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Asymmetric information in late 19th century cooperative insurance societies ☆

Daniel Gottlieb

Department of Economics, Massachusetts Institute of Technology, Cambridge, MA 02139, USA

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Abstract

Between 1880 and 1930, cooperative insurance was the main source of illness, accident, and death insurance in the United States, Canada, and England. This paper tests for asymmetric information in cooperative insurance societies and examines how their pricing policies affected the profile of members. We find strong evidence that, unlike their modern substitutes, cooperative societies were able to overcome the asymmetry of information. Furthermore, as a consequence of non-actuarial pricing, our results suggest that workers deferred their membership until they were about 40 years old.

JEL classification: D82; G22; N21

Keywords: Cooperative insurance; Asymmetric information; Non-firm organizations

1. Introduction

Since the Great Depression, American workers have relied mostly on employers and the government to insure themselves against sickness or disability. Between the 1880s and the Great Depression, however, the situation was substantially different. Government insurance was virtually non-existent and employers generally did not provide insurance to employees. Instead, cooperative associations—also known as fraternal, friendly, benevolent, or benefit societies—were the main source of illness, accident, and death insurance.

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E-mail address: daniel_g@mit.edu

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Cooperative associations were introduced in the United States in the years that followed the Civil War, motivated by a dramatic increase in burial costs and an expansion in the demand for professional health care.[1] Modeled after the English benefit societies, they were the first organizations to provide low-cost insurance in America. By 1920, over a third of the adult male population received sickness, accidents, or death benefits through association in cooperative societies.[2]

The "intrusive monitoring" employed by these associations—requiring medical examinations to screen prospective members and having a committee regularly visiting members who claimed benefits—allowed for an informational advantage over commercial insurance companies. However, internal issues prevented them from charging actuarial prices like commercial companies. Instead, cooperative societies adopted a policy of equal rates and benefits for members of all ages. Age-scaled membership fees and age-based screening discouraged older workers from joining.

Although the decline in cooperative societies coincides with the implementation of social insurance, we still do not know whether there exists a causal relation between them. Several explanations have been proposed but most of them either have not been tested or have important drawbacks. Therefore, although most people agree that the modern insurance arrangements affect the economy in important ways, we do not know why they arose or if there are feasible alternatives to them.

A common justification for the collapse of cooperative insurance is that it relied on commercial methods that led to excessive financial fragility. Unlike insurance companies, cooperative societies adopted an egalitarian pricing system except for an initial age-scaled membership fee, which generated an incentive for workers to postpone their association. Furthermore, healthier workers and those who were less exposed to risk would be less willing to join benefit societies, leading to adverse selection problems.

Using data from two surveys covering a total of 8912 workers conducted by the Bureau of Labor from Michigan and California in 1889 and 1892, this paper examines whether the monitoring employed by cooperative insurance societies allowed them to overcome the asymmetry of information. Moreover, we analyze the effects of their commercial practices on the age profile of members.

Although this is the first paper to formally test for asymmetric information in fraternal insurance societies, our analysis is related to an extensive literature on non-market institutions such as credit cooperatives[3], microfinance programs[4], and sharecropping[5]. The paper that is closest to ours is Murray (2003), which studies cross-country aggregated data from Austria, Belgium, Denmark, France, and Germany from 1885 to 1908. However, the dataset does not contain important information needed to test for asymmetric information formally (such as the workers' age, for example).

Guinnane (2001) studies German rural credit cooperatives from late 19th century using data from the cooperatives. There are two main advantages from using data on workers instead of data from the societies. First, since asymmetric information is, by its own

[1] Kaufman (2002). Several historians have claimed that cooperative societies emerged as a response to industrialization—see Hopkins (1995, pp. 10).

[2] Beito (2000).

[3] See, for example, Banerjee et al. (1994) and references therein.

[4] See, for example, Ghatak and Guinnane (1999) and references therein.

[5] See Stiglitz (1974). Braido (2005) surveys the recent empirical literature.

definition, related to the fact that workers in a certain group are or behave differently from the rest of the population, it is important to have access to data on those who do not belong to the cooperative association.[6] Moreover, gathering data on workers avoids the survival bias problem that would result if more efficient firms were more likely to be sampled.

Thomasson (2004) examines whether Blue Cross and Blue Shield suffered from adverse selection after commercial insurance companies entered the market for health insurance in the 1950s. She finds that the Blues faced adverse selection in the market for individual health insurance but not in the market for group health insurance. The test for adverse selection employed by Thomasson consists on examining whether, controlling for observable characteristics (which include the insurance premium), the Blue Cross/Blue Shield insurance was more expensive than the plans offered by commercial companies. If so, we would be able to conclude that the Blues faced consumers with a higher probability of medical expenditures.

There is, however, a potential drawback with her approach. Any difference in costs would lead us to conclude that the firm with higher costs was facing adverse selection. For example, it is usually argued that the provision of group insurance avoids several administrative costs (e.g., the costs of selling the insurance product).[7] In that case, the difference in the price of group and non-group insurance might be driven by administrative costs instead of higher probability of medical expenditures. Similarly, any difference in the costs faced by the Blues and commercial companies might be incorrectly interpreted as evidence of adverse selection.

Our results show strong and robust evidence of *symmetric information* in the cooperative insurance market. Moreover, they indicate that the pricing scheme employed by fraternal societies affected the age profile of members: younger workers usually postponed their decision to adhere, although cooperative associations were relatively successful in discouraging older individuals from joining.

The rest of the paper is organized as follows. Next section briefly reviews the literature on cooperative insurance societies, Section 3 describes the data set, and Section 4 presents the empirical tests. Then, Section 5 concludes.

2. Cooperative insurance societies

Cooperative insurance associations emerged in the United States after the Civil War and matched commercial life insurance in size twenty years after their introduction. By the mid-1890s, the cooperative insurance system had grown to be as much as twice the size of its commercial counterpart.[8] According to Beito (1999), "between 1890 and 1910, the number of people belonging to societies offering death benefits increased from 1.3 million to 8.5 million." Furthermore, "a conservative estimate is that one-third of adult males in the United States were members [of fraternal societies] in 1910".

[6] This is not problematic when individuals do not face a binary choice of whether or not to join but instead face different coverage options. Then, one can test for asymmetric information by accessing whether risk and coverage are positively correlated. However, this is usually not the case in cooperative insurance.

[7] See Gruber (2005, pp. 397).

[8] Witt (2001, pp. 987–989).

The majority of members of cooperative insurance associations were working-class men in urban or industrial areas (see Table 1). These associations typically provided members with illness and accident insurance and, in some cases, death benefits. Since the major cost of illness and accidents was the loss of income, most societies offered cash benefits instead of medical services. Furthermore, death benefits were usually "enough to pay for a respectable funeral."[9]

Cooperative societies developed strict disciplinary rules to deal with informational asymmetries. To mitigate adverse selection problems, prospective members had to undergo medical examinations as well as "character investigations".[10] Applicants typically required a member to serve as a sponsor and the provision of references was also needed. Members would be expelled from the society for making false statements of their age or for lying during their medical examinations.

