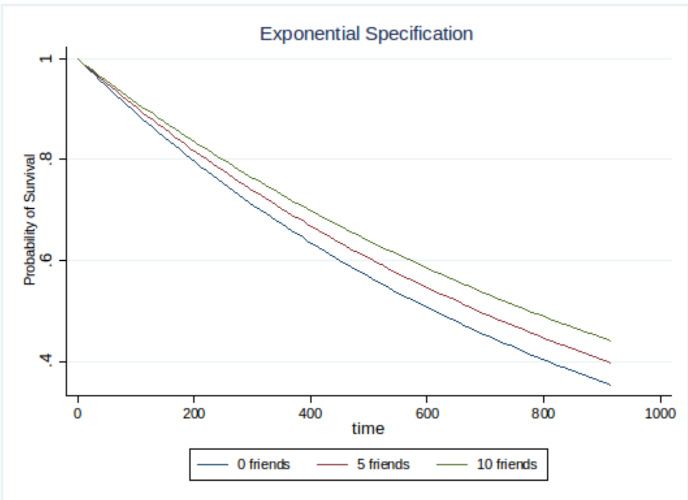
1865 had more friends, even though a group who surrendered during these years would have no hope of a quick exchange."

OLS statement page 1474 line 65 and footnote 22. "When we ran an OLS regression of the number of friends on the covariates we later use in our hazard specification, we found that professionals and proprietors, the Irish, older men, and the recently wounded were less likely to have many friends, whereas those from a large city had more friends"... "The coefficient on recently wounded was -0.879 ($= 0.397$)."

Predicted probability of death page 1475, line 24. "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.)"

The summary statistics mentioned for the variable friends match the initial file, but not the data that is actually included in the regression.

Figure 2.1: Exponential specification



The file "survival.dta" contains the predicted survival probability for individuals with 0, 5 and 10 friends (evaluated at means for the other covariates).

Table 2.13: Characteristics of POWs by Number of Friends in First Two Weeks of Captivity and Late or Early Capture

	Early capture				Late capture			
	< 3		>= 3		< 3		>= 3	
	Mean	Std. err.	Mean	Std. err.	Mean	Std. err.	Mean	Std. err.
US born	0.706	0.456	0.77	0.421	0.709	0.455	0.738	0.44
Irish	0.082	0.275	0.109	0.311	0.136	0.343	0.14	0.347
German	0.108	0.311	0.046	0.21	0.064	0.244	0.043	0.204
British	0.053	0.224	0.021	0.143	0.036	0.186	0.032	0.175
Other	0.048	0.213	0.046	0.21	0.056	0.229	0.047	0.213
Artisan	0.233	0.423	0.2	0.401	0.203	0.402	0.207	0.406
Farmer	0.423	0.495	0.355	0.479	0.451	0.498	0.444	0.497
Prof. or proprietor	0.09	0.286	0.075	0.264	0.069	0.253	0.053	0.225
Laborer	0.235	0.425	0.288	0.453	0.248	0.432	0.288	0.453
Unknown	0.019	0.135	0.081	0.274	0.029	0.169	0.008	0.089
Enlisted in big city	0.545	0.499	0.497	0.501	0.461	0.499	0.42	0.494
Property inc in 1860	444.889	1056.215	703.517	2190.478	502.019	1099.896	620.684	2498.66
Age when captured	26.079	7.152	24.848	6.588	26.995	7.558	25.658	6.601
Height when captured	171.518	6.2	171.377	6.914	171.959	6.495	171.338	6.765
Officer	0.111	0.315	0.092	0.289	0.065	0.247	0.049	0.217
Married in 1860	0.27	0.446	0.246	0.432	0.279	0.449	0.233	0.423
Fraction company dead before capture	0.056	0.054	0.057	0.046	0.116	0.069	0.112	0.054
Company birthplace fragmentation	0.554	0.183	0.516	0.238	0.543	0.199	0.553	0.173
Company occupational fragmentation	0.587	0.173	0.614	0.177	0.586	0.173	0.601	0.168

Table 2.14: Determinants of number of friends

Professional or proprietor	-0.913***
	-0.0979
Irish	-0.267***
	-0.0984
Age at capture	-0.0391***
	-0.00504
Wounded 10 days before capture	-0.831***
	-0.0876
Large city	0.553***
	-0.0649
Observations	23256
R-squared	0.152

Table 2.15: Number of Friends

	Initial	In estimation
Mean	5.58	2.87
Std. Dev.	9.22	5.12
Median	2	1

The statement did not specify a point in time, but we find a coincidence with the statement at $t = 330.76$ (average days of imprisonment was 131.62).

