SOCIAL MOBILITY AND MORTALITY IN SOUTHERN SWEDEN (1813-1910)

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1. Introduction

Aim of this research project is to seek the influence of intergenerational social mobility on mortality in Sweden, covering the transition from preindustrial to a breakthrough industrial society. According to previous studies (see, e.g. Bengtsson and Van Poppel, 2011; Bengtsson and Dribe, 2011; Dribe *et al*., 2012), Social Economical Status (SES) did not affect substantially life expectancy of Swedish population in the XIXth century. Instead of this, other variables could be key factors. Thus, a new question emerges for us: could it be possible that other socio-economic factors, such as the intergenerational social mobility, may have affected life expectancy? This issue is important not only for our understanding of present-day health and mortality patterns, but also for our knowledge about living conditions in the past. The long-term development of social mobility has been a major research issue for a long time within both demography and economics. A key interest revolved around the extent to which social mobility regimes differed between countries at different levels of development or with a different institutional structure, and whether these patterns changed during and after industrialization (see, e.g. Bourdieu *et al*., 2009; Lipset and Bendix, 1959; Van Leeuwen and Maas, 2010), but few studies have examined this issue from a longitudinal perspective, covering the entire period from a preindustrial to an industrial society. The aim of this article is to contribute to this line of research by studying socioeconomic differences in adult mortality in a long term historical perspective, starting early in the demographic transition (1813) and going up to 1910, thereby covering the transformation from a pre-industrial society to the first part of the breakthrough of industrialization.

Industrialization brought about overwhelming changes in the structure of the labour market, with a massive growth in occupations within both the manufacturing and service sectors (Schön, 2000). However, while changing employment from the agricultural to the industrial sector implies occupational mobility, the transformation of an unskilled farm worker into an unskilled industrial worker cannot automatically be considered as class mobility (Dribe *et al*., 2012).

The study is based on a unique longitudinal dataset covering the entire period from 1813 to 1910, using information on occupation to identify socioeconomic status. According to historical criterion, we divide the study into three periods: 1813–1869, 1870–1894 and 1895–1910. The first period was characterized by agricultural transformation, early industrialization and the first phase of the demographic transition with declining infant and child mortality. Scania community changed from being a typical rural area dominated by freeholders and tenants on crown land into a small industrial town characterized by food and textile industries (Dribe *et al.*, 2012).

The second period (1870-1894) saw the real breakthrough of industrialization in Sweden and declining adult mortality. It showed the first signs of industrialization where there was an early industrialization in textiles (Schön, 2000).

In the third period, industrialization continued at a more rapid footstep with an accompanying relative decline of the rural sector (see, e.g. Schön, 2000; Bengtsson and Dribe, 2011). New positions are being generated throughout the western world in the XIXth century and others have disappeared as consequence of the growing importance of the industrial sector and of the decline of agriculture. In this way the process of industrialization implied a considerable degree of occupational mobility with new work positions (Lipset and Bendix, 1959), being clearly associated with increasing class mobility.

As Dribe *et al*. (2012) display, the initial phases of industrialization were associated with a downward intergenerational mobility, as during the initial stages of industrialization individuals had to abandon higher class positions in agriculture. On the other hand, the mature industrial society has experienced an important upward social mobility as a "new" middle class has emerged.

2. Data and methods

We use a longitudinal individual-level data in a confined geographic area of Sweden. In detail, we choose a dataset from the Scanian Economic-Demographic Database (SEDD)[1] comprised by 80.966 observations of 3.385 individuals both men and women registered between 1813 and 1910. The database is a longitudinal economic and demographic dataset, based on family reconstitutions and local population registers[2] (which typically consist of records of the baptisms, marriages

[1] The data is maintained by the Scanian Economic Demographic Database, which is a collaborative project between the Regional Archives in Lund and the Centre for Economic Demography, Lund University (Sweden). The source material is described in *Reuterswärd and Olsson* (1993), and the quality of data is analysed in *Bengtsson and Lundh* (1991). For more details: https://www.ed.lu.se/databases/sedd

[2] The parish register material is of high quality and shows no gaps for births, deaths, or marriages. Migration records are less plentiful, but a continuous series exists from the latter part of the eighteenth

and burials in a community), containing information about individuals who were living in five rural coast parishes (Hög, Kävlinge, Halmstad, Sireköpinge, and Kågeröd) located in western Scania, the southernmost county of Sweden.