To reduce the occurrence of moral hazard, many societies banned the recovery of benefits by members who had been exposed to "unusual danger". A visiting committee was obliged to visit members requesting benefits with the purpose of identifying irregularities. Members were punished with expulsion and denial of their claims if irregularities were found.[11]

The efficiency advantage of the fraternal societies relative to commercial companies was so apparent that, in 1909, the president of Prudential Insurance Company claimed that "the assurance of a stipulated sum during sickness can only safely be transacted by fraternal organizations having a perfect knowledge of and complete supervision over the individual members."[12]

Nevertheless, despite all the effort exerted to mitigate informational asymmetries, some accounts of adverse selection, and moral hazard can be found. In an analysis of English associations, Gilbert (1965) argues that some older members would use sick benefits as pensions. Based on cross-country aggregated data from Europe between 1885 and 1908, Murray (2003) argues that societies serving workers who were not required to buy insurance faced significant adverse selection. When comparing German workers whose insurance was mandatory with those whose insurance was voluntary, he concludes:

> "The historical record suggests that, in fact, voluntary fund applicants were more likely to suffer from poorer health than were compulsory fund applicants. (...) Among 25–34 year olds in Leipzig, men in voluntary funds claimed three times as many sick days as did men in compulsory funds (22 days per member versus 7.5) and women claimed twice as many days (25 days per member versus 13)."

However, most of the data examined by Murray is aggregated and does not have important information about factors that affect the workers' risk (as age and occupation, for example). Therefore, since the analysis is based on partial correlation statistics that do not control for the workers' observable characteristics, it is not possible to test for asymmetric information formally.

[9] Gilbert (1965).
[10] The Order of the World, Fraternal Monitor, 1890.
[11] Witt (2001, pp. 802)
[12] Quoted by Starr (1982, pp. 242). See Roback (1989) or Smith and Stutzer (1992).

Table 1
Cooperative insurance societies members, Connecticut, 1891

Percent by occupation	Life societies	Sick and funeral benefit societies	Endowment societies	All societies
In business	27.86	10.33	20.31	15.15
In the professions	8.83	4.27	3.9	5.42
Farmers	0.35	1.13	0	0.89
Well-paid mechanics	34.69	45.73	46.14	42.92
Lower paid workmen	15.28	22.93	16.68	20.76
Clerks	11.24	7.05	5.91	8.09
Housewives	1.75	6.81	6.58	5.51
Workingwomen	0	1.75	0.48	1.26
Total	100	100	100	100

Source: Cummings (1893).

In a different (although related) context, Guinnane (2001) has studied a group of German credit cooperatives between 1880 and 1914. His results suggest that these cooperatives were more efficient than commercial banks for having access to better information.[13]

However, Guinnane (2001) focuses on a specific group of cooperatives and the fact that this group survived may bias the result.[14] Our approach allows us to overcome this problem since the data concerns the workers instead of the societies—and therefore, workers who belonged to unsuccessful societies are also included. Moreover, since he only had data on workers who joined the cooperative, it was not possible to test for the presence of asymmetric information. Our sample allows us to test for asymmetric information directly since we have data on workers who belonged to a cooperative association as well as on those who did not.

Unlike commercial insurance companies, cooperative insurance societies adopted an egalitarian pricing system. After the initiation fees, which were scaled by the member's age at joining, rates and benefits were equal for members of all ages and risk profiles.[15] The choice of such practices is usually attributed to social reasons,[16] although one should also bear in mind possible political motivations.[17]

To prevent the occurrence of adverse selection due to the egalitarian pricing policy, other mechanisms were developed. Age-scaled initiation fees were employed to discourage older individuals from becoming members. Men over forty were typically discouraged or prohibited from joining.[18] A rigorous medical process screened for healthy prospective

[13] Banerjee et al. (1994) develop a model of credit cooperatives and test it using data from 19th century Germany. They find support for the "peer monitoring" view according to which cooperatives had better information than commercial banks.

[14] Guinnane (2001) argues that some unsuccessful cooperatives merged with neighboring institutions and, therefore, part of their records survived. However, the fact that part of the records of the unsuccessful cooperatives was lost may bias the result.

[15] Cole (1891).

[16] Clawson (1989, pp. 227).

[17] The fact that most influential members were typically older may have contributed to maintaining egalitarian policies.

[18] See Emery (1994, pp. 13). Murray (2003) documents that L'Union du Commerce, a French fund of mutual aid societies, had a manual recommending managers to reject those over 40 since "the risk of illness is considerably augmented after that age". Hopkins (1995, pp. 18) argues that age limits in English societies were usually in the mid-thirties although some societies allowed individuals up to 46 years old to become members.

members and banned candidates based on their family history as well as their own. Hence, the admissions process limited the benefits of cooperative insurance to the healthiest members of the community.[19] As a report by the Ancient Order of United Workmen's health policy states:

> "Fraternal benefit societies have made good use of the medical examination, and the result has been the acquiring of a splendid class of risks. (...) Had no restrictions been placed upon the admission of new members, physically impaired persons would have rushed to join and a speedy end to fraternal protection would have followed."[20]

The pricing policy generated significant cross-subsidization from young and lower-risk members to old and higher-risk members within an association. To maintain the financial viability of the system, these societies had to constantly add young members with low risk profiles and prevent lower-risk members from leaving.[21] The members' impossibility to recover any of the previous investment made in the society as well as the scaled initiation fees introduced a cost for leaving.[22]

Nevertheless, it has been argued that young workers had an incentive to defer their association as well as to create new societies instead of joining existing associations where they would have to subsidize older workers.[23] The results in this paper suggest that young workers did postpone their association although societies were relatively successful in avoiding older individuals from joining.

Therefore, contemporaries generally agreed that cooperative insurers were better at monitoring members, which allowed them to mitigate moral hazard problems more effectively than commercial insurers. Their main concern, however, was that non-actuarial pricing could generate massive adverse selection.

Around 1920, the cooperative system started to decline and, by the 1930s, fraternal societies had only 8% of the market having been substituted by commercial insurance and government social programs.[24] Although the increase in government-provided insurance coincides with the drop of cooperative societies, the causal relation between them is still unknown. Moreover, as in most controversial periods in history, the same piece of evidence has been mentioned as supporting different, often contradictory, and hypotheses.

A widespread justification for the fall of cooperative insurance is that it was based on a non-viable arrangement due to its reliance on flawed commercial methods that led to

[19] Witt (2001, pp. 822).

[20] Basye (1919, pp. 50). Quoted by Kaufman (2002, pp.159).