Table 3 with regiment fixed effects page 1476, line 2. “Even when we included state of regiment fixed effects, the hazard ratio on the number of friends remained virtually unchanged (e.g. the hazard ratio on the initial number of friends was 0.976, = 0.009).”

Table 3 with splines page 1476, line 6 and footnote 23 “Our experiments with splines suggested that the marginal effect of a friend on survival was greater for the first two friends than for more.” Footnote 23: ”The hazard rate on the marginal effect of fewer than three friends was 0.956 (= 0.044) and the hazard rate on the marginal effect of three or more friends was 0.980 (= 0.011). Although the first hazard rate was not statistically significantly different from one, the two terms together were jointly significant.”

Weibull specification page 1477, line 12. “When we use a Weibull rather than an exponential specification, we found no evidence of duration dependence...”

Month dummies page 1477, line 19. “When we included dummy variables in our specification indicating that an individual had survived 1, 2, 3 or more months, we found that those who had survived one or two months were less likely to die than those still in their first month of captivity, but that the advantage of having survived a third month was small and there was no advantage to having survived a fourth month.”

Table 2.16: Table 3 with regiment state effects

	Hazard rate	Std. err	Hazard rate	Std. err	Hazard rate	Std. err
Number of friends	0.984*	-0.009	0.978	-0.009		
Initial number of friends					0.976++	-0.009
Ln(number of prisoners in camp)			1.538++	-0.141	1.525++	-0.14
Fraction of company dying before capture	1.427	-1.227	1.19	-1.011	0.787	-0.653
Professional or proprietor	0.512	-0.134	0.506++	-0.131	0.502++	-0.13
Artisan	0.862	-0.114	0.862	-0.114	0.851	-0.112
Laborer	1.163	-0.148	1.154	-0.146	1.141	-0.145
German	1.135	-0.213	1.116	-0.21	1.103	-0.206
Irish	0.731*	-0.118	0.723	-0.116	0.723	-0.115
British	0.616*	-0.167	0.630*	-0.17	0.637*	-0.174
Other	0.612	-0.145	0.603	-0.144	0.602	-0.143
Sergeant, corporal or officer	0.570++	-0.117	0.561++	-0.113	0.557++	-0.112
Age at captivity	1.042++	-0.008	1.040++	-0.007	1.040++	-0.007
Height at enlistment	1.014*	-0.007	1.014*	-0.007	1.014*	-0.007
Observations	3026		3026		3026	
Number of subjects	23174		23174		23174	
Log pseudo likelihood	-1307.77		-1291.45		-1290.674	

[a]

[a] Company clustered standard errors are in parentheses. Symbols ++, +, and * indicate statistical significance levels of 1, 5, and 10 percent respectively.

Table 2.17: Spline at 3

	Hazard rate
Fewer than 3 friends	0.956
	-0.0443
3 or more friends	0.980*
	-0.0108
Observations	23256
Chi-sq	7.789
Prob ¿ chi-sq	0.0204

Cox Proportional Hazard Model page 1477, line 26 footnote. "We also investigated the use of a Cox proportional hazard model to allow the baseline hazard to rise or fall in any month. Controlling for camp conditions, we obtained a statistically insignificant hazard ratio on friends of 0.987 (= 0.009). We suspect that we are losing power because of our small sample size."

On limiting the sample page 1480, line 17. "When we restricted the sample to exclude deaths after September 1864 and captures prior to October 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 (sdev=0.001) and the derivative of the coefficient on the number of men in the regiment with the same last name was 0.035 (sdev=0.007)."

