Adverse selection in mutual benefit societies – an longitudinal approach

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Abstract

Mutual benefit societies evolved as the major provider for illness, accident and burial insurance in the late 19 th and early 20 th century in the Western world. One of the major problems facing the insurers was the risk for adverse selection; that unhealthy individuals had more incentive then healthy to insure when priced for the average risk. By empirically examine if the longevity among insured in mutual benefit societies was different from uninsured, we seek to identify the presence of adverse section. We find no compelling evidence that unhealthy individuals was more likely to insure, or reasons to believe that adverse selection was behind the decline of mutual benefit societies in the twentieth century.

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Abstract

Mutual benefit societies evolved as the major provider for illness, accident and burial insurance in the late 19th and early 20th century in the Western world. One of the major problems facing the insurers was the risk for adverse selection; that unhealthy individuals had more incentive then healthy to insure when priced for the average risk. By empirically examine if the longevity among insured in mutual benefit societies was different from uninsured, we seek to identify the presence of adverse section. We find no compelling evidence that unhealthy individuals was more likely to insure, or reasons to believe that adverse selection was behind the decline of mutual benefit societies in the twentieth century.

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Introduction

At the turn of the twentieth century, mutual benefit societies peaked as the main providers of illness, accident and burial insurance in the Western world. Based on collective ideas of help-to-self-help, workers organized a variety of mutual benefit societies, known as fraternal, friendly and health insurance societies. Before the emerging public insurance schemes in Western Europe or the development of the two pillars of employers and government insurance in the US, mutual benefit societies was an attractive form of working-class insurance (Beito, 2000).

Mutual benefit societies are with few exceptions not around us today in the Western world, but declined in the same period as we observe the implementation of social/employer insurance schemes (Leeuwen, 2016). Still, we have a limited understanding of why the mutual schemes failed. A number of arguments have been put forward, but many are not tested or have major drawbacks (Gottlieb, 2007). While there are a general consensus on the importance of insurance schemes related to health today, we do not know why the predeceasing mutual schemes failed to provide a reasonable alternative.

From an economic stand-point, a common perception is that the decline of mutual benefit societies was related to their egalitarian pricing policy. In contrast to commercial insurers, the pricing of risk and the distribution of benefits was shared equally across the pool of individuals enrolled by mutual benefit societies (Murray, 2005). While the egalitarian pricing policy might be seen as an act of solidarity among workers, it also created incentives towards adverse selection. Individuals facing a greater risk exposure or being unhealthy, would be more willing to join a society if priced equally, making mutual benefit societies less economically viable. The fundamental theoretical reason for government intervention on health insurance markets is generally recognized as the problem of adverse selection (Einav and Finkelstein, 2011).

In this paper we consider the issue of adverse selection, by examining wheatear mutual benefit societies enrolled individuals facing a greater risk exposure and or was less healthy. For this purpose we use an accumulated hazard risk of mortality measure for a cohort of insured/uninsured individuals born and deceased in Sweden through the nineteenth and the twentieth century. By separating lines of insurance (un/self-, health and life insurance), distinguishing between policies (e.g. different size/value of policy)

and kind of termination (voluntary/ fatal) and considering individual characteristics, we provide a comprehensive account for the presence of adverse selection in mutual benefit societies.

In addition to previous historical studies on mutual benefit using morbidity records to infer information asymmetry (Gottlieb, 2007; Murray, 2011; Andersson and Eriksson, 2017), this paper offer a cleaner test of the adverse selection hypothesis as the risk of moral hazard is more limited, if any, when considering the hazard risk of mortality. By using longitudinal individual-level data, instead of society-level or cross-section, we are able to examine the adverse selection hypothesis in relation to individual characteristics, insurance decision and outcomes over individual's life-course.

We find no compelling evidence on the presence of adverse selection in mutual benefit societies. There are no major differences between lines of insurance (un/self-insured, health insured and life insured), or by termination (voluntary/lapse or fatal outcome), or kind of policy (size/value of policy). We argue that adverse selection seems less to have played a part in the decline of mutual benefit societies in the twentieth century.

The remaining of the paper is organized as follows. In the next section reviews the literature on mutual benefit societies, section 3 the theory of adverse selection, section 4 the data and method, section 5 the empirical results. Section 6 concludes.

The Evolution of mutual benefit societies

Mutual benefit societies had its origins already in medieval guilds, protecting members for unanticipated medical costs, supporting dependent widows and orphans and covering funeral expenses. But it was not until the nineteenth century mutual benefit societies was widely diffused in the Western world. From the onset of the industrial revolution, the need to protect loss of wage-labour income due to illness, accident and death in absence of social protection networks, created incentives to organize mutual insurance societies. Among wage earners in the growing urban and areas in England, Netherlands and other early industrial economies, mutual societies based on close social affinity either in occupation, location, social class, and religion or other affiliation, became increasingly popular (Gosden, 1961; Gerwen and Lucassen, 1996).

The early mutual benefit societies were small and organized along direct democracy principles. Even though their primary function was to reduce personal financial risk by accumulating funds, their social cohesion was a distinctive part of their operation. In that regard was the principles of mutualism, where members created close social bunds, trust and solidarity essential to enable the sharing of loss within a group of individuals facing similar risks (Skogh, 1999).