[21] According to Cole (1891, pp. 472), "That the fraternal orders recognize the necessity for increased membership is shown by the frequency of their appeals to members to be active in securing new members."

[22] This practice could not be adopted by most commercial insurance companies since, by the 1880s, some states had passed legislations requiring them to allow policyholders to recover some part of the previous investment (Witt (2001, pp. 804)).

[23] Indeed, Witt (2001) documents that several societies were created and many older societies died off during the 1880s as low-risk members left old associations and joined new societies. Studying data from Austria and Leipzig, Murray (2003) presents evidence that sectors where insurance was compulsory had a higher proportion of insured younger workers.

[24] Zanjani (2003).

excessive financial vulnerability.[25] Egalitarian prices prevented young and healthier workers from joining. When analyzing the fate of the French societies, Zeldin (1979) argued that "ignorance of the principles governing insurance was common, methods of administration [were] amateur in the extreme (...). The most serious omission was that the whole movement was never established on an actuarial basis."[26] Furthermore, the absence of a social security system combined with increased longevity induced several workers to use the illness insurance as a pension plan.[27] Therefore, adverse selection and moral hazard significantly raised the costs of cooperative insurance causing its financial fragility and eventually led to the rise of private- and government-provided insurance.

Kaufman (2002, pp. 47) argued that "in essence, most fraternities and mutual benefit societies relied on what we now call Ponzi schemes".[28] However, although there may have been Ponzi schemes, it was not in the nature of fraternal insurance since societies could accumulate assets to guarantee resources for future liabilities.

Indeed, the financial impossibility argument has recently been challenged by Emery (1996), who studied the practices in several lodges of the Independent Order of Odd Fellows (a North American subsidiary of a British association) in British Columbia and refuted the hypothesis that the financial policies of this society were unsound. He showed that fraternal lodges would accumulate assets during their early years of operation enabling them to finance the costs of aging among its members. Emery has not, however, examined whether their pricing practices generated adverse selection or moral hazard.

Another common justification for the decline of fraternal societies is that the increase of government-provided insurance crowded out cooperative insurance. Peebles (1936), for example, affirmed that the Great Depression transformed previously indifferent government and employers into benevolent parties willing to provide workers insurance. Beito (1990) argued that the introduction of workers' compensation caused the reduction of disability insurance by cooperative associations. Green (1985) claimed that the National Health Act, which provided government-financed medical care in Britain, drove off cooperative societies.[29] This view is also consistent with the time-series evidence from Britain, Canada, and, in the case of workers' compensation, the United States.[30]

If the crowding-out hypothesis is correct, it is fundamental to assess whether benefit societies were a more efficient source of insurance. Green and Cromwell (1984), for example, believed so and, therefore, have argued that the crowding-out of benefit societies by government-provided insurance in Australia generated unnecessary inefficiencies. This

[25] See Applebaum (1961) or Clawson (1989) for analyses of the American societies. See also Gosden (1961), Zeldin (1979), and Verbruggen (1996) for the English, French, and Belgian cooperative insurance system, respectively.

[26] Quoted by Murray (2003).

[27] Gilbert (1965) argues that: "The actuarial effect of this greater longevity of friendly society members was multiplied by the growing reluctance of men in early life to join societies at all. Hence, by the end of the century the average age of friendly society members was rising rapidly both because of the increased longevity of members themselves and because new entrants came to the societies at a more mature age. In the older, larger societies, the proportion of elderly members was growing be the 1890s at an alarming rate."

[28] See also Witt (2001, pp. 822–826)).

[29] This hypothesis is less appealing in the American case since, unlike most European nations, a large-scale state-provided health insurance was not implemented in the 1910s.

[30] Using data from the 1917–1919 Bureau of Labor Statistics Cost-of-Living study, Kantor and Fishback (1996) found that the introduction of workers' compensation at least partially crowded out private accident insurance.

view contrasts with Peebles (1936) who has claimed that the depression revealed that the cooperative system was incapable of providing insurance adequately so that the introduction of government-provided insurance was necessary.

Hopkins (1995, pp. 70) claimed that "membership had been confined to the better paid worker (...). [S]ocieties had nothing to offer the poorest classes in the cities, and when the state of these deeply impoverished classes had become more and more painfully apparent toward the end of the century, then some form of state assistance became more or less inevitable." Hence, despite its undesirable effects of crowding out more efficient associations, the introduction of government-provided insurance might have been necessary for equity reasons.

It has also been argued that the slowdown of immigration in the years following World War I and the resulting assimilation helped breaking down cooperative insurance societies.[31] Similarly, it has been claimed that the decay of the cohesiveness of American communities was responsible for the decline in cooperative insurance.[32]

Some have suggested that employer-provided health insurance was a way to circumvent wage controls imposed during the Second World War.[33] However, this justification is incompatible with the evidence that the drop of cooperative societies started by the 1920s and that it was almost over by 1940. Moreover, it is not clear why it would have permanent effects.

Zanjani (2003) proposed an alternative explanation for the emergence and fall of cooperative insurance associations based on the imposition of solvency regulations. Cooperative insurance was not more efficient than its commercial counterpart but only a second-best alternative to circumvent government regulation. According to Zanjani (2003):

> "As solvency regulations were applied to legal reserve companies in the latter half of the 19th century, the market share of the (unregulated) fraternal orders grew from nothing to more than 50% before 1900. (...) Fraternal insurers declined in importance after being subjected to solvency regulation in the early 20th century."

He tested this prediction based on a series of fraternal insurance associations formed in each state between 1900 and 1952 and the results are compatible with his hypothesis. However, any other event happening at the same time (as the introduction of workers' compensation, for example) would lead to the same conclusions and we would be unable to identify the effects. A perhaps more problematic issue is that the same pattern was also observed in Canada and England where these regulations have not been adopted.[34]

Buffum and Whaples (1991) suggested that the Great Depression may have created conditions under which cooperative insurance was no longer viable. This, in turn, caused an increase in commercial and government provided insurance.

As the discussion above shows, although several theoretical explanations have been suggested, they either have important drawbacks or still have not been subject to a careful empirical evaluation. Hence, the fall of cooperative insurance is still not well understood and neither is why the American insurance system became so strikingly different from its

[31] See Kaufman (2002, pp.161).
[32] See Siddeley (1992).
[33] See Siddeley (1992).
[34] The institution of social insurance in England and the decline in fraternal societies occurred in the 1910s.

British and Canadian counterparts given that they were remarkably similar in the early 1900s.[35] Thus, to understand the reasons for the emergence of the modern insurance system and the cross-country differences, and to determine whether there are feasible alternatives to it, it is essential to understand the previous system.