Scania, called the "granary of Sweden", was almost exclusively a rural economy and conditions were similar throughout the province in years of low real wages (Alter *et al*. 2004). The local environment is quite homogenous since it only encompasses rural locations. Industrial activities start, however, to develop in one of the parishes after 1860, also in some neighboring areas. While the mortality rate for both men and women in working ages declined throughout this period, no social differences are found, neither during the preindustrial nor during the industrialization period (Bengtsson and Van Poppel 2011).

The research is based on a comparison of socioeconomic and class attainment across two generations, typically from parent to son/daughter. More specifically, we are looking at the impact of the parent class on their offspring's attainment and, if the change has occurred, what consequences produced on the life expectancy of the second generation.

In this study, we measure socioeconomic status by occupation of the family head using socioeconomic codification SOCPO: a classification scheme designed to capture the economic as well as cultural status of an occupation (Van de Putte and Miles, 2005). Practically, social mobility is defined as the chances of an individual, at age 35, have or not the same SES of her/his father, according to SOCPO.

However, although the employment change from the agricultural to the industrial sector implies professional mobility, the transformation of an unskilled agricultural worker into an unskilled industrial worker cannot automatically be considered as class mobility. Specifically, the social class of the son is measured using the SOCPO observation occurring at age 35, whereas that of the father is obtained taking in account the SOCPO at son's birth.

The SOCPO sorts individuals by occupational information using a comparable social class system. The occupation of individuals is classified according to a recently developed coding scheme, the *Historical International Standard Classification of Occupations*, called HISCO (Van Leeuwen *et al*. 2002). HISCO translates occupational descriptions covering a long historical time, from various languages and countries into a common code, compatible with the International Labour Organisation's International Standard Classification of Occupations

century. Information concerning farm size and property rights, in addition to various kinds of information from poll-tax records, land registers, and household examination records, are linked to family reconstitutions based on the parish records of marriages, births, and deaths. Taken together, we have rich information on the household size and structure as well as socio-economic conditions (Bengtsson and Broström, 2010).

(ISCO68) scheme[3]. These HISCO-codes are classified according to a social class scheme, the HISCLASS-scheme, developed by Van Leeuwen and Maas (2005)[4]. The main reason for using it is that while it focuses on social power, it is also highly correlated with education and income, as well as this classification can be used both for rural and industrial societies. SOCPO is a 5-category classification scheme (Van de Putte and Miles, 2005) based on skill level, degree of supervision and whether self-employed or not, as well as on pure status (Table 1). The five classes are: the elite class (SP-level 5, including large agricultural proprietors), the middle class (SP-level 4, including self-sufficient farmers), skilled workers (SP-level 3), semi-skilled workers (SP-level 2, including smallholders and crofters), and unskilled workers (SP-level 1, including farm workers).

Table 1 – *Socioeconomic classification (SOCPO).*

Social power level	Commanders (authority)	Self-employed (business/property owners)	Skill	Pure status
5	High commander: executive, general policy tasks	Large-scale self-employed	Non-manual superskilled	Nobility
4	Medium commander: supervisor of skilled workers	Medium-scale self-employed: local businessmen and farmers	Manual superskilled/ non-manual skil.	
3	Low commander: supervision of semi- and unskilled workers		Manual skilled	
2		Small-scale self-employed	Semi-skilled	
1			Unskilled	

Source: Van de Putte and Miles (2005).

[3] Recently, progress has been made in solving comparability problems (in terms of time periods or geographical areas) for historical occupational information with the development of a historical version of the ISCO68 classification of occupations. ISCO68 is a coding grid for occupational information drawn up by the International Labour Organization (ILO) and used by statistical agencies across the world. After many rounds of consultations with leading historians and experts on historical databases, ISCO68 has been converted into HISCO, a tool that can be used to code occupational information as found in historical censuses and vital registers in a comparable way (van Leeuwen and Maas, 2010). Coding of occupational titles worldwide is ongoing; the progress so far can be seen on the History of Work Website of the International Institute of Social History: https://historyofwork.iisg.nl.

