



<http://www.diva-portal.org>

Preprint

This is the submitted version of a paper published in *Scandinavian Economic History Review*.

Citation for the original published paper (version of record):

Andersson, L F., Liselotte, E. (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

<https://doi.org/10.1080/03585522.2016.1274677>

Access to the published version may require subscription.

N.B. When citing this work, cite the original published paper.

Permanent link to this version:

<http://urn.kb.se/resolve?urn=urn:nbn:se:umu:diva-130349>

Sickness absence in compulsory and voluntary health insurance: The case of Sweden at the turn of the twentieth century

Lars Fredrik Andersson, Umeå University

Liselotte Eriksson, Umeå University

Abstract

At the turn of the twentieth century, Swedish health insurance was organised according to the Western European models of both voluntary, 'fraternal' principles and compulsory, 'factory scheme' principles. In this paper, we trace the characteristics of both organisational forms, and compare the sickness absence by considering the role of risk selection and mitigation across a large panel of voluntary and compulsory health insurance societies operating in Sweden between 1900 and 1910. We find that voluntary societies used a wide set of rules and practices in order to select and monitor members in order to keep down the number of sick cases. Compulsory societies applied shorter waiting periods and offered more medical treatment, leading to more frequent but shorter sickness absences.

Keywords: Health insurance, Sickness absence, Developing economies, Voluntary insurance, compulsory insurance

Acknowledgments

The paper has benefited from comments and criticism from the editor and anonymous referees. We gratefully acknowledge the financial support received from Umeå University through the grant 'mobility and regional development' and for support for the projects: Forte, 'Sociala normer och sjukförsäkring' and the Swedish Research Council 'Efficiency and equality in private and public insurance'.

1. Introduction

In the emerging industrial wage labour market, loss of income due to sickness was one of the greatest risks to the wage-earner's standard of living during the 19th and early 20th centuries (Horell & Oxley, 2000; Harris et al., 2012). As a response to this, mutual societies designed so as to aid their members in the event of sickness or death were established throughout the Western countries in the 18th and 19th centuries (Emery & Emery, 1999). Figures from the UK and the US show that the co-operative self-help movement included a substantial part of the workforce at the turn of the 20th century (Riley, 1997; Beito, 1999; Horell & Oxley, 2000). In Sweden, the share of health insured in the workforce increased by 50% between the years 1901–1910; from 14% in 1901 to 30% in 1910 (Eriksson & Andersson, 2016). According to a cost-of-living survey covering the years 1913–14, 82% of urban working class households had health insurance coverage, while self-employed farmers and others less dependent on mitigating the loss of wage income were covered to a lesser extent by health insurance (Socialstyrelsen, 1919).

There are parallels between the historical mutual health insurance societies and today's establishment of community-based mutual health insurance pools in low income countries. These systems, based on mutual aid, reciprocity and solidarity are, according to Jütting (2000), the most important alternatives to state or market-based insurance. Hence, a wave of community-based mutual health insurance initiatives has swept across Africa, Asia, and Latin America during the last decades (Jütting, 2005). Both the historical examples and today's mutual pools, arose as a response to a situation where public health programmes and/or market-based health systems were absent or are proving to be inadequate to meet the population's needs (Jütting, 2000; Hsaio, 2001).

While today's mutual health insurance initiatives are mostly based on voluntary principles, the emerging Swedish health insurance market was based on a mix of different mutual

organisations. The European forerunners in mutual health insurance, such as Britain and Germany, greatly influenced the mutual principles of organising health insurance in Sweden (Lindeberg, 1949). One of the most important differences in organisational structure between health insurance societies was between compulsory health insurance societies and voluntary health insurance societies (henceforth 'compulsory societies' and 'voluntary societies'). Previous studies have shown that the two forms had implications for sickness absence (Murray, 2003).

Voluntary societies were based on the ideas of help-to-self-help that became prevalent in the social liberal era of the mid-19th century. As a contrast, compulsory societies emanated from more traditional, patriarchal workplace relations between employer and employee (Lindeberg, 1949). Since all workers became members, compulsory societies reduced the risk of adverse selection by including all workers in a workplace (Murray, 2003; 2007). According to Emery and Emery (1999), voluntary societies had to handle a substantial risk of adverse selection, since unhealthy people are expected to have a greater incentive than healthy people to purchase insurance.¹ However, due to efficient monitoring and selection, but also trust and social control, voluntary societies were able to reduce not only adverse selection, but also moral hazard (Smith & Stutzer, 1990; 1995).

Based on a study of compulsory German *Knappschaften*, Guinnane and Streb (2011) argue that such societies faced difficulties in simulation. The compulsory membership may have played down the monitoring advantages of self-help organisations that were based on trust and social proximity and accompanied by the risk of social sanctions. Furthermore, in compulsory societies with only employees as members, employers might have had additional incentives to keep employees healthy, compared to voluntary societies with a more diverse

¹ Unhealthy people will face the same cost, but receive greater benefits than healthy people unless such differences in risk are priced correctly.

selection of members. This may have influenced the ways that benefits such as medical treatment and income compensation were provided and applied so as to mitigate sickness absence. A review of the effects of community-based health insurance in developing countries made by Ekman (2004) indicates that mutual health insurance pools, which are mostly voluntary in their organizational form, do not result in higher quality health care. In relation to this, our study provides an historical example of whether a compulsory system might have involved incentives other than voluntary systems that might have influenced sickness duration. Research further argues that the size of the risk-pool in mutual health insurance pools in low-income countries is often too small, which makes them vulnerable to adverse selection problems (Atim, 1999). By investigating the impact of size on adverse selection in historical health insurance societies, this study might inform researchers but also those with an interest in developing economies when it comes to understanding the determinants that have the potential to contribute to a more successful health insurance system. Hence, the subject of this paper deals with current questions of modern society that involve both aspects of ideology, economic efficiency and the role of the state and the market. This study aims to investigate whether the choice of voluntary or compulsory principles of underwriting and mitigating risk impacted on sickness absence in Swedish occupational health insurance societies at the turn of the 20th century.

In addressing this issue, we will trace the characteristics of the two organisational forms and compare sickness absence by considering the role of risk selection and risk mitigation in line with the following three questions; (i) How did organisational form affect the control and selection of members? (ii) How did organisational form affect the level of sickness benefits, and how did the level of benefits affect sickness absence? (iii) Did organisational form make a difference in medical treatment mitigation outcomes?

The empirical analysis is based on Swedish voluntary and compulsory health insurance societies operating in the early 20th century – a time when the Swedish health insurance system was expanding rapidly both in terms of members and number of societies. Health insurance societies were at that time commonly organized according to occupation/ workplace, gender and social proximity – such as fellowship or affiliations based on religious, temperance or other popular movements. To compare the two organisational forms, we focus on occupational-based health insurance societies (42% of all health insurance societies). The analysis is based on qualitative archival records and quantitative statistical reports. We will provide narrative examples in order to identify strategies and measures for reducing moral hazard and adverse selection, but rely on econometric analyses to examine the role of organisational form.

Although a number of studies have attempted to examine differences in morbidity rates by organisational form, the investigations have mainly been conducted on an aggregated level (Murray, 2003). Our paper offers the potential to move beyond the aggregated level and compare compulsory and voluntary principles at the level of individual societies. By using data on a large set of individual occupational societies, this study can trace more specifically the mechanisms that can help to explain variation in sickness absence across organisational form, and thereby contribute to a broader understanding of this division in European mutual health insurance (Murray, 2003).

The remainder of the paper is organised as follows. Section two shows on the development of Swedish occupational health insurance societies in the late 19th and early 20th centuries.

Section three outlines the principles and characteristics of voluntary and compulsory societies.

Section four gives an account of the selection of risk across organisational form. Section five

provides an analysis of the relation between benefits and reported sickness. Section six

addresses medical treatment, while the conclusions are given in section seven.

2. The evolution of Swedish occupational health insurance societies

In Sweden, the rise in the demand for health insurance and the establishment of numerous societies took place at the turn of the 20th century – a period of rapid industrialisation and urbanisation (Lindeberg, 1949).² Workers who left the social safety net of the agricultural society primarily drove the demand for health insurance and the establishment of health insurance societies, but employers who had incentives to be concerned about their employees' health and absence from work also assisted in establishing occupational societies.

Occupational health insurance societies were the most common form of organization (42% of all health insurance societies) in Sweden 1901–10. Within that form of organization, voluntary societies were the most common and the most popular. Due to a higher rate of entry and growth between 1901 and 1910, the number of societies and members increased more rapidly among the voluntary societies. The voluntary share (of all occupational societies) rose from 57% to 76%, and the share of members increased from 49% to 71% between 1901 and 1910 (Kommerskollegii, 1901–1910). This might be due to the fact that compulsory societies almost exclusively recruited new employees as members, while voluntary societies could have a broader target group than only employees at a single workplace. Additionally, the interest among employers to start-up new compulsory societies may have been reduced by the parliamentary discussion on the prohibition of compulsory societies. In the Law of Registered Health Insurance Societies that came into force in 1910, compulsory health insurance societies were prohibited, and employers could no longer force employees to join the workplace's society. It seems less likely that the change in organizational structure was due to

² Sickness funds were most common in urban areas. 52.2% of all sickness fund members were situated in cities in 1909. The sickness funds established in the countryside were largely situated in municipalities or connected to factories or mills (Lindeberg, 1949).

changes in employment or occupational structure in the economy at large. The reduction in numbers of members and societies took place across all occupations/industries 1910 (Kommerskollegii, 1901–1910). Economy-wide changes in non-agriculture employment structures by industries were small during the time period. As shown in the historical national accounts (Schön & Krantz, 2015), the largest relative changes took place in building and construction (a reduction in employment share by 3% between 1901 and 1910).

A few of the voluntary societies were old (founded in the 18th century), but most were founded from the 1860s onwards. Many were founded in the early 20th century. Compulsory societies on the other hand were only established from the late 1860s onwards. One reason for the compulsory societies being younger might be that they to a great extent were dependent on the survival of the industry connected to them (Bohman, 1994). In mill towns, the mill owner often introduced institutions with similar functions (Rydén, 1990).

Occupational health insurance societies evolved all over Europe in the late 19th century but developed different characteristics. As a contrast to America, France³, Denmark and Britain, the Swedish system of occupational health insurance societies comprised both voluntary and compulsory societies (Murray, 2007). Membership was compulsory in 30% of the occupational societies in Sweden on average between 1901 and 1910 (Kommerskollegii, 1901–1910).⁴

Swedish occupational health insurance societies have their origin in the German compulsory health insurance societies *Knappschaften*. According to Lindeberg (1949), who has written a monograph on Swedish health insurance societies, German miners introduced health

³ In France, only miners were to be compulsorily insured (Murray, 2007).