This paper presents evidence that asymmetric information was not an important feature in cooperative insurance societies, unlike current insurance markets.[36] The screening process probably compensated for possible adverse selection from the egalitarian pricing. Combined with age-scaled membership fees, it may also have prevented older workers from joining. Moreover, intrusive monitoring and social pressure may have been an effective way of mitigating moral hazard.

Therefore, we reject the hypothesis that the commercial practices adopted by fraternal societies induced adverse selection and moral hazard that eventually led to its substitution by government- or employer-provided insurance.

3. Data

The data are taken from two surveys conducted by the Bureau of Labor from Michigan and California, comprising a total of 8912 workers.[37] The former was conducted in 1889 and features workers in the furniture industry. It covered a total of 73 firms in 24 cities in the state of Michigan. The survey was undertaken to gather ''reliable information relating to the social conditions surrounding employees''.

The Michigan Bureau conducted personal interviews with workers, asking several questions including the worker's socioeconomic status and, most importantly for our purposes, the number of days lost during the year, the cause for loss of time, the number of memberships in cooperative societies, and the weekly benefits received in case of sickness or accident. As shown in Table 2, 30% of the sample consists of artisans, 46% consists of skilled workers and 23% consists of unskilled workers. The ages of employees in the sample vary from 11 to 74, with the median value of 26.

Twenty-three percent of the workers belonged to a benefit society. Consistently with the fact that most societies did not allow women to become members, there is a striking disparity between the percentages of male and female who belonged to cooperative associations: Among the 216 women, only 2 of them claimed to be part of a benefit society, whereas about 28% of men belonged to a benefit association.

Among those who belonged to a benefit society, 84% were members of one association, 14% were members of two associations, and 2% were members of three associations. Among those who received benefits in case of sickness or accident, the average replacement rate was 53%. About 40% of workers who were entitled to benefits had a replacement rate higher than 50%.

[35] See Costa (1995) for a study of possible reasons for the U.S. not having established a social insurance system by the 1910s as England.

[36] See, for example, the survey by Fortin and Lanoie (1998) for evidence of moral hazard in the market for workers' compensation. Gruber (2000) presents evidence of moral hazard in the disability insurance program. Cutler and Zeckhauser (1997), Cutler and Reber (1998), and Finkelstein (2004) show evidence of adverse selection in private health insurance markets.

[37] These surveys were collected by Carter et al. (1993a,b) and are available at <www.eh.net/databases/labor/>.

Table 2
Summary statistics (Michigan)

Variable	Mean	Std. Dev.
Age	28.181	(11.518)
Skills		
Artisan	0.301	(0.459)
Skilled	0.462	(0.499)
Unskilled	0.227	(0.419)
Married	0.464	(0.499)
Female	0.040	(0.196)
Years in present occupation	6.444	(7.489)
Years with present employer	2.978	(3.523)
Days lost during the year	40.221	(36.423)
Annual family earnings	399.822	(208.049)
Weekly benefit in case of Sickness or Accident	6.100	(3.046)
Replacement rates	0.528	(0.361)
Replacement rates > 25%	0.915	(0.278)
Replacement rates > 50%	0.398	(0.490)
Replacement rates > 75%	0.131	(0.338)
Replacement rates > 100%	0.061	(0.239)
Replacement rates > 125%	0.027	(0.163)
Age began to work	13.939	(2.590)

Source: 1889 Michigan Bureau of Labor.
Notes: Skills, Married, and Female are dummy variables. Replacements Rates were calculated based on a 300-day work year: Replacement rates = (300/7)*(Weekly Benefits)/(Annual Earnings). When calculating the weekly benefits in case of sickness or accident and the replacement rates, 9 outlier observations were excluded since the reported values were unrealistically high and were probably due to miscoding. The reported weekly benefits were more than 30 times greater than the average benefits and replacement rates were between 1637 and 8035%.

The most cited reason for loss of time was by far the inability to obtain work, with more then 2000 answers. Sickness and accidents were cited by 426 workers.

The other data set consists of a survey conducted by the California Bureau of Labor Statistics among 3493 workers in 1892. The interviews featured questions regarding the worker's socioeconomic status as well as the number of days lost due to illness, whether the worker belongs to a benefit society, the weekly benefits in case of accident, and other benefits covered by the association. Surveyed workers were between 10 and 76 years old and the median age is 26. Table 3 presents the main descriptive statistics of the California survey.

Among members of benefit societies, 80% received only weekly benefits in case of illness or accidents. For about 19% of workers, the benefits included the access to doctors.

Unlike the Michigan survey, the California survey suffers from a significant amount of missing data: only 939 workers have answered the number of days lost due to illness. However, there does not seem to be a selection problem since the probability of not having this information is not correlated with the probability of being a member of a benefit society.

Among workers who were entitled to benefits in case of sickness or accident, the average replacement rate was 61%. About half of them had replacement rates higher than 50 and 11% had replacement rates greater than 100%.

These surveys were not random samples of the population. Since they were conducted by visiting firms, self-employed or unemployed workers, and housewives were not interviewed. The Michigan survey contains relatively few individuals over 65 and 70% of the sampled individuals worked in the two largest cities. However, the proportion of skilled

Table 3
Summary statistics (California)

Variable	Mean	Std. Dev.
Age	28.156	(12.398)
Married	0.306	(0.461)
Female	0.182	(0.386)
Years in present occupation	9.750	(9.917)
Years with present employer	3.563	(4.559)
Days lost during year		
Days lost due to illness	25.510	(33.808)
Days lost due to no work	70.769	(61.468)
Days lost due to other reasons	28.740	(27.323)
Annual family earnings	670.481	(328.948)
Weekly benefit in case of sickness or accident	10.167	(4.728)
Replacement rates	0.612	(0.313)
Replacement rates > 25%	0.976	(0.152)
Replacement rates > 50%	0.523	(0.500)
Replacement rates > 75%	0.241	(0.428)
Replacement rates > 100%	0.107	(0.310)
Replacement rates > 125%	0.041	(0.199)
Age began to work	15.071	(2.918)

Source: 1892 California Bureau of Labor.
Notes: Married and Female are dummy variables. Replacements Rates were Calculated based on a 300-day work year. When calculating the weekly benefits in case of sickness or accident and the replacement rates, 3 outlier observations were excluded since the reported benefits were unrealistically high (especially compared to the worker's wage).

and unskilled workers matches the 1900 census sample remarkably well.[38] Furthermore, the proportion of workers belonging to a benefit society also seems to be quite similar to other estimates.[39] In the California survey, 42.5% of male workers were members of cooperative associations, which is slightly above other estimates.