The early society's primary advantage compared to commercial insurer was their ability to overcome information asymmetry (Gotlieb, 2007). Having regular face-to-face contact led to a reciprocal social control, and faced with the risk of exclusion, close social bunds created incentives to avoid fraudulent behavior. Only individuals known by members was accepted (and informal and formal rules was met). However, their operation seems exceptional vulnerable in other principle regards. One on the major issues was the insufficient distribution of risk, where members facing the same kind of risk (same occupation, workplace, and neighborhood) shared their losses mutually. Another concern of direct-democracy was the lack of professional management, where rotating offices led to subsequent changes in position and limited accumulated *know-how*. The sociability function of the early societies, could led to unforeseen risk of sharing out the money, or that funds were used for other purposes then intended when members collectively faced economic hardship (Linden, 1996).

In the UK, Gosden (1973) note that the expansion of early mutual benefit societies came to a halt in the in the 1820s and 1830s. In the decades that followed, the early small societies was gradually replaced by larger societies. One distinctive part of the second wave was the affiliated orders, mutual benefit societies with lodges, of which the most prominent was the *Independent order of Oddfellows* (220,000 members in 1842) and the Ancient Order of Forester (76,990 in 1846). In close parallel to the UK, an early primacy of small local societies in the US was followed by an expansion of affiliated orders. Beito (1999) show how mutual benefit society grew popular among blue-collar workers in the late 19th century, and that close to one-third of all adult males was insured by 1910. Figures from the UK show that mutual benefit societies included a substantial part of the workforce at the turn of the 20th century, where over fifty per cent of male workers over age of nineteenth as members in 1891 (Neave, 1997). A parallel process is shown for Continental Europe, although the principles for organization differed.

While liberal virtues of help-to-self-help was encouraged in Belgium, the Netherlands and France to promote workers to voluntary enroll in mutual benefit societies, statutory health insurance schemes was enforced in the German speaking countries (Murray, 2003). For specific industries (e.g. mining) statutory schemes was implemented in e.g. France, but in Germany and Austria statutory insurance was implemented on a wide scale. Already in the mid-19th century many local authorities in Germany obligated wage-earners to join mutual benefit societies, and with the national health insurance act in 1883, all industrial workers was obliged to join health insurance schemes (Stollberg, 1996). Beyond raising the figures of membership, the statutory principles mitigated the adverse-selection problem; an issue of potential concern in the more general, larger voluntary societies that lacked close social cohesion and kinship.

In a cross-country study on European economies between 1885 and 1908, Murray (2003) argues that voluntary societies faced a significant disadvantage compared to compulsory schemes. In an account of morbidity records, Murray finds three-times higher claims among the voluntary funds. In a more recent paper, Murray (2011) found evidence of asymmetric information among US cooperative health insurers. Based on a survey of several hundred micro insurers in 1908, figures shows that voluntary insurance funds faced much higher claim rates then compulsory. Their sources of the difficulties was, according to Murray, the classic information problems of moral hazard and adverse selection, which burdened voluntary societies more severely than compulsory.

Although the affiliated societies suffered less from the insufficient distribution of risk and lack of professional management recognized in small early societies, their capacity to mitigate information asymmetry was arguably more limited. As the affiliated societies for internal reasons, with few exceptions, applied egalitarian pricing principles, workers more risk exposed or less healthy were more incentivized to join when priced for the average risk. Unless the advantages of social cohesion recognized was successfully enforced also in the larger, affiliated societies, the issue of adverse selection was potentially a major concern.

Selection in mutual insurance markets

The evolution of liberal affiliated orders in the *Anglo-Saxon* context in late 19th century, was influential in the development of mutual benefit societies among later industrialized countries in both southern and northern Europe. In both Italy and Spain, the liberal system followed the course of leading countries, where open, mixed, general societies was the main organizing principles of mutual benefit societies (Castillo, 1996; Tomassini, 1996). In the Scandinavian countries, the liberal self-to-self-help system was to a growing extent organized in larger, general societies from the turn of the twentieth century. From late nineteenth century up till First World War, the average society went from 140 to 600 members in Denmark, and from 110 to 500 in Sweden. Behind the figures was the rise of larger general societies and the decline of the early small societies.

In the Swedish context the diffusion of affiliated orders took-off in the early twentieth century. In parallel to the U.S development, the temperance movement led a number larger societies based on affiliated orders to accept teetotalers as members only. Being a part of the temperance movement, the mutual benefit society was considered an association for mental and mortal improvement and operations were designed to improve and elevate their members as in the US (Cordery, 1997). Also in Sweden, the advantage of temperance affiliation in selecting members and creating social cohesion, was utilized in the development of nation-wide mutual benefit societies. Of all societies with affiliated orders in Sweden by 1910, close to half of the members was part of the two largest temperance societies (Kommerskollegii, 1912).