⁴ Sickness insurance in the case of loss of income was the foundation of the business of Swedish occupational health societies, although they could also provide medical support, for wives and children too, burial insurance and a small pension in the case of invalidity or old age. In some compulsory societies, only a certain part of the workforce was permitted in the society, excluding less skilled workers.

insurance societies in the mining districts in Sweden in the 16th and 17th centuries. In 1884, one-third of all Swedish workers employed in iron mills had health insurance (Arbetareförsäkringskommittén, 1889). The concept of *Knappschaften* and the idea that the employer needed to provide social security for their employees also connects to the development of compulsory societies in Swedish mill towns from the 1600s. Mill towns often functioned as small independent units and were organised along patriarchal principles. The mill owner could supply the workers and their families with services such as schooling and medical assistance, and widows and orphans of workers could be provided for. On the other hand, the workers were in the hands of the mill owner, who often owned the tied cottages and could put workers in debt in different ways to prevent them from leaving their employment (Rydén, 1990).

The measures by mill owners and employers in industrialised mills and other workplaces later to introduce compulsory societies were in many cases a way to conform with the patriarchal regulations of 1847 and 1871 that implied that employers had a supportive duty to their employees, namely to watch over their 'health, virtuousness and godliness', as long as the employment lasted (Arbetareförsäkringskommittén, 1889). Since the accident frequency in mining and basic metal manufacturing was high, the employer could, by establishing health insurance societies at the workplace, transfer some of this responsibility onto the employees. Furthermore, while membership in a compulsory society often ended if the employee left the workplace, the employer could effectively bind skilled workers to the company and reduce the negative effects of too large a labour force mobility (Lindeberg, 1949). Several compulsory societies also applied penalties⁵, such as deductions in salary for employees who

⁵ Voluntary societies could use penalties in the cases when the rules of the society were infringed. The penalties were larger in compulsory societies, but the difference is not significant. The penalties were on average between 0.20–0.40 SEK per member and the average premium was on 10.27 SEK.

arrived late, which were collected in a fund to benefit the operation of the society or '[...] the society or widows and children at the workplace'.⁶ An important example of the more all-encompassing strategy of compulsory societies in relation to members/employees was the more frequent use of medical treatment by a company doctor, besides compensation for the loss of income. The existence of a company doctor implied that the insured members were deprived of the right to choose their doctor themselves. To choose a doctor in the case of sickness was, according to Lindeberg (1949), a very important issue for health insurance members, since the objectivity of the company doctor was often questioned.

With the 1901 *Workplace Accident Act*, more responsibility for compensation was put on the employer. To reduce the financial consequences of the 1901 act, employers supporting compulsory societies argued that this support should be deducted from the compensation that the company was obliged to pay employers suffering from work-related accidents. According to Lindeberg (1949), some compulsory societies reduced the period for which employees were entitled to sick benefits, because of the additional costs the Workers Accident Act put on employers. Societies like the one at Örebro's wool factory paid the same benefit as usual, on the condition that liability for the accident compensation that the worker received was passed on to the compulsory sickness fund (Lindeberg, 1949). The regulation of work-related accidents resulted in an increase in the establishment of compulsory societies at the turn of the 19th century, since it became a convenient way to handle payments to those employees who were entitled to accident insurance.

The Swedish voluntary societies were more influenced by the British friendly societies and the help-to-self-help movement than the compulsory societies, but also had an old tradition

⁶ Riksarkivet, Stockholm (RA), Socialförsäkringskommittén. Sjukkasestadgar mm. 320147, vol. 28: 1915:

'Stadgar för Tumpa bruksarbetares begravningskassa'.

within the guilds. Voluntary societies gathered together groups of people with other things in common than just the workplace, such as friendship, region or popular movement.

It was common that the employer supported both compulsory and voluntary occupational societies financially, although compulsory societies were receiving more financial support (Arbetareförsäkringskommittén, 1889). Lindeberg (1949) argues that the role of the company or employer in the control and operation of the society could be controversial. In cases where there were voluntary societies at a particular workplace, it was common that employers wanted the societies to take over the responsibility when it came to checking that members were in fact sick and distributing sickness benefits. In some cases, the employers also wished to turn the voluntary society into a compulsory society (Lindeberg, 1949). Voluntary societies were mostly anxious to remain independent of the employer, since they feared that too great an influence by the employer could result in negative reforms and fewer benefits for the members. In some compulsory occupational health insurance societies such as the *Lomma* cement factory and *Höganäs* pottery factory (Lindeberg, 1949; Wiklund, 1939), it took several years before employees were allowed to be chairmen and board members and, in the case of trade-union conflicts, strikes and lockouts, the society was in the hands of the employer (Wiklund, 1939). Other voluntary societies, on the other hand, actively applied for financial support and involvement from the employer (Bohman, 1994).

Unlike the US experience, the labour unions that offered health insurance did not manage to attract the masses in Sweden. At the turn of the 20th century, only 2% of all members were organised in union-based societies in Sweden (Murray, 2007; Edebalk, 1987). The labour union societies were, with very few exceptions, voluntary and often established both as a means to attract union members and also as a response to the compulsory societies that were often run in the interests of the employer or company (Lindeberg, 1949).

Hence, in Sweden, in contrast to e.g. Britain and Germany, the employer could be the founder of a society at a particular workplace, but the society could still be voluntary for employees, although this was rarer (Bohman, 1994). There could be two health insurance societies operating at the same workplace, one established by the employer and one by the employees.⁷ Furthermore, some employers demanded only that the employees were insured in a health insurance society, not necessarily in a workplace specific compulsory society. Hence, in some cases voluntary and compulsory societies could both be founded and governed by members or employers, and both organisations could receive employer support.⁸

The diversity of Swedish occupational health insurance societies might be due to Swedish health insurance societies not only being influenced by German customs, but also by British friendly societies. Lindeberg (1949), in his work on Swedish health insurance societies, shows how Swedish health insurance societies copied the regulations of British friendly societies. Cordery (2003) defines British friendly societies as 'workers' voluntary associations which primarily supplied insurance benefits, which could and often also did provide conviviality [...] (p. 8). Hence, the Swedish occupational societies could entail conviviality and voluntarism and have the character of a fraternity (*Brödraföreningens sjuk- och begravningskassa*, 1932), as well as being compulsory and run and governed by the employer.

⁷ RA, Socialförsäkringskommittén, Sjukkestadgar mm. 320147, vol. 28: 1915: 'Festskrift till sjukkasserörelsens i Finnsång 100-års jubileum'.

⁸ Besides the support from employers, both compulsory and voluntary societies often received donations from philanthropists, but also from the local parish. In some cases, societies viewed it to be the local parish's obligation to support the society financially. The health insurance society for workers in Grycksbo received support from the local parish, but it also demanded support from a parish close by, since the society had members from that parish as well (Bergström, 1999).

However, despite the fact that Swedish voluntary and compulsory societies shared many similarities, there were important organisational differences that might have influenced members' access to benefits and members' sickness absence.

3. Regulations and strategies to control and select members

To trace the guiding principles for selecting and controlling members across organisational forms in Swedish health insurance, a wide set of policy charters collected by the *Social Insurance Committee* in 1915 have been examined together with monographs of health insurance societies. Descriptive statistics on another 512 policy charters of registered Swedish health insurance societies between 1901 and 1910 have been collected in order to investigate formal differences regarding organisation and regulation (Kommerskollegii, 1901–1910).⁹ Previous research argues that the voluntary principle could encourage adverse selection, since voluntary health insurance societies always had to deal with a higher demand for health insurance among those with the poorest health, since it would be advantageous for the sick and elderly to join (Murray, 2007; Leeuwen, 2012).

On the other hand, compulsory societies could effectively avoid adverse selection by including every employee at a workplace (unless the workplace itself faced adverse selection).

⁹ The sample encompasses in total 847 societies across the country. To examine organisational form, we are, however, forced to restrict the sample to societies supplying policy charters. After imposing that restriction, the data covers 512 societies, of which 145 are compulsory. Most of the societies are in operation for 7 years or more, and only a few are active for only one or two years. The distribution of T is fairly similar for voluntary and compulsory societies and, for our sample of societies in comparison to the population of societies. A comparison between societies included in the sample and the population shows that the distribution of T is similar. For a few individual variables, the sample data differed from the population as a whole. When running t-test for all variables, we find that the sampled societies were significant younger (15.3 compared to 18.0) and larger (236 compared to 205). For the other variables, no significant differences were identified.

In their study of German *Knappschaften*, Guinnane and Streb (2011) argue for the advantageous compulsory principle of including all employees in order to reduce adverse selection. Although adverse selection was largely avoided, the authors find evidence of *Knappschaften* instead facing major problems with simulation and moral hazard (Guinnane & Streb, 2011).

Table 1 shows the formal rules put forward in the policy status by organisational form in Swedish occupational sickness societies between 1901 and 1910. The description shows that voluntary societies imposed stricter age limits than compulsory societies, and that the time before benefits could be claimed was longer; 90 days on average for new members in voluntary societies and 61 days for new members in compulsory societies. Voluntary societies also imposed stricter rules on waiting times. Members in voluntary societies had to be sick for more than 7 days before claims could be made, while compulsory societies demanded only 2 days.

Voluntary societies further offered significantly higher benefits to cover income losses. The minimum benefit per week was substantially higher, whereas the maximum benefit was only somewhat higher. Also, when comparing the benefits from the financial accounts, voluntary societies offered significantly higher benefits.¹⁰ The difference in compensation levels within societies was less among members. For incumbent members, voluntary societies offered a more egalitarian principle for sharing benefits and a more advantageous benefit to premium ratio. In order to reduce the risk of adverse selection, voluntary societies imposed stricter limits on receiving benefits for new compared to incumbent members. The guiding principles recognised in the policy charters support the claim that voluntary funds applied proactive

¹⁰ To compare benefits across time and space is expressed in real terms with the 1905 price level of Stockholm as reference year/place. The fixed price calculations are based on cost-of-living-standard indices constructed for each city between 1901 and 1910. The cost-of-living includes prices for food stuff, fuel and rent (Kommerskollegii, 1904–1912; Socialstyrelsen, 1919; 1933).

measures in order to reduce the risk of adverse selection when recruiting new members. The female membership rate was higher in compulsory societies, which illustrates the fact that women more were often formally excluded from joining voluntary societies, since these were more often based on fraternalism and club-like characteristics.

Nekby (2004) argues that *ex post* premiums predominate in groups with long-term relationships.¹¹ Societies based on *ex post* premiums are expected to impose stronger measures to control for moral hazard. In line with Nekby's argument, we find that voluntary societies were to a significantly higher extent based on *ex post* premiums. The larger size of compulsory societies could, as Guinnane and Streb (2011) argue, imply that a worker would be less likely to feel strongly that abusing the system was hurting someone to whom they had close social ties, which would imply a higher level of sickness reporting and moral hazard. The qualitative account of policy charters of occupational societies shows that generally speaking, the majority of all occupational societies excluded the chronically ill, and hidden diseases were still grounds for exclusion.¹²

Voluntary societies, in particular, applied age limits and asked for a doctor and/or priest's certificate in order to reduce the risk of adverse selection. There was more often a lack of age limit, or demands for a doctor's certificate or recommendations from other members for joining, in compulsory societies' policy statements.¹³ The explanation for this is that, in compulsory societies, a health screening was usually conducted in conjunction with the

¹¹ About half of the Swedish occupational health insurance societies based their underwriting on *ex post* premium payments.