4. Empirical tests

Adverse selection occurs when the agent has better information than the insurer about parameters that are relevant for the relationship. In most theoretical models, this information concerns their level of risk. Then, for any given price, riskier workers demand more insurance.[40] Moral hazard occurs when the probability of missing work due to sickness or accidents depends on some non-contractible decision made by the agent so that agents

[38] In the survey, 23% of workers were unskilled while in the 1900 national sample, this number was 24%. This information was not available in the California survey.
[39] Among the male workers in the Michigan survey, 28% were members of a cooperative association. According to a survey conducted in 1890 by the Maine Bureau of Industrial and Labor Statistics, about 34% male workers belonged to a benefit society. In a survey conducted by the Kansas Bureau of Labor and Industrial Statistics between 1884 and 1887, about 26% of workers were members of a benefit association. In a survey among 549 farmers conducted by the Wisconsin Bureau of Labor, Census and Industrial Statistics in 1895, this number is about 20%. A survey conducted by the Michigan Bureau of Labor and Industrial Statistics in 1890 found that about 29% of male workers in the agricultural implement and iron industries in Detroit belonged to a benefit society. These numbers are also close to the estimate of Beito (2000) according to which the proportion of male workers who were members of a benefit society in 1920 was about 1/3.
[40] See Rothschild and Stiglitz (1976).

with more coverage voluntarily choose to exert less preventive actions and, therefore, face a higher probability of having accidents.[41] Hence, although the causality may go in both ways, models of asymmetric information predict a *positive correlation between coverage and risk*.

This prediction seems to be quite robust. In particular, it does not require specific assumptions on preferences and remains valid when private information is multidimensional. Moreover, since this correlation holds for any price scheme, it does not require the estimation of the firm's pricing policy and also does not assume that the firm is pricing optimally. Thus, we do not need to address the issue of whether cooperative societies were adopting an optimal pricing mechanism to test for the existence of asymmetric information in their contracts.

Notice, however, that the relevant correlation for the test is a conditional correlation. More specifically, the theory predicts that within a group of observationally identical buyers (or, controlling for all observable attributes), there must be a positive correlation between risk and coverage. It does not imply that the unconditional correlation must be positive.

To examine for asymmetric information in the cooperative insurance contracts, we apply a test proposed by Chiappori and Salanié (2000) which is based on a pair of probits.

Denote by $i = 1,\ldots,n$ the workers in the sample. Let X_i denote the set of exogenous variables for individual i. Define the following binary variables:

$$y_i = \begin{cases} 1 & \text{if } i \text{ belonged to an insurance society} \\ 0 & \text{if } i \text{ did not belong to an insurance society} \end{cases},$$

$$z_i = \begin{cases} 1 & \text{if } i \text{ got sick or suffered an accident} \\ 0 & \text{otherwise} \end{cases}.$$

Since the two surveys have somewhat distinct questions, the variable z_i adopted in each of them is slightly different.[42] When using the Michigan survey, it is defined as a dummy variable taking value 1 if the worker reported sickness or accident as a cause for loss of time during the year.

The California survey does not report the causes for loss of time but, instead, reports the number of days lost due to illness. Then, when using the data from the California survey, z_i is defined as a dummy variable indicating whether the worker got sick for more than a given number of days.

Now, we set two probit models: one for becoming a member of an insurance society and another for the occurrence of getting sick or suffering an accident:

$$y_i = I(X_i\beta + \varepsilon_i > 0) \text{ and } z_i = I(X_i\gamma + \eta_i > 0),$$

where $I(\cdot)$ denotes the indicator function and ε_i and η_i are independent standard normal random variables.

Each probit is estimated independently. The generalized residuals are given by

[41] See Holmstrom (1979).

[42] Ideally, one would define z_i as a dummy variable indicating whether the individual received sickness or accident benefits. However, since this data is not available, the occurrence of sickness or accident is used as a proxy.

$$\hat{\varepsilon}_i \equiv E[\varepsilon_i|y_i] = \frac{\phi(X_i\hat{\beta})}{\Phi(X_i\hat{\beta})}y_i - (1-y_i)\frac{\phi(X_i\hat{\beta})}{\Phi(-X_i\hat{\beta})} \text{ and}$$

$$\hat{\eta}_i \equiv E[\eta_i|y_i] = \frac{\phi(X_i\hat{\gamma})}{\Phi(X_i\hat{\gamma})}y_i - (1-y_i)\frac{\phi(X_i\hat{\gamma})}{\Phi(-X_i\hat{\gamma})},$$

where $\phi(\cdot)$ and $\Phi(\cdot)$ denote the pdf and the cdf of the standard normal distribution.

As argued before, economic theory predicts that, in the presence of asymmetric information, the correlation between the choice of joining an insurance society and the risk conditional on observable characteristics must be positive. Moreover, whenever information is symmetric, economic theory predicts that this correlation must be zero (as long as individuals are risk-averse).

Therefore, under the null hypothesis of symmetric information, the covariance between ε and η must be zero:

$$E(\varepsilon\eta) = 0.$$

Squaring both sides, we obtain:

$$[E(\varepsilon\eta)]^2 = \frac{[E(\varepsilon\eta)]^2}{E(\varepsilon^2\eta^2)} = 0,$$

where the first equality follows from the fact that ε and η are independent standard normal variables.[43]

Applying the analogy principle, according to which one should substitute a population condition by its sample counterpart, it follows that

$$W \equiv \frac{(\sum_{i=1}^{n}\hat{\varepsilon}_i\hat{\eta}_i)^2}{\sum_{i=1}^{n}\hat{\varepsilon}_i^2\hat{\eta}_i^2},$$

should be "close" to zero under the null hypothesis.[44] A "large" W indicates that the covariance between ε and η is different from zero and, therefore, is evidence against the null hypothesis.

From the results of Gourieroux et al. (1987), it follows that W is asymptotically distributed as a $\chi^2(1)$ under the null hypothesis of conditional independence between ε_i and η_i. Thus, under the null of symmetric information, W is asymptotically distributed as a χ^2 variable with one degree of freedom.

This procedure can also be used to model the choice of joining two or more benefit societies as well as the choice of how much benefit to receive in case of sickness or accident. Hence, in the Michigan sample, we also consider the alternative specifications where y_i is taken as a dummy variable indicating whether the worker was entitled to benefits greater than a given threshold in case of sickness or accident.

The variables included in X_i in the Michigan sample are: age, age began working, and dummies for occupation (31), skill (2), city (17), place of birth (11), firm (21), sex (1), mar-

[43] Since they are independent standard normal, $E(\varepsilon^2\eta^2) = E(\varepsilon^2)E(\eta^2) = 1$.