On the mortality of privates page 1480, line 54. "The fraction of sergeants or higher rank is not a reflection of own officer mortality. When we restricted the sample to privates, we found that the derivative of this coefficient was 0.115 (sdev=0.054)."

On the role of networks in predicting escape from Andersonville page 1482, line 25. "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 an individual was one of the 140 escaped."

See table below for the final three verifications:

The only in-text claim that we are not able to confirm is their statement that there is no mortality difference between the colored non-officers and the rest of the Andersonville POWs (page 1480, footnote 29) as we dont have any information on the race of the POWs.

2.6 Non-parametric estimation

The following figures are our replications of the Kaplan-Meier survival estimates which show no differences to the original:

Table 2.18: Weibul

	Specification 1		Specification 2		Specification 3	
VARIABLES	Hazard rate	Std. err.	Hazard rate	Std. err.	Hazard rate	Std. err.
Number of friends	0.986	-0.009	0.979	-0.009		
Initial number of friends					0.977++	-0.009
Ln(number of prisoners in camp)			1.531++	-0.139	1.517++	-0.139
Fraction of company dying before capture	1.242	-0.897	1.008	-0.722	0.733	-0.525
Professional or propietor	0.566	-0.147	0.562	-0.144	0.554	-0.142
Artisan	0.95	-0.121	0.952	-0.12	0.942	-0.119
Laborer	1.308	-0.157	1.303	-0.154	1.296	-0.154
German	1.198	-0.218	1.169	-0.212	1.153	-0.209
Irish	0.771	-0.123	0.765*	-0.12	0.753*	-0.118
British	0.630*	-0.17	0.644	-0.174	0.646	-0.176
Other	0.656*	-0.155	0.643*	-0.153	0.640*	-0.151
Sargeant, corporal or officer	0.536++	-0.114	0.531++	-0.11	0.528++	-0.11
Age at captivity	1.046++	-0.008	1.045++	-0.008	1.045++	-0.008
Height at entlistment	1.01	-0.007	1.01	-0.007	1.011	-0.007
Observations	23256		23256		23256	
Log pseudo likelihood	-1322.852		-1306.836		-1305.627	
Duration dependence	1.088		1.08		1.084	

[a]

a. Company clustered standard errors are in parentheses. Symbols ++, +, and * indicate statistical significance levels of 1, 5, and 10 percent respectively.

Table 2.19: controlling for months survived

	Specification 1		Specification 2		Specification 3	
	Hazard rate	Std. err.	Hazard rate	Std. err.	Hazard rate	Std. err.
Number of friends	0.989	-0.009	0.982*	-0.009		
Initial number of friends					0.977++	-0.009
Ln(number of prisoners in camp)			1.612++	-0.146	1.604++	-0.145
Fraction of company dying before capture	1.368	-1.001	1.117	-0.811	0.832	-0.603
Professional or propietor	0.56	-0.145	0.557	-0.142	0.547	-0.14
Artisan	0.946	-0.121	0.951	-0.121	0.939	-0.12
Laborer	1.302	-0.158	1.302	-0.156	1.298	-0.156
German	1.22	-0.223	1.195	-0.216	1.178	-0.213
Irish	0.774	-0.125	0.770*	-0.122	0.756*	-0.12
British	0.618*	-0.168	0.632*	-0.172	0.634*	-0.174
Other	0.658*	-0.156	0.650*	-0.156	0.647*	-0.154
Sargeant, corporal or officer	0.533++	-0.114	0.531++	-0.111	0.526++	-0.11
Age at captivity	1.047++	-0.008	1.046++	-0.008	1.045++	-0.008
Height at entlistment	1.01	-0.007	1.01	-0.007	1.011	-0.007
Survived 1 month	0.407++	-0.08	0.362++	-0.072	0.352++	-0.071
Survived 2 months	0.472++	-0.092	0.401++	-0.08	0.393++	-0.078
Survived 3 months	0.74	-0.137	0.64	-0.12	0.631	-0.118
Survived 4 or more months	0.833	-0.134	0.745*	-0.12	0.740*	-0.119
Observations	23256		23256		23256	
Log pseudo likelihood	-1307.333		-1287.9		-1285.595	

[a]

a. Company clustered standard errors are in parentheses. Symbols ++, +, and * indicate statistical significance levels of 1, 5, and 10 percent respectively.