Although the temperance movement was strong in early twentieth century, far from all workers took an active part as members or were committed absolutist/teetotalers. Without any affiliation to temperance, occupation, social class or other affiliation, the selection of members into the larger, general affiliated societies had less opportunities to make an informed selection on members. When applying an egalitarian pricing policy, where the pricing of risk and the distribution of benefits was shared equally across the pool of individuals enrolled by mutual benefit societies, the affiliated orders (without affiliation to eg. temperance) faced a greater risk for adverse selection.

In a setting with mutual benefit societies lacking information advantages, individuals would have information about expected claims that the society was lacking. If such societies further needed to

attract new members to avoid financial insolvency in the long run (due to lack of actuarial expertise), benefit societies would effectively be competing each other. In such a setting, we would in line with the basic adverse selection theory (see eg. Chiappori et al., 2006), expect a positive correlation between risk and coverage. The reason would be that unless mutual aid societies could differentiate between high-risk and low-risk individuals in their selection of new members, the two groups would be offered the same price due to egalitarian pricing. It would imply that individuals facing a high risk exposure or suffering from bad health were incentivized to buy insurance when priced for the average risk. Societies lacking this information could not avoid such risks effectively.

When mutual benefit societies offered multiple insurance contracts (such as smaller and larger policies), another expected relation in line with the basic adverse selection model is that high-risk individuals would be incentivized to purchase more comprehensive coverage. Within a mutual society, members facing a low risk would demand a less comprehensive coverage than high risk members, as the latter would be underpriced if priced for the average risk. In the presence of adverse selection, not only is high-risk individuals expect to insure more. Another expected outcome on insurance market in the presence of adverse selection is that of under-insurance. That is individuals who face a low expected claims risk in relation to the premium offered at the average cost, and therefore, remain outside the insurance pool (or purchase too small policies).

If adverse selection was a major concern, the affiliated mutual aid societies in particular would face an over-representation of high-risk individuals and *vice versa* an under-representation of low-risk individuals. Among the individuals insured, high-risk individuals would demand more insurance cover, and purchase larger policies to take advantage of being underpriced.

Examining adverse selection

Historical studies on the selection of individuals into mutual benefit societies are few and largely based on aggregated data (Murray, 2005, 2011; Andersson and Eriksson, 2017). One exception is Gottlieb (2007) that examine morbidity in a sample of US manufacturing workers by enrolment in mutual aid societies. In this paper, we seek to offer a cleaner test of the adverse selection hypothesis by considering the hazard risk of mortality. As the morbidity measure arguably include an element of moral hazard, such a mix is more limited, if any, when considering mortality.

Our empirical setting is the closest related to contemporary studies on selection in the life insurance market based on micro data, where the relation between life insurance uptake and mortality is examined. Cawley and Philipson (1999) examined the relation by using data from the U.S. Health and Retirement Study (HRS). They measured the probability of death by self-perceived risk and actual death, where the subjective measure was based on questionnaires and the objective was captured by using observed deaths over two waves of the HRS (1992 & 1994). After controlling for a set of individual characteristics, they found that the death rate for persons who had life insurance was lower than for those who lacked it. In a follow-up paper on the same data, He (2009) restricted the sample to include individuals without life insurance in the first HRS wave (1992) only, and then examined the mortality rate between insured/uninsured individuals in the second wave (1994). She finds that the ones being insured faced a greater mortality risk. In a more recent paper, Hedengren and Stratmann (2016) uses a matched data including respondents from the U.S income and program participation survey (SIPP) with administrative records providing survival information. As the latter provide hard evidence wheatear an individual actually died, they avoid using alteration to infer death as in previous studies. When running a regression relating death with life insurance, they find no compelling evidence of adverse selection.

In our study we expand the time frame of analysis to cover individual's entire life span, and thereby avoid the right-hand censoring of contemporary studies. For our purposes, we are the most interested in examine adverse selection in places enrolled by affiliated societies (as adverse selection of conceptual reasons aforementioned are the greatest). As the early mutual benefit societies emerged in the larger cities, or at larger work-places, the affiliated order expanded into smaller urban centres, villages or even rural areas with few individuals insured. By tracing the enrolment of new members into one of the largest affiliated benefit societies without affiliation to temperance or unions (*Svenska folket*) in the

early twentieth century Sweden, we seek to examine the presence of adverse selection with respect to the uninsured population.

To capture the enrolment, our data is based on a sample of 40 places (parish/districts) where affiliated branches (sections) was established by *Svenska folket* between 1904 and 1911 (close to 400 bransches/sections was established in total that period). For the 40 places included, we have sampled individuals that represent both insured and uninsured. In practice we first sampled all individuals enrolled, and in a second step sampled another 10 individuals of the same sex, born in the same year, at the same place (parish). As the insured are left censored (i.e include only individuals surviving up until policy was written), we impose the same censoring at their 'statistical twins'. Our sample consists of 18,148 individuals, of which 2062 insured/enrolled by the society considered (16% of all members in the society is included).