[44] The W statistic was proposed by Chiappori and Salanié (2000).

ried (1), widowed (1), number of dependents (5), and whether the worker had a sewing machine (1). To account for possible non-linearities, we also included the square of age. Thus, we control for 94 variables plus a constant.[45]

The variables included in X_i in the California data are: age, age began working, the square of age, and place of birth (20), industry (4), occupation (10), marital status (2), sex (1), number of dependents (5), and dummies for not answering the age, the age began to work, and the sex. Hence, we control for 48 variables and a constant in the California sample.[46]

The fact that a positive correlation between coverage and risk is implied by both adverse selection and moral hazard has important implications. It allows us to test for the presence of asymmetric information without having to specify whether the informational asymmetry is caused by moral hazard, adverse selection, or both. However, it does not allow us to untie adverse selection effects from those of moral hazard. The fact that fraternal societies provided insurance against illness, accidents, and death complicates an attempt to discriminate the causes of informational asymmetries in these societies. It is usually argued that adverse selection is more relevant than moral hazard for life insurance since the decision of whether to live is not likely to be substantially affected by insurance benefits. On the other hand, moral hazard is likely to be extremely important in disability insurance. Cooperative societies defined sickness as the inability to work at one's usual occupation.[47] Such a subjective criterion may affect a worker's willingness to consider himself disabled.

4.1. Factors affecting the probability of joining a cooperative society

First, we study the factors determining whether a worker belongs to a cooperative society, and whether or not the worker is eligible to receive positive sickness or accident benefits. This corresponds to running the first probit, letting y_i denote each of these actions. The results are reported in Table 4. The parameters estimated in all choice specifications and in both surveys are very similar.

As expected, women were less likely to join a fraternal association even though they did not have a different probability of getting sick or suffering an accident. Skilled workers were much more likely to belong to a cooperative association as well as receiving weekly benefits in case of sickness or accident than unskilled workers.[48]

The parameters of age and the square of age are both statistically significant. The estimated probability as a function of age is bell-shaped: it is increasing for workers younger than about forty and decreasing for older workers (see first column of Table 5 and Fig. A.1).[49]

[45] See Table A.1.
[46] See Table A.2.
[47] See Emery (2001).
[48] They were also less likely to become sick or suffer an accident.
[49] Forty years old corresponds to the 83‰ in the Michigan sample and to the 85‰ in the California sample. Fig. A.1 depicts the proportion of workers who were members of cooperative societies for the Michigan sample. The figure for the California sample is similar and was presented in an earlier version of this paper, which is available from the author.

Table 4
Probability of belonging to a benefit society or being entitled to benefits

	Michigan				California	
	Belong to a benefit society		Entitled to sickness or accident benefits		Belong to a benefit society	
	coef.	*p* Value	coef.	*p* Value	coef.	*p* Value
Constant	−3.858	0.000	−3.788	0.000	−4.636	0.000
	(0.302)		(0.300)		(0.574)	
Age	0.151	0.000	0.148	0.000	0.246	0.000
	(0.014)		(0.014)		(0.030)	
Age^2	−0.002	0.000	−0.002	0.000	−0.003	0.000
	(0.000)		(0.000)		(0.000)	
Female	−1.166	0.001	−1.064	0.001	−0.873	0.000
	(0.351)		(0.332)		(0.212)	
Married	−0.002	0.984	0.011	0.932	0.236	0.121
	(0.122)		(0.124)		(0.153)	

Notes. Standard deviations are shown in parenthesis. Regressions include the variables described in Tables A.1 and A.2.

Table 5
Highest probability of belonging to an association (Age)

	Unweighted	Weighted
Michigan		
Belonging to a cooperative society	41.1	40.86
Being eligible for positive sickness or accident benefits	41.14	40.84
California		
Belonging to a cooperative society	39.73	—

Notes. Calculated from the estimates presented in Table 4. "Weighted" refers to the weighted probit described in Section 4.3.

This non-monotonicity is possibly due to two competing effects. On the one hand, the egalitarian pricing scheme induced individuals to defer their inclusion in the cooperative association and choose to join more societies when older. However, this behavior caused a negative externality to all other members of the association since older individuals had, on average, higher risk. Thus, as described in Section 2, societies adopted-scaled entrance fees as well as age-based screening to discourage older individuals from joining.

Our results suggest the first effect dominated until workers were about forty. After that age, either their entry was forbidden or the entrance fees were so high that it did not pay to postpone the join decision any further or to join other associations. This result is consistent with the accounts that men over 40 were typically discouraged or prohibited from joining.[50] Therefore, we find evidence that young individuals did postpone their association decision although societies successfully prevented workers older than 40 from entering.

Another possible cause for the decrease in the probability of belonging to a benefit society after age 40 is a change in the (unobservable) characteristics of workers in the surveyed industries. This would happen if less healthy individuals were less likely to belong to a benefit society and were more likely to leave the industries as they aged. However, as we show

[50] See Emery (1994, pp. 13), Murray (2003), or Hopkins (1995, pp. 18).

in the next section, becoming sick or suffering an accident is not correlated (after controlling for observable characteristics) with belonging to a benefit society. Hence, even if less healthy workers left the industry as they aged, this would not affect the probability of belonging to a benefit society.

4.2. Asymmetric information in cooperative societies

We test for asymmetric information in the choice of whether or not to join a cooperative society, and whether or not to receive sickness or accident benefits greater than zero, one, or two dollars per week. Because our focus is on the asymmetric information, the results from the probit determining the probability of becoming sick or suffering an accident are not reported here.[51]

As described previously, under symmetric information, the amount of coverage an individual purchases is uncorrelated with the individual's risk (controlling for observable characteristics). Under asymmetric information, risk, and coverage are positively correlated. To partial out the effect of observable characteristics, we calculate the residuals of two probit regressions. Then, the test consists on examining whether the correlation between the residuals is "close" to zero.

The W test statistics for the presence of asymmetric information as well as the correlation between the residuals are presented in the first column of Tables 6 and 7.

The null hypothesis of symmetric information is not rejected in any of the three specifications for the Michigan sample under the critical value of 60%. The same conclusion holds for the California sample for almost all threshold levels (see Fig. A.2). Thus, we find strong evidence of symmetric information in cooperative insurance societies.

The only case where asymmetric information could not be rejected is for the California sample for threshold levels between 43 and 52. However, the correlation between residuals was negative, which suggests that, if one side of the market was better informed about the worker's risk, it was the insurance societies.[52] Moreover, if we apply a Bonferroni adjustment to take into account the multiplicity of the tests performed, we cannot reject the null hypothesis of symmetric information for any threshold level under the significance level of 20%.[53]

A potential problem with the preceding results is the use of data from female workers in the regressions. As shown in Table 1, very few workingwomen belonged to benefit societies. Hence, the factors that affected the membership decision might differ significantly between male and female workers. Furthermore, some of the women that were included as members of benefit societies might be due to miscoding.[54]

To investigate this problem, we have performed the previous calculations excluding women from the sample. The results are reported in the second column of Tables 6 and

[51] These results are presented in an earlier version of this paper, which is available from the author.