Table 2.20: Cox proportional models

	Hazard rate	Std. err.	Hazard rate	Std. err.	Hazard rate	Std. err.
Number of friends	0.992	-0.009	0.987	-0.009		
Initial number of friends					0.978	-0.009
Ln(number of prisoners in camp)			1.593++	-0.149	1.587++	-0.149
Fraction of company dying before capture	1.751	-1.298	1.558	-1.148	1.179	-0.867
Professional or propietor	0.557	-0.144	0.556	-0.142	0.546	-0.139
Artisan	0.942	-0.121	0.952	-0.122	0.938	-0.12
Laborer	1.284	-0.157	1.287	-0.157	1.284	-0.156
German	1.241	-0.228	1.218	-0.223	1.2	-0.22
Irish	0.765	-0.126	0.763*	-0.123	0.746*	-0.121
British	0.613*	-0.166	0.625*	-0.169	0.626*	-0.171
Other	0.658*	-0.159	0.652*	-0.159	0.649*	-0.158
Sargeant, corporal or officer	0.538++	-0.115	0.537++	-0.113	0.532++	-0.112
Age at captivity	1.048++	-0.008	1.046++	-0.008	1.046++	-0.008
Height at entlistment	1.01	-0.008	1.01	-0.007	1.011	-0.007
Observations	23256		23256		23256	
Log pseudo likelihood	-3102.845		-3086.134		-3083.63	

[a]

a. Company clustered standard errors are in parentheses. Symbols ++, +, and * indicate statistical significance levels of 1, 5, and 10 percent respectively.

Figure 2.2: Kaplan-Meier survival estimate

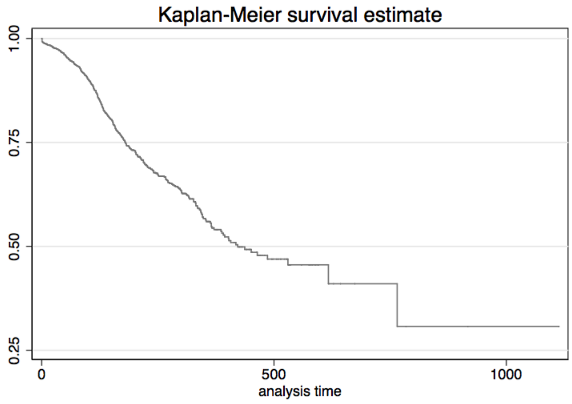


Figure 2.3: Kaplan-Meier survival estimates by early and late capture date

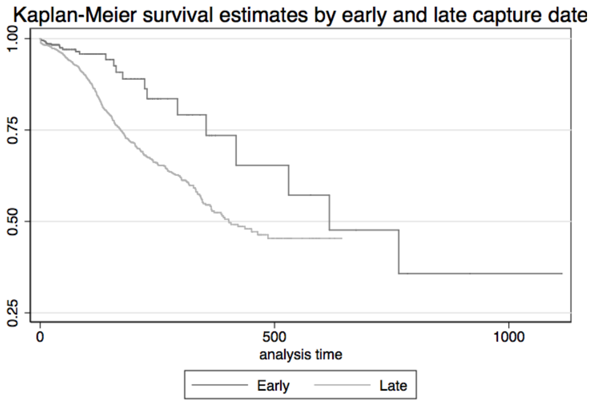


Figure 2.4: Kaplan-Meier survival estimates by camp for late captures

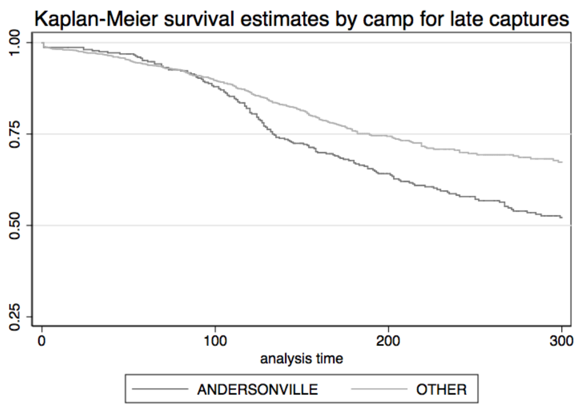


Table 2.21: table 4 net transfer

VARIABLES	Hazard Rate	Std. err.
Net transfer of friends	0.946**	-0.024
Observations	15998	