¹² RA, Socialförsäkringskommittén, Sjukkestadgar mm. 320147, vol. 28: 1915: 'Stadgar för Skromberga Arbetares Fortsättningskassa'; 'Stadgar för Tumpa bruksarbetares begravningskassa'. See also Lindeberg 1949, p. 151.

¹³ RA, Socialförsäkringskommittén, Sjukkestadgar mm. 320147, vol. 28: 1915: 'Stadgar för Sjukkassan Eriksbergs bryggeris arbetareförbund'; 'Stadgar för Hargs arbetarförenings sjuk- och begravningshjälpkassa'.

recruitment of the employee. Since employers usually employed younger people, who within a given time frame had to join the society, the risk of older members joining the society was reduced (Lindeberg 1949). Some voluntary occupational societies also tried to reduce the risk that young employees postponed their membership in the voluntary society by not accepting members after a certain period of employment.¹⁴

Previous research has acknowledged that risk could be mitigated in societies through social control (Emery, 1996; Emery & Emery, 1999). Hence, voluntary societies often demanded that applicants had to be recommended by an existing member who put his own reputation and membership at risk. The member had to be sponsored by two 'reliable members'.¹⁵ In some cases, it was even specified that someone on the society board should be familiar with the applicant in order to guarantee the good character and the good health of the prospective member (Lindeberg, 1949). A frequent phrase used when selecting new members in voluntary societies was: '[...] the member should be in good health and not have a disorderly way of life so that the solvency of the society is put at risk'.¹⁶ Compulsory societies did not need to consider the attraction of the fund to prospective members as voluntary societies did; therefore, members of voluntary health insurance societies were more closely involved in the selection of new members than those in compulsory health insurance societies. According to the policy statements, voluntary societies were more anxious to secure and reinforce the society's positive image and reputation so as to make it easier to attract new members.

¹⁴ RA, Socialförsäkringskommittén, Sjukkassestadgar mm. 320147, vol. 28: 1915: 'A. B. Borås klädningstygfabriks arbetares sjuk- och begravningshjälpskassa'. See also Lindeberg 1949, p. 152.

¹⁵ RA, Socialförsäkringskommittén, Sjukkassestadgar mm. 320147, vol. 28: 1915: 'Förvaltningsberättelse över Jonserefs sjuk- och begravningskassas verksamhet 1917'; 'Stadgar för Hargs arbetarförenings sjuk- och begravningshjälpskassa'; 'Stadgar för Sandviks sjukkassa'.

¹⁶ RA, Socialförsäkringskommittén, Sjukkassestadgar mm. 320147, vol. 28: 1915: 'Arbetspersonalens sjuk- och begravningskassa vid AB Atlas 1887'; 'Gäddvikens arbetares sjuk och begravningskassa'.

To reduce the occurrence of moral hazard, health insurance societies employed rigorous checks, visiting the reported sick member at home, thus reducing the risk of malingering and ensuring that the member's sickness was not self-inflicted due to hazardous behaviour or drinking or other immoral activities. It was also more common in compulsory societies that a 'company doctor' visited those who reported sick.¹⁷ In voluntary occupational societies, every member had a mandatory duty to regularly act as a 'sickness-controller' and visit the sick member at their home in order to establish that the member was, in fact, sick (Wiklund, 1939; Dahl, 1948). As recognised in a large body of literature, the success of mutual associations was due to the social ties among members that allowed mutual insurers to monitor sickness more intrusively than formal verification applied in a corporate or public setting (Emery, 1994; Emery, 1996; Emery & Emery, 1999; Gottlieb, 2007). By monitoring members through social control together with the threat of social sanctions, members' incentives to act accordingly increased (Emery, 1994; 1996; Gottlieb, 2007). The different organisational strategies by voluntary and compulsory societies might mirror a difference in sickness outcomes.

[Insert table 1 about here]

4. Variation in sickness absence by occupation, age and duration

Our study shows that sickness absence differed by organisational form. Voluntary societies had, on average, lower figures of cases of sickness (19% less than compulsory). In turn, members of compulsory societies had, on average, significantly shorter sick-leave duration. For each case of sickness, members stayed home for 22.3 days, while voluntary members

¹⁷ RA, Socialförsäkringskommittén, Sjukkasestadgar mm. 320147, vol. 28: 1915: 'Stadgar för arbetarnes sjukförsäkring vid Fr. Kurzels Vigognespinneri i Malmö'.

were at home for 23.7 days. Voluntary societies reported a significantly lower figure on sick days per member (6 days) compared to members of compulsory societies (7 days).

One potential reason for differences in sickness absence is selection; the risk of adverse selection and the ability to discriminate high-risk types. Another argument is prudence; a kind of positive self-selection mechanism in which individuals with greater personal responsibility and health have a greater reluctance to join a voluntary health insurance society. In principle, the ability of voluntary health insurers to discriminate between risk-types on the basis of prudence and social proximity might have had economic advantages. Voluntary societies managed to insure relatively homogeneous risks by excluding high-risk types (e.g. heavy drinkers and dangerous occupations), which enabled accurate premium rating, less costly contracts and effective mutual monitoring in order to mitigate asymmetrical information between the insurer and insured (Hemenway, 1990).

As already noted in one parliamentary investigation from the late 19th century, accidents were more common in industries such as mining and basic manufacturing (metal, wood, pulp and paper), whereas workers occupied in service industries faced less risk of accidents. Accidents were one of the reasons for workers to report sick (Arbetareförsäkringskommittén, 1889). By selecting members by industries that faced less risk of accidents and/or had a lower risk of being sick, voluntary societies could benefit from the discrimination of risk types.

Table 2 shows sickness across industry and by organisational form. Both compulsory and voluntary societies were present across all industries, with the exception of wholesale and shipping, where only voluntary societies were present. Most of the members were occupied in basic metal and engineering. Members in compulsory societies were more commonly occupied in the chemical and electrical industries. Voluntary members were more frequently occupied in service and other industries.

[Insert table 2 about here]

In order to indicate the importance of industry sector for sickness absence, we have examined how the total amount of sickness absence is affected if industry weights are changed by organisational form. Compulsory societies have been weighted by voluntary member shares and *vice versa*. When aggregated to the total of all industries, it is shown that the number of sickness cases and sick days is affected by industry structure. When comparing *Total* (the original weights) with *Total adjusted* (when weights are replaced by organisational form), it is shown that sickness cases are reduced (0.34 to 0.32) in compulsory societies when voluntary industry weights are assumed. For the voluntary societies, the number of cases of sickness increases (0.28–0.30), while sick days are only slightly affected (6.01–6.1) if compulsory industry weight is assumed. All other things being equal, the calculation indicates that differences in occupational structure increase the differences in sickness absence rate across organisational forms. The selection of risk from the industry structure indicates a positive selection of risk on behalf of voluntary societies.

Both the selection of members by age and the ageing of members was a concern among health insurers. As shown by the policy charters, age limits were imposed and voluntary societies applied stricter age limits than did compulsory insurers. Screening on the basis of age seems to find its first empirical support in a contemporary investigation conducted by the Swedish life insurer *Svenska lif* in 1906. The investigation shows that members of health insurance societies had, on average, 4 sick days between the ages of 20 and 30. Thereafter, morbidity rates increased up to 5 sick days at the age of 40, and further to 7 at the age of 50. At higher ages, the number of sick days increased even more. At the age interval 60–64, the number of sick days was three times higher than the average among young members (Betänkande, 1909).

A public investigation from the late 19th century shows that most members were young (15–25), and that most members joined in the first years after establishment. Thereafter, most members remained within the same societies throughout their life unless they moved to other places (Arbetareförsäkringskommittén, 1889). It was not until the establishment of nationwide societies in the early 20th century that societies could expand their business by the extensive recruitment of new members over the long term (Lindeberg, 1949). Most societies established in the late 19th century typically expanded the operation in the first 10–15-years after establishment, and grew less thereafter. As societies matured, the age of members increased. Unless a significant drop-out and new recruitment occurred, members aged as the society aged.

To indicate the age structure of Swedish health societies in the early twentieth century, we have compiled age-data for all the Stockholm-based societies with policy status in 1905. The sample includes 103 societies and 54,538 members. The Stockholm-based voluntary societies were significant older (16.7 compared to 15.3) and larger (498 compared to 205) than the national average. The compulsory societies operating in Stockholm were significantly younger (14.0 compared to 15.1) and larger (652 compared to 309) than the national average shown in table 1.¹⁸

When comparing the significantly younger and larger compulsory societies with the voluntary societies, we find that the age distribution of members also differed. Compulsory societies had significantly younger members (32.5 years of age on average) than the voluntary societies (39.2). The share of old members (≥ 50 years of age) was significantly lower among the compulsory societies (10.1%) compared to the voluntary societies (20.1%) on average.

¹⁸ Riksarkivet Arninge (RA), Riksförsäkringsanstalten, Registrerade sjukförsäkringsbyråer, Första och andra sjukförsäkringsbyråer: 'Statistiska redogörelser 1905'.

The age of the society correlated positively with the age of members. A correlation analysis shows that the average age of a society is positively related to the average age of its members (0.40), and to the share of its old members (0.43). It is also shown that the average age and the share of old members was highly correlated (0.91). When comparing the growth rate (change in the number of members from beginning of year to end of year) with the average age and share of old members, a significant negative association is identified (-0.15, -0.18). When running a regression analysis with the average age of members as dependent, we find a significant impact of growth (-0.072**) and age of society (0.23***), and compulsory membership (-6.44***).¹⁹ The analysis suggests that compulsory societies had younger members even if the age of societies was similar to that of voluntary societies in our full sample of Swedish health societies.

Table 3 shows the age distribution among 54,538 members of 103 health insurance societies operating in Stockholm in 1905. Most of the members were between 20 and 40 years of age (60%). In compulsory societies, the share of members of less than 40 years of age was substantially larger than in voluntary societies (74% compared to 60%). Especially the share of members below the age of 25 was larger among the compulsory societies. Members below 20 years of age made up 15% among the compulsory societies, but only 3% of the voluntary societies. Among the old members, it is shown that compulsory societies had only 3% of their members of 60 years of age or older, while 8% of the members of voluntary societies were in the same age range.

[Insert table 3 about here]

¹⁹ When running the model the share of old members as dependent, we identified a significant impact of growth of members (-0.15*), age of society (0.61***), and compulsory membership (-8.21***). The regression analysis based on average age had an Adj R-squared of 0.36, and the model on old members an adj. R-squared on 0.26).

***, **, * denotes significant at the 1%, 5% and 10% level respectively.

To account for the age structure of sickness rates, the average number of sick days is compared with the size of each age class. The difference in age structure between compulsory and voluntary societies corresponds to an increase in sick days from 5.0 to 5.8. Given that the compulsory societies had on average younger members, as our statistical analysis indicates, the age structure would produce higher morbidity rates in the voluntary societies. Taking into consideration the age, growth and organizational form of society, the average age of members is estimated to be 40 years of age in voluntary societies and 34 years of age in compulsory societies. The share of members 50 years or older is estimated as 21% in voluntary and 13% in compulsory societies. All other things being equal, the differences in age structure is expected to correspond to an increase of between 0.6 and 0.8 sick days per annum in voluntary societies in comparison to compulsory societies.