[52] See Maskin and Tirole (1990) for a model featuring an "informed principal". Although missing work between 43 and 52 days because of sickness is not among the worse states of nature (about 12.5% of workers missed more than 52 days), it was relatively rare. Only about 5% of workers lost between 43 and 52 days due to sickness. Our results suggest that, for this range, societies were better at evaluating the probability of missing work due to sickness. This might have been due to societies knowing better the probability of some industry-specific diseases or analyzing in more detail than some workers their family history for some types of diseases.

[53] In that case, the adjusted p value for the 45 days threshold level becomes 0.2149.

[54] The possibility of miscoding is more problematic in the California sample, where 4.2% of members of benefit societies were women. In the Michigan data set, only 0.16% of members were women.

Table 6
W Test for asymmetric information (Michigan)

Choice	All workers			Male workers			Weighted probit		
	Corr.	*W*	*p* Value	Corr.	*W*	*p* Value	Corr.	*W*	*p* Value
Admission in a cooperative society	0.0065	0.2082	0.6482	0.0093	0.4339	0.5101	−0.0488	0.5555	0.4561
Eligible for weekly benefits > \$0 if Sick or Accident	0.0050	0.1268	0.7218	0.0078	0.317	0.5734	−0.0447	0.6519	0.4194
Eligible for weekly benefits > \$1 if Sick or Accident	0.0050	0.1293	0.7192	0.0079	0.3244	0.569	−0.0432	0.6281	0.428
Eligible for weekly benefits > \$2 if Sick or Accident	0.0051	0.1318	0.7166	0.0080	0.3316	0.5647	−0.0460	0.6690	0.4134

Notes. "Corr." denotes the correlation between the residuals of the probits determining the "Choice" and becoming sick or suffering an accident. "*W*" denotes the *W* statistic.

Table 7
W Test for asymmetric information (California)

	All workers			Male workers		
Minimum number of days sick	Corr.	*W*	*p* Value	Corr.	*W*	*p* Value
15 Days	0.0033	0.0086	0.9261	0.0060	0.0173	0.8954
20 Days	−0.0003	0.0000	0.9962	−0.0004	0.0012	0.9724
25 Days	−0.0186	0.3561	0.5507	−0.0215	0.3611	0.5479
30 Days	−0.0201	0.3191	0.5721	−0.0334	0.7687	0.3806
35 Days	−0.0413	1.3163	0.2513	−0.0589	2.1921	0.1387
40 Days	−0.0524	2.3428	0.1259	−0.0641	2.5816	0.1081
45 Days	−0.0737	4.7369	0.0295	−0.0945	5.4281	0.0198

Notes. "Corr." denotes the correlation between the residuals of the probits determining the choice of belonging to a benefit society and becoming sick for the given minimum number of days. "*W*" denotes the *W* statistic.

7. As in the previous analysis, the null hypothesis of symmetric information is not rejected in all specifications for the Michigan sample. In the California sample, the null hypothesis is not rejected at significance level of 5% for all threshold levels except for levels between 43 and 52 days. In that interval, the evidence suggests that cooperative societies might have known more about the workers' probabilities of sickness than the workers themselves.[55]

4.3. Weighted probit

Another potential problem with the previous regressions is the possibility of selection bias. Since representatives of the Bureau of Labor conducted interviews by visiting firms, individuals who worked more days were more likely to be interviewed. Thus, as workers with higher rates of sickness and accidents had a lower probability of being interviewed, our results could be biased.

To correct for this bias, we estimate a weighted probit, where higher weights are assigned to workers with lower probabilities of being sampled. Assuming that the

[55] Applying the Bonferroni adjustment, the *p* value for the 45 days threshold level becomes 0.1358.

probability of being sampled is the same for every day worked, the appropriate weights are given by the inverse of the number of days worked.[56]

As shown in the second column of Table 5, the estimated age where the probability of belonging to a benefit society or being entitled to positive benefits is highest does not considerably differ from the one obtained in the unweighted probit.[57]

The W test statistic for the Michigan sample is presented in the last column of Table 6.[58] First, notice that the correlation between the residuals becomes negative when the weights are introduced, indicating that selection might be biasing the result towards the hypothesis of asymmetric information.[59] Moreover, the null hypothesis of symmetric information is not rejected under extremely high significance levels after controlling for the probability of being interviewed.[60]

Therefore, the results obtained in this paper indicate that cooperative societies were successful in circumventing the problems associated with asymmetric information. This conclusion becomes even more evident when one contrasts our results with evidence from most current insurance markets (especially accident insurance), which seem to be deeply affected by adverse selection and moral hazard. Hence, the empirical evidence analyzed in this paper supports the view that cooperative insurance was effective in dealing with informational asymmetries.

Nevertheless, cooperative insurance was not accessible to all workers. More than one half of workers in the California survey and almost 3/4 of workers in the Michigan survey were not members of fraternal societies. This proportion is substantially higher than the 15% of Americans who were uninsured in 2002, which is already much higher than the proportion in other developed countries.[61] Lower income workers had significantly less access to insurance.[62] African Americans were prohibited

[56] The Michigan sample provides the number of days lost during the year. Assuming that an individual can work, at most, 300 days per year, the amount of days worked is given by: 300-#(days lost). The results, however, seem to be quite robust with respect to the weights chosen.

[57] Indeed, none of the coefficients of variables reported in Table 4 significantly changed under the weighted probit.

[58] In the weighted probit case, the W statistic becomes $W \equiv \frac{\left(\sum_{i=1}^{n} w_i \hat{\varepsilon}_i \hat{\eta}_i\right)^2}{\sum_{i=1}^{n} w_i^2 \hat{\varepsilon}_i^2 \hat{\eta}_i^2}$, where w_i denotes the weight attributed to individual i.

[59] A possible explanation for this result is that, for individuals who missed work more often, cooperative societies might have been better informed about their probabilities of sickness and accidents than the own workers. However, since the correlation is not statistically different from zero, this "informed principal" hypothesis is rejected for the whole sample.

[60] Unfortunately, about 87% of the workers in the California sample did not answer the amount of days worked. Hence, we could not run the weighted probit using data from the California sample.

[61] See Gruber (2005, pp. 397).

[62] Buffum and Whaples (1991) estimated that a 10% rise in wages increased the probability of purchasing sickness or accident insurance by 10% for Michigan workers in the 1880s. Costa (1995) estimated that California workers in the 1890s had an elasticity of insuring with respect to husband's earnings of 0.23 for health or accident insurance and 0.1 for health insurance alone. Di Matteo and Emery (2002) examined the market for life insurance in Ontario in 1892. They concluded that, although the likelihood of holding insurance was generally increasing in wealth for the whole sample, it was decreasing for sufficiently low wealth levels. Fishback and Kantor (1992) also obtained a positive correlation between wages and belonging to a benefit society for surveys conducted between 1884 and 1903 for the states of California, Maine, Kansas, New Jersey, and Indianapolis. However, they have argued that this correlation may also be due to companies paying a risk premium to workers who faced more dangerous working conditions.

from joining most white fraternal societies.[63] Most benefit societies did not allow women to become members. Thus, even if cooperative insurance was more efficient, equity considerations must also be taken into account when comparing it to modern insurance institutions.[64]

5. Conclusion

Cooperative insurance was the main source of sickness and death insurance in the United States between the mid-1880s and the 1920s. However, it started to decline in the 1920s and, by the 1930s, fraternal societies had only 8% of the market, having been substituted by commercial insurance and government social programs. Understanding the reason for the collapse of benefit societies is fundamental to understand the rise of modern insurance and to evaluate whether there are feasible alternatives to it.

