ABSTRACT

Aim of this research project is to seek the influence of intergenerational social mobility on mortality in southern Sweden, covering the transition from preindustrial to a breakthrough industrial society. According to previous studies, Social Economical Status (SES) does not affect substantially life expectancy of southern Swedish population in the XIXth century. Could it be possible that other socio-economic factors, such as the intergenerational social mobility, may affect life expectancy?

In order to achieve this goal, a dataset between 1813 and 1910 from the Scanian Economic-Demographic Database (SEDD) is going to be used. Intra social mobility is going to be defined as the chances of an individual, between ages 30 and 49, experiences a change of his SES according to SOCPO codification. Therefore, a Cox Proportional Hazard model is going to be applied in order to estimate the influence of social mobility. We are going to estimate a model for each SOCPO category. This model includes social mobility status, age, sex, year of birth, parish of residence and position in the household.

Results confirm previous studies. Other variables, as marital status, are more explanatory. Moreover, the model results could indicate that intergenerational upward mobility have a positive impact in terms of mortality reduction.

KEYWORDS

Social mobility – Mortality – Survival Analysis – Cox Model

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

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, 2010; Bengtsson and Van Poppel, 2011; Bengtsson and Dribe, 2011; Dribe *et al.*, 2013) Social Economical Status (SES) did not affect substantially life expectancy of Swedish population in the XIXth century. Instead of this, other variables, such as public health measures or education, 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 affect life expectancy?

During the early industrialization period under study, 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.

The period 1870-1894 showed the first signs of industrialization where there was an early industrialization in textiles (Schön, 2000). Industrialization continued at a more rapid footstep after 1890.

In fact in the XIXth century across the Western world, new positions are generated and others are disappeared as consequence of the growing importance of the industrial sector and of the decline of agriculture. So 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.* (2013) display, the initial phases of industrialization were associated with a downward intergenerational mobility, actually during the initial stages of industrialization individuals had to abandon higher class positions in agriculture. While in mature industrial society, when emerged a "new" middle class made, was experienced an important upward social mobility.

DATA AND METHODS

In order to achieve this goal, we have used a longitudinal individual-level data in a confined geographic area of Sweden. In detail, a dataset from the Scanian Economic-Demographic Database (SEDD) comprised by 80.966 observations of 3.385 individuals both male and female sex registered between 1813 and 1910 is selected. The database is a longitudinal economic and demographic dataset containing information about individuals who living in five parishes in southern Sweden for the period 1813 to 1910. Thus it is built on local population registers for five rural Scanian coast parishes (Hög, Kävlinge, Halmstad, Sireköpinge, and Kågeröd). The analysis is focused on three periods according to historical criterion (preindustrial period: 1813-1869; early industrial period: 1870-1894 and the first part of the breakthrough of industrialization: 1895-1910).

We test our hypotheses upon mortality linking changing social mobility and attainment to the industrialization process.

In our study, social mobility is defined as the chances of an individual, at age 35, have or not the same SES of his father, according to SOCPO codification. Our studies are 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 class of the parent on their offspring's attainment and, if the change had occurs, what consequences produced on the life expectancy of the second generation. With a condition, if the changing employment from the agricultural to the industrial sector implies occupational mobility, the transformation of an unskilled farm worker into an unskilled industrial worker is not ever considered as class mobility. Specifically, the social class of the son is measured using the SOCPO observation occurring at the age closest to 35, whereas that of the father is obtained taking in account the SOCPO at son's birth.

Thus SOCPO is comprised by 5-category classification scheme. The SOCPO sorts individuals using occupational information (HISCO) and landholding figures (including land tenure - manorial, crown, freehold) including the size of landholdings. Our main reason for using it is that while it focuses on social power. Social power as a measure of the control of resources. It is also highly correlated with education and income, as well as this classification can be used both for rural and industrial societies.

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).

Concretely, in our 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) and downward (a negative change).

- Social status (*birthsocpo*). Categorical. 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).
- Historical periods (*period*). Categorical. From 1813 to 1869 (1), between 1870 and 1894 (2) and above this period (3).
- Individual household size (*HouseholdSizeCat*). Categorical. For possible status according to a quartile distribution: household composed by less than 5 members (1), 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: 0 no migrant, 1 no Swedish migrant.
- Marital Status (*married*). Categorical. Dummy variable: 0 not married, 1 married.
- Gender (*Sex*). Categorical. Dummy variable, 'Female' and 'Male'.

Consistent with expectations, our period under study were associated with increasing absolute mobility, obviously dominated by downward moves. The social mobility is enough equally distributed upon male and female sex. The female social mobility represents 49 percent of total mobility experienced in the total period (Table 1).

The social mobility is enough equally distributed upon marital status (Table 2).

Moreover, in the second period the social transition was stronger with 46 percent of case. The social class that contributes most to change is the middle one (Table 3).

Furthermore, there is not an important migration in our period: less than 1% of social mobility come from immigrant (Table 4).

As regards the social position at birth, those who come from the middle class have experienced a higher absolute social mobility. There was also a significant drop in elite class, with 66% of downward social mobility (Table 5). Finally, those who belong to a large family (with more than 30 components) tends to have an absolute high downward social mobility.

RESULTS

Despite scale graphs are not equal, it could be observed that after age 55 social mobility does not respect the hazard proportionality assumption (Figure 1). Thus, the study must be focused on prior ages (from age 35 to 55), taking as a reference category *no mobility* (0).

Therefore, a Cox Proportional Hazard model is going to be applied in order to estimate the influence of social mobility and other possible mortality determinants:

$$\ln h_i(a) = \ln h_0(a) + \beta x_i$$

where *hi(a)* is the hazard of death for an individual *i* at duration (age) *a*, *h0(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 (*xi*).