Data on insured are gathered from the societies original ledgers, where each new members was registered by name, date of birth, place of birth, policy (later events was registered subsequently). For some, the date of death has been registered, but to arrive at a full count, we have matched all insured with the Swedish death index (SDI). SDI offer a population full-count of all deceased in Sweden from 1900 onwards (Sveriges dödbok, 7). The matching is based on full name, date of birth, place of birth. Out of 2732 identified members (in the 40 places considered), 2062 was successfully matched with SDI. For the uninsured, we use the SDI data to gather information on name, date of birth, place of birth, marital status, date of death, place of death.

Since our analysis is conducted on time-to-event data, we employ survival analysis. The association of enrolled/insured with mortality was examined using a proportional hazard regression model, since our data include complete life histories. The cox-model takes the form:

$$h(t|\boldsymbol{x_j}) = h_0(t)\exp(\boldsymbol{x_j}\boldsymbol{\beta_x}),$$

in which $h(t|\boldsymbol{x_j})$ is the hazard rate or instantaneous rate of transition at age t for and individual with characteristics $\mathbf{x}_j$. The expression assumes that all hazard rates are proportional to a base line hazard $h_0(t)$, which describes variation by age in the transition rate for a standard individual. We apply two models describing the effect of insurance on (all-cause) mortality.

$$h(t) = h_0(t)\exp(\beta_1 INS + \beta_2 SEX + \beta_3 MIG + \beta_4 IC + \beta_5 UINS\#IC) \quad (1)$$

$$h(t) = h_0(t)\exp(\beta_1 LAPSE + \beta_2 SIZE + \beta_3 TYPE + \beta_4 SEX + \beta_5 MIG) \quad (2)$$

Model 1 tests the impact of enrolment on mortality based on the expectations that individuals that insure is being less healthy or that they when faced with greater a risk exposure than average, are incentivized to purchase insurance. At first we run only insurance (INS), and then subsequently add controls, including SEX, migration from birthplace (MIG), living in area with earlier insurance coverage (IC), and interacted with non-insured (UINS#IC) at the same location as control.
In the second cox-model we examine the association between, LAPSE (voluntary drop-out), SIZE (vector of four classes) and TYPE, either health insurance or health and life insurance (HLINS) of policy on mortality among the insured. All models are run with cluster-robust errors (on places of enrolment).

Morality among the insured and uninsured

In table 1 variable definitions and summary statistics by insured and uninsured individuals are presented. We find that the age at the point (day) of death was on average 71.2 years among uninsured and 72.0 among the insured. The standard deviation is somewhat greater among the uninsured, including both the short-lived (16.8 years) and most long-lived individual observed (107.8 years).

Most of the insured were male workers. A fairly large proportion migrated from their birth parish (the smallest regional administrative unit, n=2573), but remained within the same county (the largest regional administrative unit, N=26). Migration was somewhat less common among the uninsured. In the areas/places where the new branches by *Svenska folket* expanded, the insurance penetration (proportion of population insured) was close to 10% on average, a figure close to the nation-wide population average (8%). If assuming that only the economic active population (15-65 years of age) held insurance, the figure would approximately reach 13% nation-wide (assuming that only economically active held insurance policies). As shown by in table 1, insurance penetration varied, where the highest figure is obverse in the major urban areas and the lowest in the rural areas. By percentile (p) insurance penetration was 0%, 6%, 21% and 28% by p25, p50, p75 and p95 respectively among the uninsured in our sample at the point in time when policies was written.

[Table 1 about here]

When limiting down the sample to consider only the insured, we find that a fairly small proportion (1.3%) of members deseased within any close proximity (<4 years) to enrollment. Almost half of the members voluntarity left the society before deceased (or for other forced reason except death). The average member purchased a policy in size-class 2. Equally large shares of the new members (20%) purchased policies in class 1 and 3, and only a few (1%) went for the highest premium class (4). The premium class reflect only the size of the policy, without any adjustments to risk (equal pricing). We find that most of the members held both health and life insurnace. Of all members 34% had only health insurance and the remaining kept both health and life insurance policies. For the life insurance policies, the society from 1910 onwards imposed age-scaled premium tariffs based on actuarial calcuations similar to industrial life insurance companies at the time.

Table 1 shows only minor difference on average age of death between the individuals enrolled/insured, and the non-enrolled/insured. To show potential difference over the life-cycle that average figures compress, we illustrate survival by Kaplan-Meier estimates of the uninsured and insured individuals in our longitudinal sample.

[Figure 1 about here]

Since the sample represent individuals that survived up until the point an insurance policy was written (including the uninsured statistical twins), the estimate is equal to 1 up until the age of 20 (first observed entry in pool of insured at age 13.9). At around the age of 30 the survival estimates starts to drop. The slope is somewhat steeper for the uninsured in the ages between 30s and 40s, before it starts to converge from the age of 50. The survival estimates is much the same for insured and uninsured from the age of 70 onwards.

Although we can observe a gap in the survival estimate, the differences between the two samples are small. When running a log-rank test on the survival distributions of two samples, we cannot reject the null-hypothesis (Pr>chi2 = 0.6593) for the full sample. When running the test for the deceased between 30 and 60 years of age, where we observe a gap in the Kaplan-Meier estimates, we cannot accept the null-hypotheses (Pr>chi2 = 0.0346) at the 5% level of significance.