[2]

Figure 2.5: Kaplan-Meier survival estimates by number of friends for Anderson

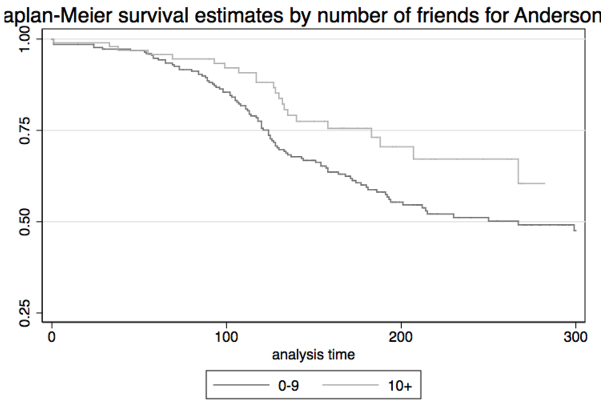


Table 2.22: Final three specifications

	Dependent variable: Lived	Dependent variable: Lived	Dependent variable: Escaped
	Shorter time period	Privates only	
Number of men in company	0.003++	0.003++	0
	-0.001	-0.001	0
Fraction of company with rank sergeant or higher	0.115	0.139++	-0.001
	-0.054	-0.036	-0.002
Number of men with same last name in regiment	0.033++	0.035++	0
	-0.007	-0.007	0
Log(number of men in camp from same town)	-0.003	-0.001	0
	-0.005	-0.005	0
Pseudo R2	0.036	0.047	0.015
Observations	25880	27923	28190

[a]

a. Company clustered standard errors are in parentheses. Symbols ++, +, and * indicate statistical significance levels of 1, 5, and 10 percent respectively.

Bibliography

Costa, Dora L., and Matthew E Kahn. 2007. "Surviving andersonville: The benefits of social networks in POW camps." *The American Economic Review* 97 (4): 1467–1487.

Chapter 3

Single-Agent Belief Distributions

Abstract

By constructing a distribution of the belief structure of a single agent, we can mitigate seemingly incommensurable beliefs. This paper proposes to generalise the concept of a single agents beliefs, from a point estimate to a distributional approximation. This will allow us to deal with differing estimates of the probability *p*, as well aswith estimates of *p* and *p* violating unitarity, in meaningful way. Additionally with a distributional approximation, we can estimate agents' beliefs, using the state which they are in.

3.1 Introduction

It generally held to be so that people sometimes hold beliefs which are incommensurable with each other. In technical terms we could say, the knowledge base is interally inconsistent. This incommensurability becomes especially apparent when these beliefs are quantified.

As an example consider the following. If we have the probability of some event *e* occuring with probability *p*. By definition, all probabilities are exhausted at *1*. Therefore the probability of that event not occuring (i.e. *p* or *not p*) is *1-p*.

p = 1 - p

It is often observed, that people hold beliefs that do not meet this condition, these beliefs can thus be described as:

p 1 - p

In addition to this, we often see that people have different beliefs about the same thing, often just moments apart (e.g. beginning and end of a survey). This could be the case for many (unrelated) reasons, such as, fatigue, hunger, anchoring, etc. We can express this as:

p_1(e) p_2(e)

In this paper I describe how we can generalise the idea of perception of probability -for a single agent- from a point estimate, to a distributional approximation.

Doing this will allow us to deal with seemingly inconsistent beliefs in a single framework in a *meaningful* way.