Concretely, we start by estimating a full model (MODEL 1)which, in addition to social mobility status, includes all the others above mentioned variables (Table7):

$$\ln h_i(a) = \ln h_0(a) + \beta mobility_i + \beta gender_i + \beta marital\ status_i + \beta period_i + \beta inmigrant_i + \beta SOCPO\ at\ birth_i + \beta household\ size_i$$

MODEL 1 shows that intergenerational social mobility affects mortality, reducing it in our studied period. However, only upward mobility is statistically significant at 5%. Moreover other key variables emerge in our model, such as marital status (who is married has less changes to die than individuals who are not); father's social position (only when is middle class); and the historical period (the breakthrough of industrialization). All these covariates are statistically significant.

Tests of the proportional hazards assumption, based on scaled Schoenfeld residuals, reveal no serious violations for the above models (Table8).

In order to complement these results, several interactions have been explored in different models without significant results (MODEL 2, MODEL 3, MODEL 4).

MODEL 2 (interactions between mobility and period):

$$\ln h_i(a) = \ln h_0(a) + \beta mobility_i * \beta period_i + \beta gender_i + \beta marital\ status_i + \beta inmigrant_i + \beta SOCPO\ at\ birth_i + \beta household\ size_i$$

MODEL 3 (interactions between mobility and SOCPO at birth):

$$\ln h_i(a) = \ln h_0(a) + \beta mobility_i * \beta SOCPO\ at\ birth_i + \beta gender_i + \beta marital\ status_i + \beta period_i + \beta inmigrant_i + \beta household\ size_i$$

MODEL 4 (interactions between mobility and marital status):

$$\ln h_i(a) = \ln h_0(a) + \beta mobility_i * \beta marital\ status_i + \beta gender_i + \beta period_i + \beta inmigrant_i + \beta SOCPO\ at\ birth_i + \beta household\ size_i$$

DISCUSSION

Results confirm previous studies showing that SES has not a significant effect on mortality during the studied period (see e.g., Bengtsson: 2010; Bengtsson and Van Poppel: 2011). Other variables, as marital status, are more explanatory. Moreover, the model results could indicate that intergenerational upward mobility have a positive impact in terms of mortality reduction. The limitations of space and time in this study prevent us from realizing deeper assertions.

Future studies should consider the importance of social mobility on mortality. Thus, our initial hypothesis should be confirmed in further analysis, controlling by other socio economic variables (e.g. HISCLASS, HISCO) as well as redefining the idea of social mobility in a more fitted concept.

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Tables

Table 1 – Mobility and gender.

	Female	Male	Total
upward	9.227	10.119	19.346
no mobility	14.931	14.917	29.848
downward	15.789	15.983	31.772
Total	39.947	41.019	80.966

Table 2 – Mobility and marital status.

	Not Married	Married	Total
upward	6.821	12.525	19.346
no mobility	9.632	20.216	29.848
downward	10.658	21.114	31.772
Total	27.111	53.855	80.966

Table 3 – Mobility and historical periods.

	1813-1869	1870-1894	1895-1910	Total
upward	6.141	8.443	4.762	19.346
no mobility	11.443	12.588	5.817	29.848
downward	9.726	16.291	5.755	31.772
Total	27.310	37.322	16.334	80.966

Table 4 – Mobility and migration.

	Not Migration	Migration	Total
upward	18.085	40	18.125
no mobility	25.605	11	25.616
downward	29.886	30	29.916
Total	73.576	81	73.657

Table 5 – Mobility and social status.

	Unskilled	Semi-skilled	Skilled	Middle class	Elite	Total
upward	7.243	8.971	1.513	1.619	0	19.346
no mobility	6.202	6.766	1.449	14.532	899	29.848
downward	0	9.244	2.638	18.129	1.761	31.772
Total	13.445	24.981	5.600	34.280	2.660	80.966

Table 6 – Mobility and individual household size.

	< 6	6 to 10	11 to 30	> 30	Total
upward	5.661	6.962	3.526	3.197	19.346
no mobility	8.057	10.280	6.222	5.289	29.848
downward	7.082	8.218	5.599	10.873	31.772
Total	20.800	25.460	15.347	19.359	80.966

Table 7 – MODEL 1.

Covariates	IRR	p>|z|
Mobility (rif. No change)	1	
• Upward	**0.663****	0.011
• Downward	0.868	0.312
Sex (rif. Female)	1	
• Male	0.961	0.729
Marital status (rif. Married)	1	
• Unmarried	**0.780****	0.038
Period (rif.1813-1869)	1	
• 1870-1894	0.829	0.156
• 1895-1910	**0.753***	0.074
Migration (rif. Migrant)	1	
• Inmigrant	1.493	0.690
Birth SOCPO (rif. Unskilled worker)	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 (rif. Less than 6 members)	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	53083	
LR chi2 (14)	23.26	
Prob> chi2	0.0562	

Table 8 – Tests of Proportional Hazards Assumption (MODEL 1).

Here it is presented the output, on Chi2 is over 5% of signification level.

Variable	Prob>chi2
Mobility	
• Upward	0.718
• Downward	0.324
Sex	
• Male	0.334
Marital status	
• Unmarried	0.113
Period	
• 1870-1894	0.423
• 1895-1910	0.481
Migration	
• Inmigrant	0.976
Birth SOCPO	
• Semiskilledworker	0.539
• Skilled worker	0.725
• Middle class	0.507
• Elite	0.746
Household size	
• From 6 to 10	0.043
• From 10 to 30	0.035
• More than 30	0.417
Global Test	0.496

Figures

Figure 1 – Hazard Proportionality Assumption