To consider a wider set of covariates on the mortality hazard rates of the two samples, we have estimated the first equation on the impact of enrolment on mortality by using cox-model (see equation 1). The coefficient estimates presented in table 2 shows no significant effect of being insured on mortality in the full sample. For the other covariates, we find that women live longer than men, individuals leaving birth-parish survive up till higher ages, especially if staying within the region. We find no impact of interacting insurance penetration, which further confirm the absence of any adverse selection.

[Table 2 about here]

To examine the diverging trends in mortality hazard in the ages 30 to 60 (see figure 1), we restricted the sample to include only individuals deceased in their 30s, 40s and 50s. When re-running the model (see equation 1), the result show a negative and significant impact of insurance on mortality. When adding the covariates, we find that sex turns negative, indicating a higher age-specific mortality among women. Migration from parish lower mortality hazard risk, but the remaining covariates are insignificant.

Our analysis of the impact of enrolment on mortality give few reasons to believe in an adverse selection of members into the mutual health/life insurance society. Although individuals being less healthy or facing with greater a risk were incentivized to purchase insurance when priced for the average risk, there were other forces counteracting any adverse selection on enrollment. Before making any claim that adverse selection was no concern for mutual benefit society, there are however additional aspects to consider first.

As shown in previous literature on adverse selection on life insurance markets, individuals may enroll only to leave voluntarily (lapse) a few years later (He, 2011). Any adverse or favorable selection on lapse will impact on the findings concerning enrollment aforementioned.

In figure 2 (top-panel) Kaplan-Meier survival estimates by lapse/no-lapse is shown. We find fairly similar survival trend among individuals enrolled independent of wheatear they terminate policies voluntary (lapse) or remain within the benefit society. Individuals that lapse in their 70s have a slight steeper

decline in survival. However, we cannot reject the null-hypothesis of equality even when restricting the log-rank test to individuals deceased in their 70s (Pr>chi2 = 0.2092).

As put forwards in previous studies health insurance (Jobb, 2011), individuals facing a greater risk or being less health, may go for larger policies. In mutual benefit societies, selecting a larger policy for more risk exposed is incentivized with equal pricing of risk.

Figure 2 (mid-panel) shows Kaplan-Meier survival estimates by large (class 3 & 4) and small policies (class 1 & 2). For the larger policies, the slope in the survival estimate is slightly steeper for individuals with larger policies deceased in their 40s and 50s, but much less so in the higher ages when the ones with larger policies live longer. When running a log-rank test for equality to the entire sample, we cannot accept the null-hypothesis of equality (Pr>chi2 = 0.0136). If sample is restricted to deceased in their 70s and thereafter, the difference is significant at the 1% level (Pr>chi2 = 0.0031).

[Figure 2 about here]

The mutual benefit societies commonly offered both health and burial/funeral insurance. However, as the latter was of a concern especially as members grew older without age-scaled tariffs, regulatory measures were imposed to reduce the risk of insolvency. In Sweden a requirement of actuarial fair premiums was imposed for life insurances offered by the mutual aid society in 1910. Only small contributions was accepted for funeral support. In the mutual benefit society considered in this study, the industrial life insurance requirements was imposed from 1911 onwards. The life policies offered were small and issued without medical examination. Tariffs was scaled by age as in commercial industrial life insurance at the time (Svenska folket, 1928).

Considering that life insurance, more than health insurance, reflects individuals mortality risk, one may expect that individuals only purchasing health insurance faced a lower mortality risk. When comparing the Kaplan-Meier survival estimates by type of insurance, it shows a slight difference in survival suggesting that members holding life insurance faced a more rapid decline in survival in their 40s and 50s. However, when running a log-rank test for equality, we cannot reject the null-hypotesis (Pr>chi2 = 0.4986).

To take into account a wider set of covariates on the mortality hazard rates among the enrolled, we have estimated the second equation on the impact of lapse, size and type on mortality by using a cox-model. In table 3 the coefficient estimates is shown.

[Table 3 about here]

We find that the voluntary termination of policies (lapse) has no significant impact on mortality. The size of policy has a negative and impact on mortality, albeit significant only in the combined models (4 & 8). Health insurance has a negative impact on mortality, albeit significant only in the combined models. The estimated hazard ratio equal .89 for the larger policies and .88 for health insurance in the full model (8). The result on size suggest a favorable selection, as the individuals facing a lower hazard risk of mortality purchased larger policies. In the selection of policies, we that individuals a greater risk purchases both life and health insurance, and not only health insurance. When interaction size with health insurance, the impact of size turns insignificant while health insurance uphold the interaction effect. For the other covariates, we find that women live longer than men, and the migration had only a small impact on selection if significant.

Conclusion

In this paper, we have examined the presence of adverse selection in mutual benefit societies. In doing so, we have compared if the hazard risk of mortality was higher/lower for individuals becoming members in nation-wide mutual benefit society in Sweden compared to a matched sample of non-members. By comparing the two samples, we trace whether the selection into the insurance pool was characterized by adverse selection, or not. Among the insured members, we further examined the impact of lapse, size and type of policy on mortality to indicate the presence of adverse selection. To provide a decisive test on adverse selection, we examined a nation-wide mutual aid society with lodgers without any affiliation of temperance or union movement, to mitigate the potential lack of social control observed in small mutual 'club-like' societies.