[4] The HISCLASS-scheme is based on a social class categorization of which the distinction between manual and non-manual labour, the level of skill, hierarchy and economic sector are the dimensions. HISCLASS distinguishes between 12 social classes. In view of the small number of cases, these have in various studies been grouped into a more limited number of categories. An experiment in which historians directly classified HISCO groups into the classes distinguished in the HISCLASS schema suggested that the results are basically the same (Van Leeuwen and Maas 2010).

3. Cox model

Consistent with expectations, the period under study was associated with increasing absolute mobility, dominated by downward moves (39,2 vs 23,9%). Moreover, gender doesn't play an important role: social mobility is equally distributed upon men and women in both experienced changes (upward and downward) and in case of any change (no mobility).

Social mobility is also fairly balanced with regard to marital status (Table 2).

Table 2 – *Mobility and marital status (% values).*

Social mobility	Not Married	Married	Total
Upward	25,2	23,3	23,9
No mobility	35,5	37,5	36,9
Downward	39,3	39,2	39,2
Total	100	100	100

Source: own elaboration on SEDD data.

As shown in Table 3, the second period (1870-1894) was characterized by greater downward mobility due to the transition from agricultural to industrial society (downward 43,6%) but in the third one (1895-1910) the benefits are evident with a sharp drop in downward mobility (35,2%) and a strong increase in upward mobility (29,2%).

Table 3 – *Mobility and historical periods (% values).*

Social mobility	1813-1869	1870-1894	1895-1910	Total
Upward	22,5	22,6	29,2	23,9
No mobility	41,9	33,7	35,6	36,9
Downward	35,6	43,6	35,2	39,2
Total	100,0	100,0	100,0	100,0

Source: own elaboration on SEDD data.

As regards the social position at birth, the three lower classes (skilled, semi-skilled and unskilled workers) have experienced an important upward social mobility. There is also a significant drop in elite class, with 66% of downward social mobility, confirming the emergence of a "new" middle class (table 4). Finally, those who belong to a large family (with more than 30 components members) tends to have an absolute high downward social mobility (56,2%).

Table 4 - *Mobility and social status (% values).*

Social mobility	Unskilled	Semi-skilled	Skilled	Middle class	Elite	Total
Upward	53,9	35,9	27,0	4,7	---	23,9
No mobility	46,1	27,1	25,9	42,4	33,8	36,9
Downward	---	37,0	47,1	52,9	66,2	39,2
Total	100,0	100,0	100,0	100,0	100,0	100,0

Source: own elaboration on SEDD data.

To estimate the influence of social mobility and other possible mortality determinants, we estimate a *Cox proportional hazards model* (Cox, 1972).

We assume that the relative effect on mortality of any covariate is constant over age. The model allows time-varying covariates. The time-varying covariates are treated by right-censoring and left-truncating the spells every time a covariate changes. It is very important to check the underlying assumptions behind this model, especially the proportionality assumption.

Since after age 55 social mobility does not respect the hazard proportionality assumption, the study must be focused on prior ages, from age 35 to 55.

Therefore, we estimate a *Cox proportional hazards model*:

$$ln\, h_i(a|X_i) = ln\, h_0(a) + X_i\, \boldsymbol{\beta}$$

where $h_i(a)$ is the hazard of death for an individual *i* at duration (age) *a*, $h_0(a)$ is the baseline hazard, i.e. the hazard function for an individual having the value zero on all covariates, and β is the vector of parameters for the individual covariates (x_i)[5].

Concretely, in the study analyzed variables are:

- Social mobility (*mobility*). Categorical. Three possible status: upward (positive change from SOCPO at birth to SOCPO at age 35c.), no mobility (equal position in both moments, reference cat.) and downward (a negative change).
- Social status at birth (*birthsocpo*). Categorical. It's corresponds to the father SES. Five Social Power Levels. These levels are labelled: 'elite' (SOCPO 5), 'middle class' (SOCPO 4), 'skilled workers' (SOCPO 3), 'semiskilled workers' (SOCPO 2) and 'unskilled workers' (SOCPO 1, reference cat.).
- Historical periods (*period*). Categorical. Three values: From 1813 to 1869 (1, reference cat.), between 1870 and 1894 (2) and above this period (3).
- Individual household size (*HouseholdSizeCat*). Categorical. Four possible status according to a quartile distribution: Household composed by less than

[5] The estimations were made using the '*stcox*' command in Stata (https://www.stata.com).