Previous literature has shown that the access to benefits from health insurance affects sickness claims. Limiting access to benefits by imposing stricter rules on the waiting time and duration time may impact both the frequency and duration of cases of sickness. To indicate the potential impact of such limiting measures, we have drawn a random sample (n=1000) from a pool with relatively few time restrictions in order to show the full range of variation in sickness duration. The sample frame is restricted to – one of the largest sickness insurers (1916).²⁰ That society did not impose any waiting time, but used a maximum duration time of 135 days. The frequency of sick cases across the duration range (1–135 days) is clearly positively skewed. Most of the cases of sickness have a duration of ten days or less. The highest frequency is concentrated to 4–6 days (25% of all cases).

²⁰ Riksarkivet, Arninge (RA), Riksförsäkringsanstalten, Första och andra sjukförsäkringsbyrån, Statistiska redogörelser: 'Allmänna sjuk-och begravningskassan 1916'.

All other things being equal, a two-day waiting time will reduce cases of sickness by 1 percent, while a 7 days waiting time would reduce cases by 37% (given the frequency of cases of sickness by sickness duration in the sample.) Imposing a qualifying period, a specific number of days where the member had to be reported as sick before receiving benefits would produce a similar effect. By imposing a six-day qualifying period, the number of cases would be reduced by 31%. Imposing a 90-day qualifying period before receiving benefits, would reduce sick days by 16%. Given the differences in formal rules imposed by voluntary and compulsory societies, it can be shown that, all other things being equal, voluntary societies would reduce the number of sick cases to a greater extent (7%) compared to compulsory societies.

[Insert figure 1 about here]

5. The relationship between benefits and sickness absence

To examine the ability to check for moral hazard and adverse selection, we have examined the relationship between benefit and reported sickness based on the aforementioned sample of 512 Swedish health insurance societies. When conducting the analysis, the basic idea is to examine whether a higher benefit leads to a higher or lower figure of reported sickness. A high benefit will provide incentives for an unhealthy individual to join a society (adverse selection) and at the same time provide incentives for an incumbent member to report sick (moral hazard). In turn, a high benefit will provide incentives for the members of a health insurance society to impose stronger controls on the selection of new members and monitoring of individuals reporting sick. Benefit schedules varied widely between societies. The lowest benefit, as defined in the policy charters, was SEK 2 a week, while the highest benefit was SEK 50 a week. When examining the variation within the panel, it appears clear that most of the variation in benefits takes place between societies (std.dev= 3.44), while less

is taking place within societies (std.dev=0.40). The data does not allow us to distribute the benefits within societies across individuals, forcing us to use the average benefit (for each society/year) as the unit of analysis.

Given that benefits on the one hand provide an incentive to report sick (for the individual) and on the other provide an incentive to keep payments down (for the group), it may be argued that the variable is the outcome of two balancing forces. To check for potential endogeneity of sick benefits, an instrumental-variable regression is estimated (Guinnane & Streb, 2011). To instrument sickness benefits, the variable premium per member adjusted for price differences across time and space (see table 1) was employed. Other instruments considered are public subsidy per member and other incomes per member. The latter two were, however, dropped after being recognised as weak instruments. The premium per member variable meets the criteria for a non-weak instrument.²¹ The instrument is also uncorrelated with the error term. Premium per member share is considered to meet the exclusion restriction, as the impact on the future premium per member, if any, is small for the individual reporting sick.

[Insert table 4 & 5 about here]

²¹ For IV regressions one could consider the correlation between the endogenous regressor and the instrument. In our analysis, the correlation is around 0.5 and highly significant. To test for a weak instrument, one commonly used diagnostic is the F-stat for the significance of an instrument (in the first stage regression of endogenous regressor). A widely used rule of thumb is that an F-stat of less than 10 is a weak instrument. The F-stat we arrive at is above 10 across all of the specifications. A more formal test is proposed by Stock and Yogo (2005). They provide critical values for single endogenous regressors. Based on their critical values from the first regression output, we can reject the null hypothesis of a weak instrument based on our F-stat reported in the first stage regression.

Tables 4 and 5 shows that benefits have a significant and positive impact on sickness (cases, days, duration) when applying an instrumental-variables regression for panel data. The negative sign in the basic fixed (FE) and random (RE) models shows the importance of instrumenting benefits. When comparing the two organisational forms, it is clear that the compulsory societies faced a larger number of reported sick cases, sick days and sick duration in relation to benefits. The result shows that one of the mechanisms making up differences in sickness figures across organisational forms was related to incentives to report sick in relation to benefits, where members of voluntary societies tended to stay home longer but less often compared to the compulsory societies.

When running the basic RE-model, we include controllers for occupation (which is absorbed in the fixed effect) in order to take into account the variation in sickness by occupation reported in Table 2. The result of the RE-model on occupation shows that workers occupied in mining, metal, stone chemicals and forest industries reported more sick days, while the result for sick cases and sick duration is mixed. The figures were higher (if significant) for compulsory societies when comparing sick days. The result by organizational form is mixed for sick days and sick duration.

It should also be noted that the multivariate analysis supports the finding that reported sickness increases with the ageing of society, as suggested by the age structure in Table 3, while the growth in the number of members reduces the morbidity rate. We also find that size, if significant, increases the number of sick days and sick cases.

6. Medical treatment and sickness

An aspect that has been acknowledged as crucial for health and sickness prevention in developing countries is the access to, and quality of, the health care provided by voluntary health insurance schemes (Ekman, 2004). Our investigation shows that compulsory societies

offered on average more than twice the amount of medical treatment (doctor and medical expenses) compared to the voluntary societies (see Tables 1). When examining the impact, we find that medical treatment had a significant, negative association with sickness absence. As shown in Table 4 and 5, the size of the effect was greater among compulsory societies in the IV models, but not in the RE-/FE-models. The mixed result on the size of the effect make it difficult to tell on the relative importance by organizational form.

When scrutinizing the annual reports submitted to the board of trade for the sample of Stockholm-based societies (see Table 3), we have identified that the employer in 38% of all compulsory societies offered free or subsidized medical treatment and medical support in addition to the benefits provided by the health insurance society. Among the voluntary societies, the employer offered doctor/medical benefits in 2.5% of all cases. For the cases where a specified amount is stated, the compulsory societies offered on average a benefit equal to 0.5 SEK per sick day.²² The amount was more than twice the amount for medical treatment on average provided by the compulsory societies (0.26 SEK), as shown in Table 1. The greater use of medical treatment among compulsory societies may be related to the patriarchal traditions that evolved around mill towns, where the employees were granted a certain social security in the case of the sickness or death of the breadwinner, at the expense of loyalty and obedience towards the mill owner. This social security was not in cash benefits; instead medical treatment was provided in the case of sickness and free housing for the widow and children of a deceased worker (Rydén, 1990). Although workers in compulsory societies received medical benefits to a greater extent than workers in voluntary societies, compilations of archives of health insurance societies in different regions show that there were downsides

²² RA, Riksförsäkringsanstalten, Registrerade sjukförsäkringsbyråer, Första och andra sjukförsäkringsbyråer: 'Statistiska redogörelser 1905': 'Af arbetsgivaren har direkt, utan kassans förmedling, bestridts läkarevård och medikamenter för delägare af kassan till belopp af:...

to the system (Bohman, 1994; Lindeberg, 1942; Carlsson, 2002). The influence of workers in compulsory societies on the administration and regulations of the society was generally much more marginal than in voluntary societies. The employer often ran the society and decided on benefit levels. What is more, as previously mentioned, employees had to pay a fine if they were late or did not behave in accordance with the regulation of the workplace, and the fines often went to the society (Lindeberg, 1942; Bohman, 1994). In the case of strikes, voluntary societies tried to keep up their business and support sick strikers, while compulsory societies often refused pay-outs to strikers. According to Eriksson (2015), workforce and migration mobility were more common among skilled workers in late nineteenth-century Sweden. Compulsory societies could present an obstacle to workplace mobility, since they did not support labour force mobility, while the membership and investments made in the society usually ended with the employment. Voluntary societies tried, to a greater extent, to resolve the issue with workers leaving an employment or area (Bohman, 1994). Lindeberg writes, as previously mentioned, in his large work on Swedish health insurance societies that there was a 'highly valued right' among members to be able to choose a doctor in case of sickness. The reason for this was that the company doctor was commonly viewed as working in the interest of the employer and not in the interest of the sick member. Employees claimed that the company doctor was more loyal to the interests of the employer than to the interests of the sick employee. Workers running voluntary societies seem to have preferred cash benefits and the opportunity to choose a doctor of their own when sick.

Gösta Carlson, previously active in the Swedish health insurance movement, argues in his monograph on health insurance societies in Gothenburg that members in occupational societies appeared to. '[...] have been less aware and less informed by the idea of mutuality and help-to-self-help, since members of occupational societies did not join the society of their own free will.' Voluntary societies usually had monthly meetings when the membership

contributions were collected, and the annual meeting was often followed by a festivity which increased the social affinity between members, according to Carlson (2002). The voluntary society Färentuna Worker's Health Insurance Society, for example, started a band and arranged picnics. Carlson ranks the voluntary choice of joining a health insurance society as morally superior to the compulsion of compulsory societies where the contributions were deducted from the salary and the worker's influence on the operation of the society was limited. Membership in a voluntary society was instead a responsible act and a sign of independence and personal maturity.

The higher frequency of sick cases in Swedish compulsory societies might be explained by the lack of social affinity and mutuality, which might have involved a higher risk of moral hazard. The lack of mutuality and social affinity in compulsory societies, but also the fact that compulsory societies on average had more members than voluntary societies, implied that members to a larger extent felt they could overuse the system, since it affected no one to whom they had real social ties. This argument is supported by several previous studies showing, the importance of social proximity, size and social control in mitigating moral hazard (Guinnane and Streb, 2011).

Additionally, medical treatment and the use of a company doctor for treating the employees could explain the, on average, shorter sickness length in compulsory societies, since a doctor employed by the company might have had incentives and even instructions from his employer to limit the sickness length of employees, as a contrast to any other doctor chosen and paid for by individual employees.

However, medical treatment in compulsory societies could also have been a strategy by the employer to ensure that the employee received medical care and could, therefore, recover faster and return to work. In this case, we should find higher medical benefits in societies with high-risk workers, but also in societies with skilled workers, since they might be harder to

replace. However, societies in industries with a high risk of accidents and sickness, such as mining, did not offer free medical treatment (according to the registers) to a greater extent than industries with lower sickness- and accident *risk*.

The risk that free medical treatment could involve an adverse selection of members in compulsory societies cannot be ruled out. Less healthy workers might have been more interested in an employment at a workplace offering free medical care than healthier workers, which might have caused adverse selection; this might also be the case if the employee had a chronically sick child, for instance, since family members were usually encompassed by parts of the benefit. Sick members might moreover be more attracted to compulsory societies, since the waiting time was shorter.