In this paper, we have tested for the presence of asymmetric information in cooperative insurance societies and analyzed how their pricing policies affected the age of members. We find strong and robust evidence that, unlike their modern substitutes, benefit societies were able to mitigate the asymmetry of information.

Our results suggest that the egalitarian pricing combined with scaled entry fees and a policy of discouraging individuals older than 40 from becoming members generated countervailing incentives for joining a fraternal society. As a result, the probability of being a member of a fraternal association increased until workers were almost 40, when it started to decrease.

More generally, the experience from cooperative insurance supports the view that nonfirm institutions may benefit from informational advantages. However, the remarkably unequal access to cooperative insurance must be kept in mind when addressing its welfare benefits and comparing it to modern insurance markets.

[63] An 1891 study reported that over 97% of the cooperative societies in Connecticut required members to be white—see Witt (2001, pp. 804). Kaufman (2002, pp. 27) documents that 34% of the fraternal societies in Boston in 1900 formally excluded blacks from membership and at least another 16% had barriers to racial integration.

[64] Of course, comparisons between late 19th century and modern institutions should be taken with caution due to demographic and social differences. In particular, since the population was much younger, it is natural for them to have less people insured. Furthermore, segregation was present in most 19th century institutions and it could have been infeasible to think of a non-discriminatory insurance system.

Appendix A

Table A.1
Variables (Michigan)

Category	Variables
City dummies	Adrian, Allegan, Ann Harbor, Big Rapids, Buchanan, Charlotte, Constantine, Detroit, Grand Ledge, Hillsdale, Manistee, Muskegon, Newaygo, Niles, Potterville, Saginaw, and Sturgis.
Firm dummies	Berkey & Gay Furniture Co., Nelson Matter & Co., Phoenix Furniture Co., Widdicombe Furniture Co., Bissell Carpet Sweeper Co., Globe Furniture, Grand Rapids Chair Co., Grand Rapids Furniture, Grand Rapids Refrigerator Co., C.H. Haberkorn & Co., Hargreaves Manufacturing Co., Kent Furniture Manufacturing Co., McCord and Bradfield Furniture Co., M.J. Murphy Co., Oriel Cabinent Co., F. Poseliues & Bros., Sligh Furniture Co., St. Johns Manufacturing., C.D. Stuard., Welch Folding Bed Co., and Wm A. Berkey Furniture Co.
Occupation dummies	Assembler, bench hand, cabinet maker, carpenter, carver, chair maker, chair weaver, clerk, engineer, filler, finisher, foreman, gilder, gluer, laborer, lumber piller, machine hand, machinist, metal worker, molder, packer, painter, polisher, round worker, sander, teamster, trimmer, turner, upholster, varnisher, and woodworker
Skill dummies	Artisan, skilled.
Age	Age, age squared, and age began working.
Family dummies	Married, widowed, one dependent, two dependents, three dependents, four dependents, and five or more dependents.
Sex dummies	Female.
Home characteristics dummies	Whether the worker has a sewing machine.
Place of birth dummies	Canada, England, Germany, Holland, Indiana, Michigan, NY, Ohio, Poland, Sweden, and US.

Table A.2
Variables (California)

Category	Variables
Place of birth dummies	Austria, Australia, California, Canada, Denmark, England, France, Germany, Illinois, Ireland, Italy, Maine, Massachusetts, New York, Norway, Ohio, Pennsylvania, Scotland, Sweden, and Switzerland.
Industry dummies	Coast sailor, dry goods employee, street RRs, and tailoring.
Occupation dummies	Cable conductor, carpenter, cigar maker, finisher, gripman, laborer, machinist, maker, sailor, and tailor.
Age	Age, age squared, and age began working. Dummies for not answering age and not answering age began working.
Family dummies	Married, dummy for not answering whether the worker is married, one dependent, two dependents, three dependents, four dependents, and five or more dependents.
Sex dummies	Female, dummy for not answering the sex.

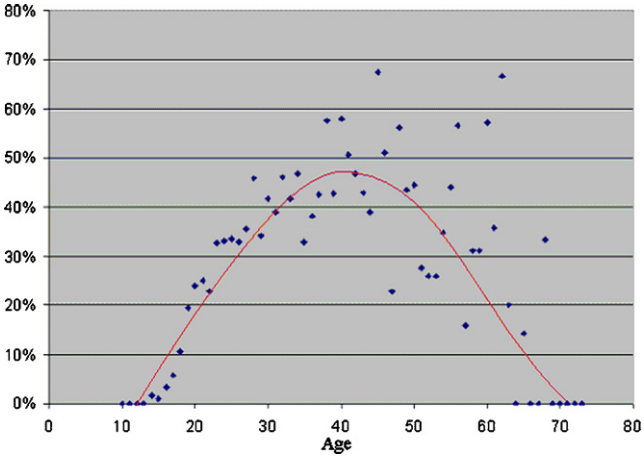

Fig. A.1. Percent of workers who are members of a Cooperative Society (Michigan).

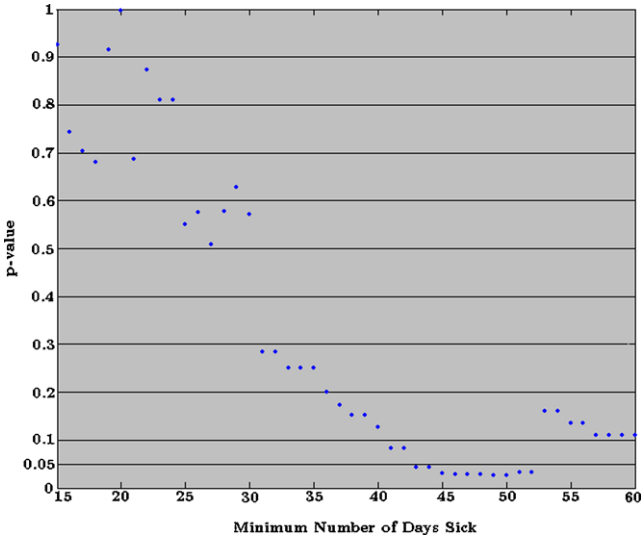

Fig. A.2. p Values of W test for different cutoff levels (California).

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