5 members (1, reference cat.), between 6 and 10 (2), from 11 to 30 (3) and more than 31 (4).

- If the individual is an immigrant or not (*migration*). Categorical. Dummy variable: No migrant (0, Swedesh born), Migrant from abroad (1, reference cat.).
- Marital Status (*married*). Categorical. Dummy variable: Not married (0), Married (1, reference cat.).
- Gender (*Sex*). Categorical. Dummy variable: Female (reference cat.), Male.

Thus, we start by estimating a full model which, in addition to social mobility status, includes all the others above mentioned variables:

$$\ln h_i(a) = \ln h_0(a) + \beta_1 mobility_i + \beta_2 gender_i + \beta_3 marital\ status_i + \beta_4 period_i + \beta_5 inmigrant_i + \beta_6 SOCPO\ at\ birth_i + \beta_7 household\ size_i$$

Table 5 – *Cox proportional hazards model.*

Variables		Haz. Ratio	Sign.
• Mobility (ref. No change)	No change (ref.)	1	
	Upward	**0,663****	0,011
	Downward	0,868	0,312
• Sex (ref. Female)	Female (ref.)	1	
	Male	0,961	0,729
• Marital status (ref. Unmarried)	Unmarried (ref.)	1	
	Married	**0,780****	0,038
• Period (ref.1813-1869)	1813-1869 (ref.)	1	
	1870-1894	0,829	0,156
	1895-1910	**0,753****	0,044
• Migration (ref. Migrant)	Migrant (ref.)	1	
	Not migrant	1.493	0,690
• Birth SOCPO (ref. Unskilled worker)	Unskilled worker (ref.)	1	
	Semiskilledworker	0,856	0,372
	Skilled worker	**0,493****	0,025
	Middle class	0,764	0,149
	Elite	0,507	0,160
• Household size (ref. Less than 6 members)	Less than 6 members (ref.)	1	
	From 6 to 10	1.136	0,336
	From 10 to 30	1.124	0,540
	More than 30	1.407	0,156

N. observations = 53.083; LR chi2 (14) = 23,26; Prob> chi2 = 0,0562
Please note that the number of observations is less due to the narrowing of the age range.
Source: own elaboration on SEDD data.

Table 5 shows hazard ratio and significativity (*p* value) for each covariate. The fitted model shows that upward intergenerational social mobility affects mortality, reducing it in the studied period. Taking as a reference category '*no mobility*', hazard ratio is 0,66 (less than 1) and therefore an upward social change sharply reduces mortality. However, only upward mobility is statistically significant since downward hazard ratio is 0,87 but the associated *p* value is 0,312 which is not significant.

Moreover other key variables emerge in the model, such as marital status (who is married has less chances to die than individuals who are not); father's social position (only when is skilled worker with unskilled worker as reference cat.); and the historical period because the breakthrough of industrialization plays an important role (hazard ratio is 0,75 with preindustrial period as reference cat.). All these covariates are statistically significant. In nineteenth-century Europe excess female mortality, especially from late childhood through childbearing ages, has frequently been observed and connected to adverse conditions for women mainly due to childbearing and work load according to the household size (see, e.g. Alter *et al.*, 2004; Humphries, 1991; Johansson, 1984; Kennedy, 1973, chapter 3; Klasen, 1998; Stolnitz, 1956). This is why we include the covariate *household size* in the model even though is not significant.