To summarise, the shorter sickness duration in compulsory societies, reported in table 2, might be explained by free medical benefits improving the health of the employees faster. The shorter sickness duration might also have been due to that company doctors had incentives or instructions from employers to keep down the sickness length, when independent doctors might have done otherwise. Regarding the higher frequency of cases of sickness in compulsory societies, this was probably an effect of the shorter waiting time making it more worthwhile reporting in sick also when it came to shorter sickness periods. By allowing shorter waiting times, members might have been prevented from becoming really sick, which could result in a shorter sickness period in the end. The higher frequency of sickness cases might also have been a result of moral hazard, since social affinity and mutuality was less expressed in compulsory societies than in voluntary societies.

In the Committee for Worker's Insurance appointed by the government in the late nineteenth century, it is shown that there was a preference among politicians for the self-help idea represented by voluntary societies. People learned to take responsibility, and it was argued that the operation of the health insurance society often became a kind of schooling in

democracy for many members; compulsory societies were viewed as being out of date.²³ Hence, with the new regulation of Swedish health insurance societies in 1910, it became prohibited for employers to prescribe all employees compulsory membership in the occupational society at the workplace.

7. Conclusion

Mutual health insurance emerged in Sweden at the turn of the 20th century. Also historically, the organisational principles of health insurance, voluntary or compulsory, gave rise to different problems and advantages for both those insured and the health insurance providers. In this paper, we have traced the characteristics of both organisational forms, and compared the sickness absence by considering the role of selection of members and mitigation across a large panel of voluntary and compulsory health insurance societies operating in Sweden between 1900 and 1910.

When comparing the sickness absence, we find that the frequency of cases of sickness was lower in voluntary societies, while sickness duration was lower in compulsory societies. Voluntary societies faced a higher risk of adverse selection than did compulsory societies, while unhealthy members had a stronger incentive to insure. Given the higher propensity for adverse selection, voluntary societies needed to more effectively control for both adverse selection and moral hazard in order to attain a sickness to benefit relationship as low as compulsory societies. Our empirical analysis shows that voluntary societies managed to control information asymmetry by applying strict rules and rigorous screening of members. Health certificates were commonly used, and membership was usually dependent on recommendations from other members who risked their own membership if they

²³ *Arbetareförsäkringskomiténs betänkande, 3, Statistiska undersökningar, 6, Sjuk- och begravningskassor*; Lindeberg, 1949.

recommended anyone who turned out to be a bad risk. This social control in voluntary societies and the application of longer waiting periods for receiving benefits assisted in mitigating moral hazard. Voluntary societies used stricter rules on waiting time to reduce the many cases of short sickness, while offering higher benefits to the members with long-duration sick leave.

Compulsory societies had shorter waiting times, but offered less generous income-loss benefits during sick leave. Compulsory societies also worked more actively to reduce sick leave duration. It is shown that medical treatment was more common in compulsory societies, and the average spending was almost double compared to the voluntary societies. When examining the impact on sickness duration, it is shown that the effect is significant. The more extensive use of medical treatment may in part explain the shorter sickness duration among compulsory health societies in Sweden in the early 20th century. The strategy was further supported by the employer offering subsidized doctor and medical treatment in addition to benefits provided by compulsory societies.

The historical voluntary system probably suffered from similar problems to today's mutual health insurance pools when it came to insuring the poorest part of the population, since reducing adverse selection implies excluding those most in need. Our historical study suggests that smaller societies more effectively controlled for risks related to information asymmetry, as a contrast to research conducted on health insurance pools in developing economies, where small pools are usually viewed as having a higher risk of adverse selection. In any case, it appears as if reciprocity, the community-based and mutual characteristics of voluntary health insurance schemes, both historically and today, made them a convenient solution for people (except high-risk individuals) in evolving economies where compulsory health insurance did not function satisfactorily. Despite this, the authorities in the early 20th century did not view compulsory societies as the future, and in 1910 compulsory societies were prohibited. The

diffusion of the social liberal ideology of self-to-self-help was perceived as being more beneficial for the individual and society than the patriarchal system in which employees were dependent and in the hands of their employers.

References

Arbetareförsäkringskomitén [Committée for workers' insurance]. (1889).

Arbetareförsäkringskomiténs betänkande, vol. 3, Statistiska undersökningar, nr. 6, Sjuk- och begravningskassor [Statistical investigations, health- and burial insurance societies], Stockholm: Samson & Wallin.

Atim, C. (1999). Social movements and health insurance: a critical evaluation of voluntary, non-profit insurance schemes with case studies from Ghana and Cameroon. *Social Science and Medicine*, 48(7), 881–896.

Betänkande [Report] (1909). *Lag angående sjuk-kassor* [Regulation of health insurance societies]. Stockholm: K. L. Beckmans boktryckeri.

Beito, D. (2000). *From Mutual Aid to the Welfare State: Fraternal Societies and Social Services, 1890–1967*. Chapel Hill: University of North Carolina Press.

Bergström, S. (1999). *Sjuk-kassan som blev begravningskassa i Grycksbo / en skrift av: Sigurd Bergström* [the health insurance society that became a burial society in Grycksbo]. Grycksbo.

Bohman, S. (1994). *Sjuk-kassor i Stockholms län: fragment från en stor folkrörelse som fallit i glömska* [Health insurance societies in Stockholm: fragments from a large popular movement that has been forgotten]. Oskarshamn: Primo tryckerier AB.

Brödraföreningens sjuk- och begravningskassa: kort historik över femtioårsjubileet [The Fraternal health- and burial insurance society] (1932). Brödraföreningens sjuk- och begravningskassa, Uddevalla.

- Carlson, G. (2002). *Idén fick sin lyftning i fanan: Om sjukförsäkringarnas historia i Göteborg berättar Gösta Carlson* [The history of Gothenburgs' health insurance societies]. Borås: Sjuhäradsbygdens Tryckeri.
- Dahl, R. (1948). *Fest- och minnesskrift, kvarnarbetarnas erkända sjukförsäkring 1902–1948* [Commemorative publication, the health insurance society of mill workers 1902–1948], Kvarnarbetarnas erkända sjukförsäkring, Kristianstad
- Edebalk, P. G. (1987). Fackförbunden som sjukförsäkringsbildare 1886–1910 [The unions as founders of health insurance societies 1886-1910]. *Arkiv för studier i arbetarrörelsens historia*, 38, 31–54.
- Ekman, B. (2004). Community-based health insurance in low-income countries: a systematic review of the evidence. *Health Policy and Planning*, 19(5), 249–270.
- Emery, G. & Emery J. C. H. (1999). *A Young Man's Benefit: The Independent Order of Odd Fellows and Sickness Insurance in the United States and Canada, 1860–1929*. Montreal: McGill-Queen's University Press.
- Eriksson, B. (2015). *Dynamic Decades: A micro perspective on late nineteenth century Sweden*. Lund University, School of Economics and Management, Department of Economic History, Lund studies in economic history 72.
- Guinnane, T. W. & Streb, J. (2011). Moral Hazard in a Mutual Health Insurance System: German Knappschaften, 1867–1914. *The Journal of Economic History*, 71(1), 70–104.
- Harris, B., Gorsky, M., Guntupalli, A. M., & Hinde, A. (2012). Long-term changes in sickness and health: further evidence from the Hampshire Friendly Society. *The Economic History Review*, 65(2), 719–745.
- Hemenway, D. (1990). Propitious Selection. *The Quarterly Journal of Economics*, 105(4), 1063–1069.

- Horrell, S. & Oxley, D. (2000). Work and Prudence: Household Responses to Income Variation in Nineteenth Century Britain. *European Review of Economic History*, 4(1), 27–58.
- Hsiao, W. C. (2001). *Unmet needs of two billion: is community financing a solution?* World Bank/HNP Discussion Paper series. Washington, DC: World Bank.
- Jopp, T. A. (2011). Old times, better times? German miners' Knappschaften, pay-as-you-go pensions, and implicit rates of return, 1854–1913. *Business History*, 53(7), 1018–1043.
- Jopp, T. A. (2012). Insurance, size and exposure to actuarial risk: empirical evidence from nineteenth- and early twentieth-century German Knappschaften. *Financial History Review*, 19(1), 75–116.
- Jütting, J. P. (2000). Social Security Systems in Low-Income Countries: Concepts, Constraints and the Need of Cooperation. *International Social Security Review*, 53(4), 3–25.
- Jütting, J. P. (2005). *Health insurance for the poor in developing countries*. Aldershot: Ashgate.
- Kockums arbetares sjukförsäkring 80-år [Kockums workers' health insurance society 80 years]. (1945) Malmö: Framtiden.
- Kommerskollegii. (1901–1910): Arbetsstatistik [Statistical proceedings] B:1 Registrerade sjukförsäkringsverksamhet [The records of registered health insurance societies], Kommerskollegii afdelning för arbetsstatistik, Stockholm, K.L Beckmans boktryckeri.
- Kommerskollegii. (1904–1912): Arbetsstatistik [Statistical proceedings] D:1 Livsmedels och bostadspriser i Sverige 1904–1912 [Prices on food stuff and rental rates], Kommerskollegii afdelning för arbetsstatistik, Stockholm, K.L Beckmans boktryckeri
- van Leeuwen, M. (2012). Guilds and middle-class welfare, 1550–1800: provisions for burial, sickness, old age, and widowhood. *Economic history review*, 65(1), 61–90.

- 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. (2007). *Origins of American health insurance: a history of industrial sickness funds*. New Haven, Conn: Yale University Press.
- Lindeberg, G. (1949). *Den svenska sjukkasserörelsens historia* [The Swedish history of health insurance societies]. Lund: Carl Bloms boktryckeri AB.
- Riley, J. C. (1997). *Sick, not dead: the health of British workingmen during the mortality decline*. Baltimore, Md: The Johns Hopkins University Press.
- Rydén, G. (1990). *Hammarlag och Hushåll: om relationen mellan smidesarbetet och smideshushållen vid Tore Petréns brukskomplex 1830–1850*. Uppsala Studies in Economic History: Uppsala.
- Schön, L. & Krantz, O. (2015). New Swedish Historical National Accounts since the 16th Century in Constant and Current Prices. Lund Papers in Economic History 140, Lund University.
- Smith, B. D. & Stutzer, M. J. (1990). Adverse Selection, Aggregate Uncertainty, and the Role of Mutual Insurance Contracts. *Journal of Business*, 63(4), 493–510.
- 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.
- Socialstyrelsen [Health authorities]. (1933). *Detaljpriser och indexberäkningar åren 1913–1930* [Consumer prices and indices-calculations 1913–1930]. Stockholm, Kungliga Socialstyrelsen.
- Socialstyrelsen [Health authorities]. (1919). *Levnadskostnaderna i Sverige 1913–1914* [The cost of living in Sweden 1913–1914]. Stockholm, Kungliga Socialstyrelsen.

