Identifying, separating, and managing asymmetric information in early 20c health insurance

The existing literature on insurance contracts emphasizes the difficulty of separating evidence of moral hazard from that showing adverse selection. Contrary to theoretical and intuitive expectations, little empirical evidence of asymmetric information has emerged. This paper surmounts the difficulties of separate testing for each kind of adverse selection by using historical data on master contracts for a large number of group health policies. Not only did each problem appear in testing, but contemporary publications indicated awareness of those problems and of their potential solutions. Having shown that each condition existed, the paper then considers how sickness insurance funds managed each problem. Longer probationary periods before applicants became covered reduced adverse selection. Longer waiting periods before claimants could receive benefits reduced the moral hazard of paid sick leave. These findings support previous claims of the fundamental institutional soundness of early forms of health insurance.

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In theory, insurance contracts are rife with informational asymmetries. The empirical literature has been catching up to the theoretical literature over the last decade or so, but some seemingly obvious theoretical predictions still remain to be established or decisively refuted. This essay examines whether a simple but historically important type of health insurance was subject to adverse selection and moral hazard, if the two can be distinguished empirically, and how insurers attempted to ameliorate such informational problems. Recent studies have not found much evidence of asymmetric information in past or present health insurance. The results of the present study suggest that these findings may follow from policy requirements that specifically aimed to mitigate these problems. The net effect in claims behavior, then, is to even out the playing field for insurer and insured in information terms, and reduce the impact of asymmetric information to the point where statistical tests cannot detect it. This paper investigates the interaction of such policy requirements and the frequency of successful claims. Variation in the ability of countermeasures to thwart information asymmetries reveals both their existence and the success of insurers in reducing their impact.

The present study uses data from a broad survey of health insurers conducted early in the twentieth century. The breadth of the data is unique, encompassing some 391 companies with sickness insurance funds. Effectively, the data consist of premium and claims information on master contracts for group health insurance. The historical nature of the data enables a clearer analysis than many studies of the present, as they were generated from a relatively simple set of insurance contracts. By far the most important benefit of health insurance in those days was a cash payment that replaced wages during sick leave. Even the minority of sickness insurance funds that provided medical benefits

in addition to paid sick leave did so not to assist the worker/claimant directly but to ensure that their physician would determine a worker's eligibility for benefits—and not a physician hired by the worker (Murray 2007; cf. Arrow 1971, 203). Clearly the primary moral hazard of sick pay was its tendency to encourage unnecessary absence, and it has been shown elsewhere that sick pay was in fact correlated with absenteeism. In addition to sick pay, absenteeism rates were also correlated with variables that suggest informational advantages enjoyed by the worker, as well as countermeasures employed by the insurance funds.

Contemporary observers of these insurance funds understood the potentially debilitating effects of informational asymmetries (Dawson 1917). It is apparent from their writings that they saw few common aspects of adverse selection and moral hazard, but rather they regarded them as two separate problems that required separate solutions. This study tests for the relationship between two characteristics of sickness funds, one associated with moral hazard and one with adverse selection, and claims against the insurance fund. It then tests for the ability of each mitigating strategy, in turn, to reduce such claims. I find that these strategies effectively reduced effects of both kinds of asymmetric information on claims behavior.

Informational asymmetries in insurance markets

In an insurance contract, the buyer, or insured, pays the seller, the insurer, a relatively small sum in exchange for the promise of a future payment from the insurer contingent upon a particular event happening. It is convenient to think of this arrangement as a Stackelberg type contract game, in which the uninformed party moves first to offer a

contract in take-it-or-leave-it fashion. The informed party, the potential insured, may have two kinds of private information. *Hidden information* about his characteristics leads to adverse selection; *hidden actions* characterize moral hazard (Salanie 2005, 3-6; compare Pauly 1968 to Arrow 1971).