Our analysis give no compelling evidence on the presence of adverse selection in mutual benefit societies. We find no major differences between lines of insurance (un/self-insured, health insured and life insured), or by termination (voluntary/lapse or fatal outcome), or kind of policy (size/value of policy). If any, we find a slight favourable selection of insured among individuals deceased in the age range between 30-60 in the full sample, and a small negative selection among the life insured if the sample is restricted to insured (health and life insurance) only. We argue that adverse selection seems less to have played a part in the decline of mutual benefit societies in the twentieth century.

References

Andersson L. F. and Eriksson L. (2017) Sickness absence in compulsory and voluntary health insurance: the case of Sweden at the turn of the twentieth century, Scandinavian Economic History Review, 65:1, 6-27.

Andersson, L. F. and Eriksson, L. Compulsory Public Pension and the Demand for Life Insurance: The Case of Sweden, The Economic History Review, Volume 68, (2015) Issue 1, pages 244–263.

Beito, D. (1999) To advance the "Practice of Thrift and Economy": fraternal societies and social capital, 1890-1920. Journal of Interdisciplinary History, 29 (4)

Beito D., 2000. From mutual benefit to the welfare state: Fraternal societies and Social Services, 1890-1967. University of North Carolina Press, Chapel Hill.

Cordery, Simon. Friendly Societies, 1750–1914. London: Palgrave Macmillan, 2003.

Daifeng, H. (2009) The life insurance market: Asymmetric information revisited, Journal of Public Economics 93 (2009) 1090–1097

Emery, H. C. j. (1996) Risky business? Nonacturial pricing practices and the financial viability of fraternal sickness insurers, Explorations in Economic History 33, 195-226.

Eriksson, L. (2014). "Beneficiaries or policyholders? The role of women in Swedish life insurance 1900-1950". *Business History.* Vol. 56, nr 8, 1335–1360.

Finkelstein A. and Poterba, J. (2004) Adverse Selection in Insurance Markets: Policyholder Evidence from the U.K. Annuity Market, Journal of Political Economy, 2004, vol. 112, no. 1, pt. 1

Gottlieb, D. (2007). Asymmetric information in late 19th century cooperative insurance societies. *Explorations in Economic History*, 44, 270–292.

Harris, T. and Yelowitz, A. (2014) Is there adverse selection in the life insurance market? Evidence from a representative sample of purchasers, Economic Letters 124 (2014), 520-522

Hedengren and Stratmann, (2016) Is there adverse selection in life insurance markets? *Economic inquiry,* Vol. 54, No. 1, January 2016, 450–463

He, D. (2011) Is there dynamic adverse selection in the life insurance market? *Economics Letters* Vol. 112, Issue 1, July 2011, Pages 113-115.

Hemenway (1990) Hemenway, D. (1990) Propitious Selection, *Quarterly Journal of Economics,* 105(4), 1990, 1063–69.

Leeuwen, M. H. D (2016(Mutual insurance 1550-2015, From Guild Welfare and Friendly Societies to Contemporary Micro-Insurers, Palgrave studies in the history of finance.