- Sollinger, G. (1985). *Sjuk- och begravningskassor och andra understöds-kassor i Kungliga bibliotekets samlingar* [Health- and burial insurance societies and other mutual organisations in the collections of the National Library]. Fälths Tryckeri, Värnamo.
- Stock, J., Yogo, M. (2005). *Testing for Weak Instruments in Linear IV Regression*. In: *Andrews DWK Identification and Inference for Econometric Models*. New York: Cambridge University Press, pp 80-108.
- Unger, J. B. (1869). *Två föredrag om arbetareföreningar: hållna i Jönköpings arbetareförening under hösten 1868 / af J. B. Unger, föreningens n. v. Ordförande*. Jönköping : Lundgren.
- Wiklund, E. O. (1939). *Telefonfabrikens erkända sjukkassa: minnesskrift 1889–1939* [The phone factory's registered health insurance society: monograph 1889–1939]. Stockholm, Arbetarnes.

Table 1. Summary statistics of compulsory and voluntary health societies

| Variable | Definition | Population | Sample | Compulsory | Voluntary | Sig |
|-----------------|---|------------|--------|------------|-----------|-----|
| Compulsory | Membership compulsory: 1, 0 otherwise | 0.29 | 0.29 | 1 | 0 | |
| Benefits | Sickness pay per day in 1905 price level of Stockholm | 1.58 | 1.59 | 1.47 | 1.64 | *** |
| Medical t. | Medical treatment expenses per day in 1905 price level of Stockholm | 0.12 | 0.16 | 0.26 | 0.11 | *** |
| Premium | Premium payment per member in 1905 price level of Stockholm | 10.27 | 10.55 | 10.64 | 10.51 | |
| Size | Number of members | 205 | 236 | 309 | 205 | *** |
| Female s. | Female participation rate | 14.8 | 14.8 | 16.0 | 14.3 | * |
| Age | Age of society | 18.0 | 15.3 | 15.1 | 15.3 | |
| Growth | Annual growth of members in per cent | 2.15 | 2.38 | 1.72 | 2.66 | ** |
| Ex post premium | Societies financed by ex post payments: 1 if ex post. 0 otherwise | 0.54 | 0.54 | 0.57 | 0.53 | * |
| Profitability | Net profit to total income | 0.17 | 0.18 | 0.13 | 0.21 | *** |
| Leverage | Premium income to total assets | 1.02 | 1.16 | 1.03 | 1.22 | |
| Exit | Exit of society | 0.04 | 0.03 | 0.05 | 0.03 | |
| Entry age min | Minimum age to become member | 16.6 | 16.6 | 15.8 | 16.7 | *** |
| Entry age max | Maximum age to become member | 48.1 | 48.1 | 50.5 | 47.7 | *** |
| Member time | Days before a new member is qualified to receive for sick pay | 85.1 | 85.1 | 60.5 | 89.7 | *** |
| Waiting time | Days of qualifying before benefit/sick pay may be claimed | 6.08 | 6.08 | 2.48 | 7.23 | *** |
| Sick time min | Minimum time of sick leave to receive benefits | 5.97 | 5.97 | 6.06 | 5.95 | |
| Sick time max | Maximum time of sick leave to receive benefits | 89.9 | 89.9 | 88.5 | 90.2 | |
| Benefits min | Minimum benefit per week | 8.95 | 8.95 | 6.57 | 9.48 | ** |
| Benefits max | Maximum benefit per week | 10.5 | 10.5 | 9.4 | 10.8 | ** |
| Benefit mean | Mean benefit per week | 9.67 | 9.67 | 8.03 | 10.03 | *** |
| Benefit dif. | Difference in min-max benefit within society | 1.94 | 1.94 | 2.88 | 1.73 | *** |
| N | Number of society/year observations | 6091 | 3490 | 1017 | 2473 | |

Note: * denote significance difference of group mean at the (***)1, (***)5 and (*)10% level.

Source: Kommerskollegii, 1901-1910; Kommerskollegii (1904-1912); Detaljpriser och indexberäkningar åren 1913-1930, Socialstyrelsen (1913, 1933)

Table 2. Sickness (number of sick cases, sick days and duration per member), medical treatment (expenses per sick day) and accidents (number of accidents per 1000 workers) across industry and by organizational form in Swedish health societies 1901-1910.

| Industry | Compulsory | | | | | Voluntary | | | | | |
|-------------------------------------|------------|-----------|---------------|------------|-----------|-----------|-----------|---------------|------------|-----------|-----------|
| | Sick case | Sick days | Sick duration | Medical t. | Share (%) | Sick case | Sick days | Sick duration | Medical t. | Share (%) | Accidents |
| Mining | 0.57 | 9.8 | 17.4 | 0.002 | 2 | 0.47 | 8.7 | 19.2 | 0.002 | 4 | 94 |
| Stone, potteries & glas | 0.36 | 9.1 | 27.1 | 0.429 | 4 | 0.29 | 5.8 | 21.4 | 0.086 | 3 | 20 |
| Metal, engineering | 0.38 | 7.8 | 22.4 | 0.110 | 25 | 0.39 | 7.5 | 20.3 | 0.047 | 18 | 59 |
| Wood industry | 0.36 | 6.6 | 21.1 | 0.461 | 13 | 0.32 | 6.3 | 21.3 | 0.150 | 9 | 48 |
| Construction | 0.25 | 5.2 | 21.7 | 0.016 | 2 | 0.21 | 4.9 | 25.7 | 0.159 | 4 | 40 |
| Leather, fur & rubber | 0.28 | 4.1 | 14.5 | 0.020 | 0 | 0.14 | 3.1 | 23.4 | 0.000 | 1 | 13 |
| Textil industry | 0.28 | 5.2 | 19.7 | 0.596 | 8 | 0.21 | 4.3 | 22.9 | 0.050 | 4 | 7 |
| Clothing industry | 0.25 | 5.5 | 23.0 | 0.111 | 8 | 0.18 | 5.1 | 29.2 | 0.308 | 4 | 4 |
| Food, beverage and tobacco industry | 0.43 | 6.6 | 15.6 | 0.063 | 1 | 0.30 | 7.0 | 24.4 | 0.061 | 6 | 25 |
| Chemical & electric | 0.38 | 7.1 | 20.2 | 0.179 | 15 | 0.33 | 6.0 | 20.0 | 0.175 | 6 | 33 |
| Pulp & Paper | 0.35 | 6.4 | 19.6 | 0.176 | 7 | 0.30 | 5.6 | 19.4 | 0.171 | 4 | 44 |
| Publishing | 0.20 | 5.4 | 27.4 | 0.028 | 2 | 0.24 | 6.2 | 26.1 | 0.272 | 3 | 7 |
| Manufacturing, other | 0.31 | 8.8 | 29.1 | 0.145 | 7 | 0.25 | 5.6 | 23.6 | 0.057 | 5 | 42 |
| Whole sale, retail | | | | | 0 | 0.16 | 4.5 | 31.0 | 0.001 | 5 | 21 |
| Land transport | 0.33 | 6.8 | 21.5 | 0.000 | 3 | 0.23 | 4.6 | 22.8 | 0.068 | 5 | 40 |
| Shipping | | | | | 0 | 0.33 | 8.3 | 25.3 | 0.189 | 1 | 24 |
| Other industries | 0.15 | 3.2 | 38.5 | 0.000 | 2 | 0.20 | 5.4 | 28.3 | 0.070 | 18 | 21 |
| Total | 0.34 | 6.97 | 22.29 | 0.213 | 100 | 0.28 | 6.01 | 23.71 | 0.098 | 100 | 42.00 |
| Total adjusted* | 0.32 | 6.3 | 24.8 | | 100 | 0.30 | 6.1 | 22.0 | | 100 | 42.00 |

Note: *Accident frequency per 1000 workers. ** Compulsory figures on sickness (case, day, duration) is weighted by voluntary shares and *vice versa*

Source: Kommerskollegii, 1901-1910

Table 3. Sick days and age distribution of compulsory and voluntary societies in Stockholm in 1905/06.

| Age class | Age distribution | | Sick days | | |
|-----------------|------------------|-----------|-----------|--------------|-------------|
| | Compulsory | Voluntary | Average* | Compulsory** | Voluntary** |
| <20 | 145 | 32 | 3,8 | 543 | 120 |
| 20-24 | 177 | 107 | 3,8 | 666 | 402 |
| 25-29 | 176 | 162 | 4,0 | 708 | 650 |
| 30-34 | 136 | 158 | 4,4 | 597 | 693 |
| 35-39 | 105 | 136 | 4,9 | 511 | 662 |
| 40-44 | 92 | 132 | 5,5 | 507 | 731 |
| 45-49 | 66 | 95 | 6,4 | 426 | 610 |
| 50-54 | 47 | 61 | 7,7 | 366 | 473 |
| 55-59 | 24 | 40 | 9,6 | 225 | 385 |
| 60-64 | 17 | 35 | 12,2 | 209 | 432 |
| 65-69 | 9 | 25 | 14,5 | 124 | 359 |
| >69 | 5 | 15 | 19,6 | 106 | 301 |
| Total | 1 000 | 1 000 | | 4 987 | 5 820 |
| Average | 32.5 | 39.2 | | 5.0 | 5.8 |
| Old members (%) | 10.1 | 20.1 | | | |
| Age of Society | 14.0 | 16.7 | | | |
| N Societies | 21.0 | 82.0 | | | |
| N Members | 13 697 | 40 841 | | | |

Note: * Average of sick days per member. Note: ** Aggregated number of sick days per age class.

Source: Arbetarförsäkringskomiten (1889); Lag angående sjukförsäkring (1909). Riksförsäkringsanstalten (1905)

Table 4. Multivariate analysis of sick cases, sick days and sick duration, fixed effect estimates.

| Panel 1. Sick cases | | | | | | | | | | | |
|---------------------|------------------------|------------|-------------|----------------------|-----------|------------|---------------------|------------|-------------|--|--|
| | Compulsory & Voluntary | | | Compulsory societies | | | Voluntary societies | | | | |
| | FE | IV | First | FE | IV | First | FE | IV | First | | |
| Benefit | -0.001 | 0.031 *** | | -0.026 ** | 0.483 *** | | 0.014 | 0.017 | | | |
| Premium | 0.010 *** | | 0.072 *** | 0.018 *** | | 0.039 *** | 0.009 ** | | 0.079 *** | | |
| Female s. | -0.001 | -0.001 *** | -0.001 ** | 0.000 | 0.000 | -0.003 *** | -0.001 | -0.001 *** | -0.001 | | |
| Size | 0.0002 | 0.0002 *** | -0.0001 *** | 0.0001 ** | -0.0003 | 0.0005 | 0.0002 | 0.0001 * | -0.0001 *** | | |
| Age | 0.002 ** | 0.000 | -0.006 *** | 0.003 | 0.004 *** | -0.009 *** | 0.001 | 0.000 | -0.005 *** | | |
| Growth | 0.000 | -0.001 *** | 0.004 *** | 0.000 | -0.001 | 0.001 | 0.000 | -0.001 *** | 0.005 *** | | |
| Constant | 0.192 *** | 0.255 *** | 0.836 *** | 0.150 *** | -0.193 * | 1.072 *** | 0.188 *** | 0.282 *** | 0.799 *** | | |
| within | 0.055 | | | 0.095 | | | 0.053 | | | | |
| between | 0.041 | | | 0.072 | | | 0.017 | | | | |
| overall | 0.030 | | | 0.050 | | | 0.011 | | | | |