Table 6 - *Tests of Proportional-Hazards Assumption.*

	rho	chi2	df	Prob>chi2
Upward	0,02082	0,13	1	0,7180
Downward	-0,05538	0,97	1	0,3236
Male	0,05585	0,93	1	0,3344
Married	-0,08890	2,51	1	0,1132
1870-1894	0,04642	0,64	1	0,4226
1895-1910	0,04069	0,50	1	0,4806
Not migrant	0,00173	0,00	1	0,9758
Semiskilledworker	-0,03618	0,38	1	0,5393
Skilled worker	-0,02001	0,12	1	0,7248
Middle class	-0,03663	0,44	1	0,5069
Elite	-0,01848	0,10	1	0,7462
From 6 to 10	0,11128	4,08	1	0,0433
From 10 to 30	0,12037	4,43	1	0,0353
More than 30	0,04698	0,66	1	0,4170
global test		13,39	14	0,4961

Source: own elaboration on SEDD data.

As shown in table 6, tests of the proportional hazards assumption (Cleves *et al*., 2010), based on scaled Schoenfeld residuals[6], reveal no serious violations for the above model.

4. Summary and discussion

This study contributes to one of the most classical debates in the social stratification literature about the link between industrialization and changing mechanisms of intergenerational social mobility and class attainment. In particular, it analyzes the influence of intergenerational social mobility on mortality in southern Sweden, covering the transition from preindustrial to a breakthrough industrial society (1813-1910). Using longitudinal individual-level data in Scania community we test the hypothesis linking changing social mobility and mortality due to the industrialization process.

One principal finding of such an analysis is that who experienced an upward social change have had a mortality reduction (hazard ratio = 0,66). Thus, the model results could indicate that intergenerational upward mobility have a positive impact in terms of mortality reduction. Secondly, other variables, as marital status, father's social position (skilled worker) and historical period (1895-1910, the breakthrough of industrialization) are significantly associated with reduced mortality.

Consistent with expectations, the initial phases of industrialization (second period, 1870-1894) were associated with a predominance of downward intergenerational mobility (43,6%). As a result of the higher growth of lower class positions, it illustrates a situation where structural labour market changes during the initial stages of industrialization forced individuals to abandon higher class positions in agriculture. During the later stages of industrialization (third period, 1895-1910), a pronounced increase in upward mobility could be observed (29,2%), which indicates a growth in higher status occupation.

Overall, the industrialization process was clearly associated with increasing class mobility. Industrialization fundamentally changed the mechanisms of attainment and intergenerational mobility. While the intergenerational transmission of status became less important over time, it became easier for people from low-class origin to enter the non-agricultural middle class.

If a consistent causal link between social economical status and mortality is open to serious doubt, is less so between social mobility and mortality.

Thus, future studies should consider the importance of social mobility on mortality since a greater knowledge about the historical process producing social inequalities can improve our understanding of contemporary mortality differentials.

[6] The proportionality test was made using the '*estat phtest*' command in Stata.

Our initial hypothesis should be confirmed in further analysis, controlling by other socio economic variables as well as redefining the idea of social mobility in a more fitted concept. Promising paths of future research in explaining the mobility transition may be the changing roles of geographic mobility and education. Although where possible, some authors used literacy as a crude indicator of educational level as well, but until the late nineteenth century, information about the level of education is rather hard to obtain and the large majority had only primary education.

In conclusion, while we have mainly charted the trends and patterns of social attainment and mobility in the period industrialization, much remains in terms of explaining the detailed patterns of mobility and how they changed over twentieth century.

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SUMMARY

Social mobility and mortality in Southern Sweden (1813-1910)

Aim of this paper is to see how intra-social group mobility affected mortality patterns in southern Sweden covering the transition from preindustrial to a breakthrough industrial society, a period of deep transformation and increasing life expectancy. According to previous studies, Social Economical Status did not affect substantially life expectancy of Swedish population in the nineteenth century. Could it be possible that other socio-economic factors, such as the intergenerational social mobility, may have affected life expectancy? We use longitudinal micro-level data between 1813 and 1910 from the Scanian Economic-Demographic Database with information on demographic events and socioeconomic status. Intra-social mobility is defined as the chances of an individual between at age 35 to experience a change of her/his Social Economical Status with respect to her/his father according to social power codification. The main reason for using it is that it is highly correlated with education and income. In addition, this classification can be used for both rural and industrial societies. A Cox proportional hazard model was applied to estimate the influence of social mobility, controlling for age and other possible determinant variables. The main finding is a significant and positive relationship between social economic mobility and mortality reduction.

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