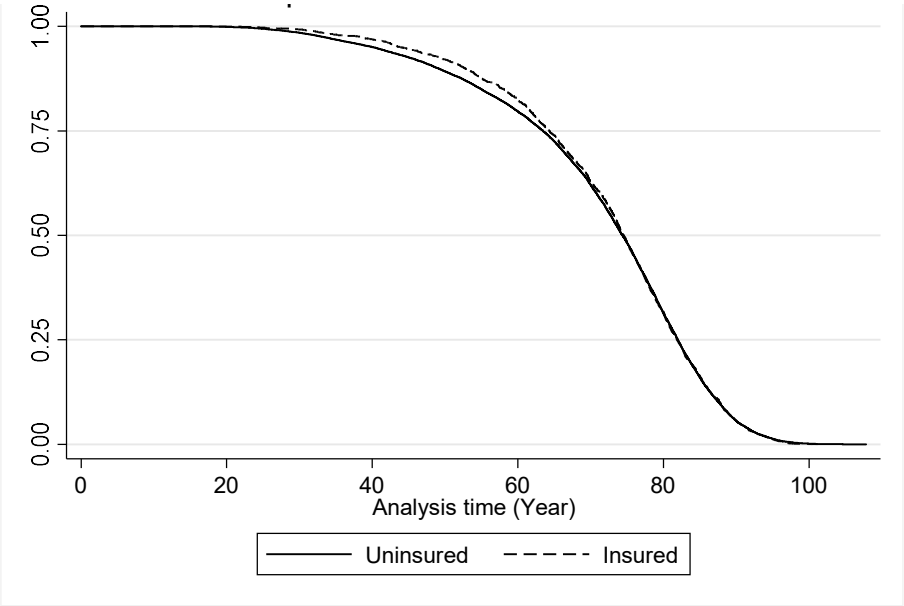
Lindeberg, G. (1949). Den svenska sjukkasserörelsens historia [The Swedish history of health insurance societies]. Lund: Carl Bloms boktryckeri AB.
Murray, J. E. (2003). Sick insurance claims as morbidity estimates: Sickness or absence? Journal of the *Society for the Social History of Medicine*, 16(2), 225–245.
Murray J. E. Workers absenteeism under voluntary and compulsory sickness insurance: Continental Europe, 1885-1908, Research in Economic history, vol. 23, 177-207.
Murray, J. E. (2011) Asymmetric information and countermeasures in early twentieth-century American short-term disability microinsurance, The Journal of Risk and Insurance, vol 78. No. 1, 117-138.
Murray, John E. Origins of American Health Insurance: a History of Industrial Health insurance societies. New Have & London: Yale University Press, 2007.
Nicholson,W., and C. Snyder. IntermediateMicroeconomics: and Its Applications. Mason, OH: Cengage Learning, 2009.
Perloff, J. M. Microeconomics. Boston: Pearson Addison-Wesley, 2004.
Rothschild, M. and Stiglitz, J. (1976) An Essay on the Economics of Imperfect Information, *Quarterly Journal of Economics* 90: 629-649.
Rydbeck, K. (1995) Nykter läsning: den svenska godtemparrörelsen och litteraturen, 1896-1925, Uppsala.
Riley, J. C. (1997). Sick, not dead: the health of British workingmen during the mortality decline. Baltimore, Md: The Johns Hopkins University Press.
Smith, B. D., & Stutzer, M. J. (1995). A theory of mutual formation and moral hazard with evidence from the history of the insurance industry. *Review of Financial Studies*, 8(4), 545–577.
Statistiska centralbyrån (1919) Registrerade sjukkassor 1916. Sveriges officiella statistik.
Svenska folkets sjukkassa, Medlemsmatrikel 1-5000, 1903-, D1:1. Landsarkivet i Östersund.
Svenska folkets understödsförening 1-5000, 1903-. Landsarkivet i Östersund.
Sveriges dödbok 7 [Swedish Death Index], 1860-2016, version 7, Sveriges Släktforskareförbund, 2018.

Table 1. Variable definitions and summary statistics by uninsured and insured in longitudinal sample

Variables				Uninsured				Insured			
Code	Variable	Description	Unit	min	mean	max	st.dev.	min	mean	max	st.dev.
AGE	Age at death	Age at point of death in	Year	16.8	71.2	107.8	15.1	18.7	72.0	101.2	13.9
INS	Insured	Insured =1, 0 otherwise	Share insured (%)	0	0	0	0	100	100	100	0
SEX	Sex	Male =1, 0 otherwise	Share male (%)	0	76.4	1	42.5	0	76.4	100	42.5
MIG_a	Migrated from parish	Migrated from parish =1, 0 otherwise	Share migrated (%)	0	73.2	1	44.3	0	85.3	100	35.5
MIG_b	Migrated from region	Migrated from county =1, 0 otherwise	Share migrated (%)	0	29.9	1	45.8	0	46.8	100	49.9
IC	Insurance penetration	Insured as share of population in district in 1905	Share of population insured (%)	0	9.7	27.9	10.4	0	9.7	27.9	10.4
ED	Early deceased	Deceased within 2 years of insured =1, 0 otherwise	Share of insured (%)					0	1.3	1	11.3
LAPSE	Lapse	Voluntary termination =1, 0 otherwise	Share of insured (%)					0	47.9	1	50.0
SIZE	Premium size	Premium class (four classes)	Class 1-4					1	2.0	4	0.6
HINS	Health insurance	Health insurance =1, 0 otherwise	Share of insured (%)					0	33.7	1	47.3
HLINS	Health and life insurance	Health and life insurance =1, 0 oterwise	Share of insured (%)					0	66.3	1	47.3
Observations (N)					18,217				2,062		
Time at risk (N)					1,145,010				148,446		

Source; Svenska folkets sjukkassa; Svenska folkets understödsförening; Sveriges dödbok 7.

Figure 1. Kaplan-Meier survival estimates among insured and uninsured.