| Panel 2. Sick days | | | | | | | | | | | |
|--------------------|------------------------|------------|-------------|----------------------|-------------|------------|---------------------|------------|-------------|--|--|
| | Compulsory & Voluntary | | | Compulsory societies | | | Voluntary societies | | | | |
| | FE | IV | First | FE | IV | First | FE | IV | First | | |
| Benefit | -1.153 *** | 2.543 *** | | -1.397 *** | 15.683 *** | | -1.057 *** | 1.670 *** | | | |
| Medical t. | -2.560 *** | -0.878 *** | -0.198 *** | -1.848 *** | -1.918 *** | 0.003 | -3.056 *** | -0.949 *** | -0.258 *** | | |
| Premium | 0.228 *** | | 0.072 *** | 0.350 *** | | 0.035 *** | 0.205 *** | | 0.083 *** | | |
| Female s. | -0.034 * | 0.003 | -0.001 * | -0.007 | 0.051 *** | -0.003 *** | -0.038 * | 0.000 | -0.001 | | |
| Size | -0.0003 | 0.0006 *** | -0.0001 *** | 0.0010 | -0.0004 | 0.0003 | -0.0003 | 0.0005 *** | -0.0001 *** | | |
| Age | 0.155 *** | 0.071 *** | -0.006 *** | 0.186 *** | 0.198 *** | -0.007 *** | 0.135 ** | 0.051 *** | -0.005 *** | | |
| Growth | -0.017 *** | -0.043 *** | 0.004 *** | -0.012 ** | -0.023 * | 0.001 | -0.022 *** | -0.052 *** | 0.004 *** | | |
| Constant | 4.695 *** | 1.681 *** | 0.858 *** | 3.657 *** | -10.380 *** | 1.086 *** | 4.819 *** | 3.002 *** | 0.782 *** | | |
| within | 0.161 | | | 0.242 | | | 0.102 | | | | |
| between | 0.192 | | | 0.400 | | | 0.150 | | | | |
| overall | 0.164 | | | 0.367 | | | 0.116 | | | | |

| Panel 3. Sick duration | | | | | | | | | | | |
|------------------------|------------------------|----|-------|----------------------|----|-------|---------------------|----|-------|--|--|
| | Compulsory & Voluntary | | | Compulsory societies | | | Voluntary societies | | | | |
| | FE | IV | First | FE | IV | First | FE | IV | First | | |

| | | | | | | | | | | |
|------------|------------|------------|------------|------------|------------|------------|------------|------------|------------|--|
| Benefit | -5.116 *** | 6.235 *** | | -3.589 ** | 7.821 *** | | -6.138 *** | 7.463 *** | | |
| Medical t. | -4.530 *** | -4.399 *** | -0.003 | -2.291 ** | -6.097 *** | -0.017 | -6.717 *** | -5.180 *** | -0.054 | |
| Premium | 0.010 | | 0.040 *** | -0.321 | | 0.052 *** | 0.080 | | 0.044 *** | |
| Female s. | -0.069 | 0.092 *** | -0.002 ** | -0.055 | 0.100 *** | -0.001 | -0.071 | 0.094 *** | -0.001 | |
| Size | -0.0022 ** | -0.0002 | 0.0000 | -0.0040 ** | 0.0005 | 0.0000 * | -0.0017 | 0.0000 | 0.0000 | |
| Age | 0.403 *** | 0.220 *** | -0.004 *** | 0.541 *** | 0.105 *** | -0.002 *** | 0.366 *** | 0.193 *** | -0.005 *** | |
| Growth | -0.027 ** | -0.050 *** | 0.002 *** | -0.043 ** | -0.051 *** | 0.002 *** | -0.017 | -0.052 ** | 0.002 *** | |
| Constant | 27.922 *** | 12.891 *** | 1.128 *** | 26.026 *** | 12.127 *** | 0.991 *** | 29.325 *** | 11.956 *** | 1.142 *** | |
| within | 0.066 | | | 0.061 | | | 0.074 | | | |
| between | 0.026 | | | 0.143 | | | 0.013 | | | |
| overall | 0.035 | | | 0.121 | | | 0.021 | | | |

Note: ***, **, * denotes significant at the 1%, 5% and 10% level respectively.

Source: Kommerskollegii (1901-1910).

Table 5. Multivariate analysis of sick cases, sick days and sick duration, random-effect estimates.

| Panel 1, Sick cases | | | | | | | | | | | | | | | | | | |
|---------------------|------------------------|-----|--------|-----|--------|----------------------|--------|-----|--------|-------|---------------------|-------|--------|-------|--------|--------|--------|-----|
| | Compulsory & Voluntary | | | | | Compulsory societies | | | | | Voluntary societies | | | | | | | |
| | RE | IV | First | RE | IV | First | RE | IV | First | RE | IV | First | | | | | | |
| Benefit | -0,016 | ** | 0,081 | *** | | | -0,021 | * | 0,596 | *** | | | -0,012 | 0,053 | ** | | | |
| Premium | 0,009 | *** | | | 0,068 | *** | 0,018 | *** | | 0,025 | *** | | 0,008 | *** | 0,076 | *** | | |
| Female s, | 0,000 | | 0,000 | | -0,004 | *** | 0,000 | | 0,004 | ** | -0,007 | *** | 0,0010 | ** | 0,000 | -0,004 | *** | |
| Size | 0,0000 | | 0,0000 | | 0,0001 | *** | 0,0000 | | 0,0000 | | 0,0001 | | 0,0000 | | 0,0000 | 0,0001 | *** | |
| Age | 0,000 | | 0,000 | * | -0,007 | *** | 0,000 | | 0,006 | *** | -0,008 | *** | 0,000 | | 0,000 | -0,006 | *** | |
| Growth | 0,000 | | -0,001 | *** | 0,005 | *** | 0,000 | | -0,001 | | 0,001 | | 0,000 | | -0,001 | *** | 0,006 | *** |
| Mining | 0,240 | *** | 0,290 | *** | -0,299 | *** | 0,197 | *** | 0,059 | | 0,258 | | 0,236 | *** | 0,282 | *** | -0,373 | *** |
| Stone | 0,071 | *** | 0,114 | *** | -0,312 | *** | 0,046 | | 0,234 | ** | -0,314 | *** | 0,063 | *** | 0,092 | *** | -0,208 | *** |
| Metal | 0,172 | *** | 0,194 | *** | -0,211 | *** | 0,100 | *** | 0,116 | * | -0,035 | | 0,184 | *** | 0,205 | *** | -0,245 | *** |
| Wood | 0,128 | *** | 0,160 | *** | -0,311 | *** | 0,086 | ** | 0,281 | *** | -0,318 | *** | 0,128 | *** | 0,139 | *** | -0,245 | *** |
| Constr. | -0,007 | | 0,013 | | -0,160 | ** | -0,027 | | 0,093 | | -0,216 | | -0,002 | | 0,010 | | -0,147 | * |
| Leather | -0,039 | *** | -0,060 | ** | 0,062 | | 0,016 | | -0,364 | | 0,590 | * | -0,049 | *** | -0,056 | * | 0,010 | |
| Food | 0,051 | *** | 0,083 | *** | -0,081 | | 0,132 | *** | 0,207 | | -0,067 | | 0,058 | *** | 0,091 | *** | -0,119 | * |
| Chemical | 0,126 | *** | 0,141 | *** | -0,071 | | 0,075 | *** | 0,124 | ** | -0,062 | | 0,106 | *** | 0,106 | *** | 0,089 | |
| Pulp&paper | 0,117 | *** | 0,123 | *** | -0,022 | | 0,064 | ** | -0,012 | | 0,130 | | 0,111 | *** | 0,119 | *** | -0,023 | |
| Publish | -0,011 | | 0,031 | * | -0,186 | ** | -0,086 | *** | -0,078 | | 0,009 | | 0,007 | | 0,046 | ** | -0,219 | ** |
| Manuf_nec | 0,042 | *** | 0,070 | *** | -0,131 | ** | -0,013 | | 0,100 | | -0,182 | * | 0,041 | *** | 0,052 | *** | 0,028 | |
| Wholesale | -0,079 | *** | -0,068 | *** | 0,040 | | | | | | | | -0,061 | *** | -0,047 | *** | -0,005 | |
| Transport | 0,022 | | 0,064 | *** | -0,254 | *** | -0,022 | | 0,162 | | -0,277 | * | 0,023 | | 0,058 | *** | -0,219 | *** |
| Constant | 0,166 | *** | 0,070 | *** | 1,255 | *** | 0,149 | *** | -0,775 | ** | 1,567 | *** | 0,169 | *** | 0,115 | *** | 1,173 | *** |
| within | 0,049 | | | | | | 0,086 | | | | | | 0,044 | | | | | |
| between | 0,333 | | | | | | 0,271 | | | | | | 0,347 | | | | | |
| overall | 0,268 | | | | | | 0,193 | | | | | | 0,294 | | | | | |

| Panel 2, Sick days | | | | | | | | | | | | | | | | | | |
|--------------------|------------------------|-----|--------|-----|--------|----------------------|--------|-----|--------|-----|---------------------|-------|--------|-----|--------|-----|--------|-----|
| | Compulsory & Voluntary | | | | | Compulsory societies | | | | | Voluntary societies | | | | | | | |
| | RE | IV | First | RE | IV | First | RE | IV | First | RE | IV | First | | | | | | |
| Benefit | -1,486 | *** | 3,439 | *** | | | -1,595 | *** | 18,720 | *** | | | -1,409 | *** | 2,460 | *** | | |
| Medical t, | -2,064 | *** | -0,564 | *** | -0,204 | *** | -1,853 | *** | -3,705 | *** | 0,090 | * | -2,403 | *** | -0,594 | * | -0,271 | *** |
| Premium | 0,290 | *** | | | 0,070 | *** | 0,407 | *** | | | 0,020 | *** | 0,261 | *** | | | 0,078 | *** |
| Female s, | 0,007 | | 0,037 | *** | -0,004 | *** | 0,036 | * | 0,169 | ** | - | *** | 0,000 | | 0,023 | *** | -0,003 | *** |