Each type of asymmetric information induces inefficiencies in the insurance contract, and so insurers seek to mitigate their effects. One hedging strategy for the insurer is to create several types of policies corresponding to the applicant's estimated risk of making a claim, and then to investigate the applicant to determine the appropriate risk group to which he should belong (Salanie 2005, 52, 89). However, in the case of the mutual insurance funds, workers had little choice in the type of policy they could purchase. Many funds offered one flat value of benefit and premium for all members. Among those that offered variable premiums and benefits, their value was determined by the worker's wage specifically to keep workers from signing on for benefits that were worth close to their usual earnings.

To reduce moral hazard, insurers may want to pass some of the cost of the risk onto the insured (Salanie 2005, 149). The optimality of cost sharing in health insurance is the subject of considerable debate. An early and influential argument in Shavell (1979) proposed that if the insurer could only imperfectly observe effort by the claimant to avoid the insured-against event, then optimal insurance levels would involve less than complete coverage. The argument carries through if the observation only concerns the accuracy of the claim, as in the present case, and again as in the present case, less than complete coverage could conveniently require a deductible (see also Pauly 1968, 536). At the same time, what makes the deductible effective as an incentive is the close

substitutability of the insurance benefit and the ex ante condition (for example, a new car as a substitute for a demolished old car). The relative lack of substitutability of ex post health care for ex ante levels of health may lead the optimal health insurance contract to omit deductibles (Bardey and Lesur 2005).

While the implications of contract theory regarding asymmetric information, and its decomposition into adverse selection and moral hazard, are straightforward, the empirical literature has developed only recently. A longstanding empirical problem has been to distinguish between moral hazard and adverse selection, as opposed to testing for the presence of either or both under the rubric of asymmetric information (Chiappori 2000, Finkelstein 2004). That is, a test for positive correlation between risk-events and insurance coverage in the cross section cannot ordinarily distinguish between the two types of asymmetric information. The fundamental problem concerns consequences of endogenous selection, particularly along unobserved characteristics, and may be resolved through analysis of panel data (Salanie 2005, 212-216). This paper aims to finesse this problem of matching workers to contracts by using data in which workers were assigned insurance contracts based on an exogenous variable, their wages. The econometric testing should be relatively straightforward, without recourse to natural experiments or panel data, as it is based on untangling the differential effects of various claiming requirements.

The thrust of the empirical literature is that evidence of asymmetric information is extremely hard to produce. A foundational paper for the empirical testing for informational asymmetries is Chiappori and Salonie (2000). They develop a relatively simple test for asymmetric information in which the ratio of error terms from probit

regressions for belonging to an insurance society and suffering an illness should be distributed as a $\chi^2(1)$ under the null of symmetric information. Contrary to previous results, they find no evidence for asymmetric information at all in data from the French automobile insurance market.

Similarly, in the most prominent paper to consider markets for health insurance, Cardon and Hendal (2001) also found no support for the hypothesis of adverse selection. They noted a specific problem of the important role of unobservables. In particular, "the main hurdle to empirical work," they wrote (p. 409), "is the lack of appropriate data on contracts as well as on performance." In early health insurance, however, contracts displayed little heterogeneity, and the survey this paper uses recorded virtually all necessary parameters, on contracts as well as performance.

Two historical studies suggest that informational asymmetries were not a great problem in the past. Gottlieb (2007) used late nineteenth century, individual-level data from the Historical Labor Statistics Project. Estimating the test statistic introduced by Chiappori and Salonié (2000), he failed to reject the null hypothesis of symmetric information. In the middle of the twentieth century (Thomasson 2004), adverse selection appeared in individual health insurance but not the much larger market for group health. She took advantage of differing pricing strategies of commercial, for-profit insurers and the non-profit Blue Cross and Blue Shield. For a time, the Blues priced policies through community rating while the commercial insurers used experience rating. By changing their practices so as to adopt experience rating, the Blues seem to have dulled any impact that adverse selection might have had. In the empirical literature as a whole, it seems odd

that a well known and intuitive theoretical inference should have received so little statistical support.