3.2 An example

On a fair die, the chance of throwing 3 eyes is 16, call this *p*. The chance that you do not throw 3 eyes (i.e. *p*) is therefore *1-p*, or

```
1 - (1/6)

## [1] 0.8333
```

This is a very simple statistical exercise, and most people will be able to give you the answer that I derived. The reason for this is that people learn to use dice and how they operate, in e.g. board games. Likewise for coin flipping and many other basic statistical trials. In this context, you would rarely find people accepting a bet that has a negative expected value. Such as non-equal payout for a fair coin flip.

However, as soon as odds become less transparent, statistical methods are often applied with less rigour. Especially when dealing with observed implicit payout structures. As a results bets with negative expected payouts, such as lotteries, are often accepted.

Let us continue with the idea of a lottery. For a lottery at the local sports club, 100 tickets were printed, yet only 5 out of every 8 tickets was sold, therefore tickets will be drawn until a winner is found. The price of a ticket is 1 apple, and the prize for the winner is 50 apples.

Our victim is called Janus. After Janus buys a ticket for the lottery, we ask him the following questions.

1. What is the chance (in percent) that you will win the lottery?
2. What is the chance (as a ratio) that someone else will win the lottery?
3. What is the chance that nobody wins the lottery?
4. You came with one apple, with how many apples do you expect to walked away?
5. What is the chance (as a ratio) that you will win the lottery?

The first question is not very hard:

```
1/(100 * (5 * 8))

## [1] 0.00025
```

But perhaps it is something you wouldn't always do without a calculator or at least pen and paper. The second probability is:

Definitely something most people would do on paper. However, since we are at the sports club, this is something we might not have at hand.

As can be seen, question (1) and (5) are identical. If you go through the questions without having done the calculations beforehand, you will likely be inclined to give a lower answer to (5) than you were to (1). Presumable you would be quite neutral when answering question (1). Yet the question preceding question (5) is rather negative, since you would probably expect to walk away with zero apples, this would lead you to be in a more negative mood when answering (5). Furthermore, you could have become tired of answering so many questions, which generally diminishes your perception of your chance of being successful.

Janus acts very much in accordance with our expectations, and gives us the following responses.

1. 2% (has to be more than two)
2. 19/20
3. 0
4. 0
5. 1/60

We observe two different estimates of the same *p(e)*.

```
p_1 = 1/100
p_1

## [1] 0.01
```

```
p_2 = 1/60
p_2

## [1] 0.01667
```

Normally we would take either one of the responses, or such some other way to come to a point estimate, such as averaging.

3.3 As a distribution

Let us assume that question (2) was answered in an slightly optimistic state, and question 6 in a slightly pessimistic state. Furthermore, let us assume that beliefs are normally distributed, and that these slightly pessimistic and slightly optimistic state are each away from the mean, below and above respectively. Lets express (5) as a number: 0.0167. We can now construct the standard deviation.

```
mu = p_1
mu

## [1] 0.01
```

```
sigma = p_2 - mu
sigma

## [1] 0.006667
```

We can now define our subjects beliefs on winning the lottery as:

B˜N(0.0167,0.00167)

Let us now suppose that our subject loses his wallet before the winner is drawn. If we want to predict how is beliefs have changed, we can for example assume that they are now 2below is mean belief. This would thus give us:

```
mu - sigma

## [1] 0.003333
```

If however, Janus there after is in a euphoric state because he find his wallet again, and on top of this a nice shiny green apple, than his new belief might change to *3s* above his mean level. Which would give us:

```
mu + 2 * sigma

## [1] 0.02333
```

p anp (1-p)

How do we match the answers to questions (2) and (3), the chance that Janus thinks he has of winning, with the chance that somebody else win (i.e. that he does not win). Let us write both odds as numbers:

p_1 = 0.02 1 - p_2 = 0.95 => p_2 = 0.05

3.4 An application

Estimation of a 95% confidence interval for a belief on probability, how the lottery profit from this.

Chapter 4

Morris Shin Currency Attacks

blafslkfjas;lfkjasfd
(Morris and Shin 1998)

Bibliography

Morris, Stephen, and Hyun Song Shin. 1998. “Unique equilibrium in a model of self-fulfilling currency attacks.” *American Economic Review:*587–597. `http://www.jstor.org/stable/116850`.

End notes