| | | | | | | | | | | | | | | | | | |
|--------------|------------|--|------------|--|------------|--|------------|-------|-----------|--|-----------|--|------------|--|------------|--|------------|
| | | | | | | | | 0,006 | | | | | | | | | |
| Size | 0,0000 | | 0,0005 *** | | 0,0001 *** | | 0,0014 | | 0,0003 | | 0,000 | | 0,0000 | | 0,0004 *** | | 0,0001 *** |
| Age | 0,049 *** | | 0,074 *** | | -0,006 *** | | 0,111 *** | | 0,308 *** | | 0,010 *** | | 0,037 ** | | 0,054 *** | | -0,005 *** |
| Growth | -0,019 *** | | -0,052 *** | | 0,005 *** | | -0,009 * | | -0,037 | | 0,001 | | -0,023 *** | | -0,056 *** | | 0,006 *** |
| Mining | 3,306 *** | | 5,173 *** | | -0,319 *** | | 5,640 *** | | -0,871 | | 0,325 | | 2,847 *** | | 4,702 *** | | -0,394 *** |
| Stone | 1,260 *** | | 3,109 *** | | -0,291 *** | | 3,625 *** | | 9,168 ** | | 0,268 | | 0,437 * | | 1,271 ** | | -0,209 *** |
| Metal | 2,223 *** | | 3,686 *** | | -0,214 *** | | 2,731 *** | | 2,416 | | 0,021 | | 2,100 *** | | 3,443 *** | | -0,248 *** |
| Wood | 1,541 *** | | 3,383 *** | | -0,273 *** | | 1,815 * | | 7,769 ** | | 0,287 ** | | 1,540 *** | | 2,704 *** | | -0,218 *** |
| Construction | -0,122 | | 0,769 | | -0,156 * | | 1,103 | | 4,480 | | 0,162 | | -0,127 | | 0,331 | | -0,127 |
| Leather | -1,398 *** | | -1,388 | | 0,044 | | 0,585 | | 12,270 | | 0,638 | | -1,597 *** | | -1,316 | | -0,006 |
| Food | 1,013 *** | | 1,542 *** | | -0,102 * | | 0,649 | | -0,055 | | 0,036 | | 1,194 *** | | 1,716 *** | | -0,135 ** |
| Chemical | 1,639 *** | | 2,000 *** | | -0,060 | | 1,962 ** | | 2,439 | | 0,019 | | 1,470 *** | | 0,937 *** | | 0,112 * |
| Pulp_paper | 1,303 *** | | 1,592 *** | | -0,006 | | 1,008 | | -2,489 | | 0,176 | | 1,289 *** | | 1,496 *** | | 0,009 |
| Publish | 0,222 | | 1,194 ** | | -0,162 * | | -1,951 *** | | -3,093 | | 0,055 | | 0,619 *** | | 1,403 *** | | -0,162 * |
| Manuf_nec | 1,241 *** | | 2,427 *** | | -0,138 ** | | 2,427 *** | | 5,029 | | 0,123 | | 0,581 * | | 0,781 ** | | 0,020 |
| Wholesale | -0,924 *** | | -0,964 ** | | 0,008 | | | | | | 0,000 | | -0,826 *** | | -0,708 | | -0,034 |
| Transport | 0,122 | | 1,617 *** | | -0,260 *** | | 0,029 | | 4,013 | | 0,192 | | 0,128 | | 1,165 *** | | -0,214 *** |
| Constant | 4,473 *** | | -2,506 *** | | 1,252 *** | | 2,230 ** | | -29,6 ** | | 1,564 *** | | 4,869 *** | | -0,271 | | 1,166 *** |
| within | 0,147 | | | | | | 0,228 | | | | | | 0,129 | | | | |
| between | 0,429 | | | | | | 0,612 | | | | | | 0,392 | | | | |
| overall | 0,355 | | | | | | 0,529 | | | | | | 0,317 | | | | |

Panel 3, Sick duration

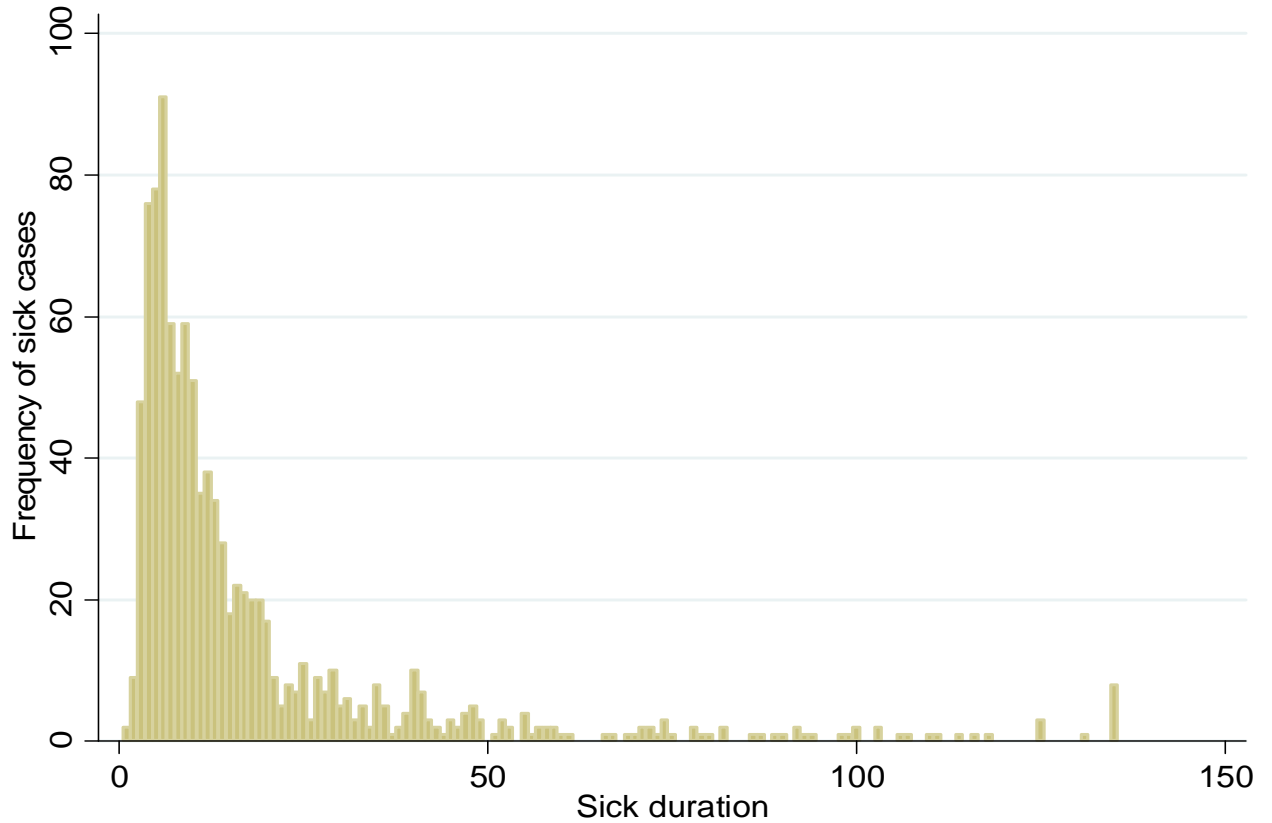
| | Compulsory & Voluntary | | | Compulsory societies | | | Voluntary societies | | |
|------------|------------------------|------------|------------|----------------------|------------|------------|---------------------|------------|------------|
| | RE | IV | First | RE | IV | First | RE | IV | First |
| Benefit | -4,228 *** | 4,954 * | | -4,741 *** | 6,594 *** | | -4,369 *** | 5,809 ** | |
| Medical t, | -4,042 *** | -4,472 *** | 0,042 | -2,270 ** | -6,046 *** | -0,007 | -5,526 *** | -5,051 *** | -0,044 |
| Premium | 0,288 *** | | 0,027 *** | -0,024 | | 0,040 *** | 0,325 *** | | 0,033 *** |
| Female s, | 0,032 * | 0,080 *** | -0,006 *** | 0,076 | 0,096 *** | -0,004 *** | 0,034 * | 0,085 *** | -0,005 *** |

| | | | | | | | | | | | | | | | | | | |
|--------------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|--------|-----|--------|-----|--------|-----|--------|-----|
| Size | 0,0000 | 0,0002 | 0,0000 | 0,0021 | 0,0009 | 0,0000 | * | 0,0000 | 0,0004 | 0,0000 | | | | | | | | |
| Age | 0,163 | *** | 0,255 | *** | -0,010 | *** | 0,331 | *** | 0,114 | *** | -0,005 | *** | 0,134 | *** | 0,224 | *** | -0,009 | *** |
| Growth | -0,030 | *** | -0,057 | *** | 0,003 | *** | -0,043 | ** | -0,061 | *** | 0,003 | *** | -0,025 | * | -0,063 | *** | 0,004 | *** |
| Mining | -7,045 | *** | -4,995 | | -0,226 | * | 5,036 | | -4,921 | ** | -0,325 | *** | -8,560 | *** | -5,014 | | -0,347 | *** |
| Stone | -2,125 | | 0,472 | | -0,281 | ** | 5,942 | | -1,638 | | -0,204 | *** | -3,779 | *** | -1,251 | | -0,250 | ** |
| Metal | -6,202 | *** | -4,081 | ** | -0,245 | *** | 1,629 | | -3,827 | *** | -0,307 | *** | -8,070 | *** | -4,711 | ** | -0,327 | *** |
| Wood | -5,517 | *** | -2,313 | | -0,367 | *** | -0,910 | | -4,054 | *** | -0,165 | *** | -6,220 | *** | -2,744 | | -0,338 | *** |
| Construction | -1,638 | | -0,958 | | -0,085 | | 3,427 | | -1,647 | | -0,048 | | -2,003 | * | -1,307 | | -0,067 | |
| Leather | -3,724 | * | -4,503 | | 0,065 | | -2,904 | | -3,689 | | -0,096 | | -3,597 | *** | -2,890 | | -0,067 | |
| Food | -2,318 | | -3,506 | | 0,142 | | -6,324 | ** | -4,369 | *** | -0,007 | | -2,617 | *** | -3,610 | | 0,094 | |
| Chemical | -5,586 | * | -4,792 | ** | -0,090 | | -0,780 | | -3,357 | *** | -0,054 | | -4,674 | *** | -4,793 | ** | 0,012 | |
| Pulp_paper | -5,980 | *** | -5,471 | ** | -0,063 | | -2,071 | | -5,507 | *** | -0,131 | | -5,996 | *** | -4,831 | * | -0,113 | |
| Publish | -0,679 | | 0,639 | | -0,137 | | 1,206 | | 0,775 | | -0,188 | * | -1,117 | | 0,585 | | -0,169 | |
| Manuf_nec | -0,898 | | 0,092 | | -0,117 | | 6,583 | * | 0,696 | | -0,055 | | -2,619 | ** | -2,088 | | -0,051 | |
| Wholesale | 6,786 | *** | 4,988 | * | 0,205 | ** | | | | | | | 5,523 | *** | 4,132 | * | 0,135 | |
| Transport | -2,654 | | -1,403 | | -0,140 | | -0,090 | | -0,961 | | -0,171 | *** | -2,719 | * | -1,384 | | -0,130 | |
| Constant | 28,301 | *** | 13,273 | ** | 1,686 | *** | 23,354 | *** | 12,312 | *** | 1,508 | *** | 29,634 | *** | 12,690 | ** | 1,655 | *** |
| within | 0,055 | | | | | | 0,052 | | | | | | 0,063 | | | | | |
| between | 0,215 | | | | | | 0,337 | | | | | | 0,202 | | | | | |
| overall | 0,176 | | | | | | 0,270 | | | | | | 0,174 | | | | | |

Note: ***, **, * denotes significant at the 1%, 5% and 10% level respectively.

Source: Kommerskollegii (1901-1910).

Figure 1. Frequency of sick cases by sick duration (days) in 1916.



Note: Random sample of 1000 sick cases.

Source: Sveriges allmänna sjuk- och begravningsfond (1916).