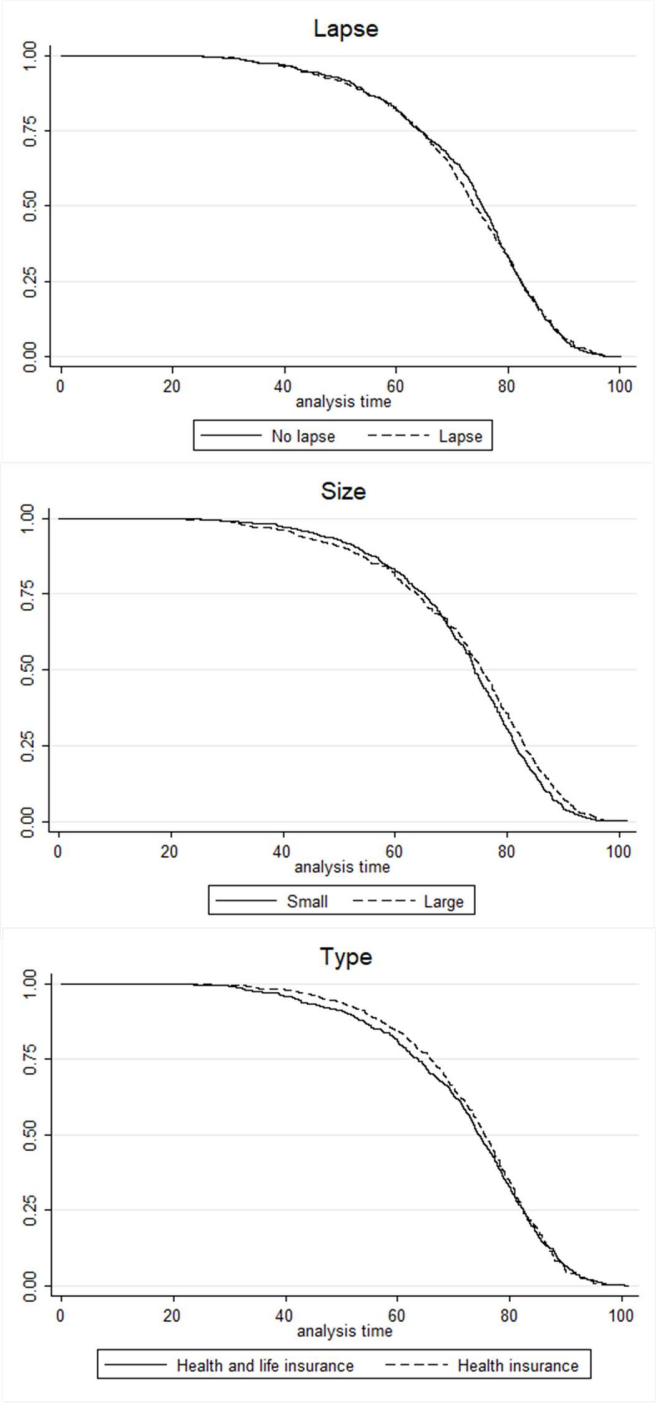
Source: See table 1.

Table 2. Coefficient estimates of cox-regression on the impact of insurance on mortality.

	Full sample				Restricted sample (Deceased between 30-60 years of age)			
VARIABLES	(1)	(2)	(3)	(6)	(7)	(8)	(9)	(12)
Insured	-0.00184	-0.00407	0.00252	0.0136	-0.119**	-0.114**	-0.0986*	-0.140*
	(0.0227)	(0.0227)	(0.0229)	(0.0300)	(0.0563)	(0.0558)	(0.0570)	(0.0776)
Sex		0.183***	0.177***	0.205***		-0.108**	-0.109**	-0.0970**
		(0.0179)	(0.0179)	(0.0187)		(0.0429)	(0.0430)	(0.0433)
Migrated from parish			-0.111***	-0.0921***			-0.185***	-0.154***
			(0.0185)	(0.0188)			(0.0434)	(0.0439)
Migrated from region			0.0388**	0.0439**			0.0252	0.0329
			(0.0172)	(0.0173)			(0.0394)	(0.0398)
Insurance penetration				-0.0649				0.394
				(0.213)				(0.546)
Insurance penetration # Uninsured				-0.00438				-0.642
				(0.225)				(0.574)
Observations	18,148	18,148	18,148	18,148	3,377	3,377	3,377	3,377

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Source: See table 1.

Figure 2. Kaplan-Meier survival estimates by lapse, size and type of insurance.



Source: See Table 1.

Table 3. Coefficient estimates of cox-regression on the impact of lapse, size and type of insurance on mortality.

VARIABLES	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
Voluntary lapse	-0.00418			-0.000200	-0.00522			-0.00328	-0.00322
	(0.0443)			(0.0445)	(0.0443)			(0.0444)	(0.0444)
Size of policy		-0.0581		-0.106**		-0.0412		-0.106**	-0.0982
		(0.0441)		(0.0521)		(0.0445)		(0.0519)	(0.0889)
Health insurance			-0.0316	-0.0915*			-0.0727	-0.132**	-0.136**
			(0.0446)	(0.0525)			(0.0458)	(0.0530)	(0.0665)
Health and life insurance # Size of policy									-0.0108
									(0.109)
Sex					0.156***	0.152***	0.173***	0.176***	0.176***
					(0.0541)	(0.0543)	(0.0555)	(0.0554)	(0.0555)
Migrated from parish					0.105	0.0958	0.120*	0.108	0.108
					(0.0675)	(0.0681)	(0.0671)	(0.0675)	(0.0674)
Migrated from region					-0.0785*	-0.0788*	-0.0781	-0.0771	-0.0767
					(0.0475)	(0.0475)	(0.0477)	(0.0477)	(0.0481)
Observations	2,062	2,062	2,062	2,062	2,062	2,062	2,062	2,062	2,062

Note: Robust standard errors in parentheses. *** p<0.01, ** p<0.05, * p<0.1
Source: See table 1.