Early twentieth century health insurance

The extent, and even existence, of health insurance in early twentieth century America has been overlooked by historians. By focusing on failed political struggles to establish government insurance, they missed the institutions that actually existed at that time (Murray 2007; cf. Klein 2003, Gordon 2003, Quadagno 2005, Lubove 1985). These insurance funds covered about a third of the industrial labor force—a share that was growing at a time when the labor force itself grew absolutely by some 27 million (Murray 2007, 91). These mutual sickness funds, sponsored by fraternal societies, employers, and labor unions, provided the lion's share of health insurance in the United States until the mid- to late- 1930s, and did so effectively (Emery and Emery 1999; Emery 1996; Beito 2000). Since the data examined here were drawn from establishment funds, it might be simplest to concentrate on them, while noting that there were many similarities between establishment funds and fraternal and union funds.

Commercial insurance, whether in the form of individual or group health policies, was relatively unimportant at that time. Commercial insurers suffered repeated losses in trying to enter this market, and at the root of their problems, they believed, was a fundamental inability to manage informational asymmetries. John F. Dryden of the Prudential reported in 1909 that commercial health insurance would never displace fraternal insurers which enjoyed "perfect knowledge of and complete supervision over the individual members" (Murray 2007, 33). Indeed, within a decade actuaries had

developed some understanding of the consequences of informational asymmetries. E.E. Cammack, later a vice-president at Aetna, criticized early attempts at estimating useful claims tables for not including the effects of moral hazard, a term he used (Cammack 1921, 279). They also understood the potential effects of adverse selection—again, using that term--if not how to manage it (Craig 1920, 82). The smaller sickness funds, many with decades of rule-of-thumb experience, understood both the effects of informational asymmetries and how to mitigate them (Smith and Stutzer 1995).

To initiate coverage, a new employee either applied to join his company's fund or was automatically enrolled if the employer made membership compulsory. Some funds imposed age limits on older applicants, typically around 45 or 50, to prevent older and less healthy workers from joining. Here, thwarting selection bias was based on the observable characteristic of the applicant's age. Other funds also required new hires to wait some weeks before accepting them as members. Insurance funds imposed such a probationary period specifically to force applicants to reveal any chronic conditions, so that they could then be rejected. Because selection bias was a particular problem among funds with voluntary membership, those funds were twice as likely to impose probationary periods. When the National Industrial Conference Board studied mutual insurance associations they observed that voluntary membership (NICB 1923, 6) "tends to include chiefly those who feel the need of provision, and so makes for an unfavorable selection of risks." One consequence, noted the Illinois state commission charged with investigating the feasibility of government insurance, was that (Illinois 1919, 537), "in the voluntary associations a period of probation may be set up by the older employees in the association in order to discover what sort of risk a new employee promises to be,

before he is admitted to membership....By this means [the employer] is freed from risk of sickness benefits arising in connection with the casual and shifting body of his employees."

Once admitted, members in about two-thirds of funds paid an entrance fee of just over a dollar. Then, typically, members paid an average of 10 cents a week in dues (i.e., premiums), on pay day directly to a collector from the fund. These dues were typically assessed as a flat rate, not as a share of earnings, nor were they experience rated. At average wages of 1909 manufacturing workers, dues were about 1 percent of their earnings. Dues were positively related to benefits; a worker who wanted to receive a more valuable benefit payment had to make greater dues payments (Murray 2007).

To make a claim, workers notified their fund upon becoming sick. The fund verified the claim by sending a physician or a committee of fellow members to investigate. Such monitoring was thought to be necessary to limit "malingering," or unnecessary claims: that is, moral hazard (Pauly 1968). Generally the first week went by before the fund would pay a benefit. The worker then faced a deductible of a week's pay, which was thought to reduce moral hazard. As the Illinois commission reported (1919, 539), "The establishment of a waiting period before a sick member is entitled to benefits is an additional check on malingering." The NICB concurred (1923, 11): "...the waiting period should be long enough to discourage malingering and at the same time should not be so long as to work a hardship on those who suffer from minor injuries and illnesses." After that week he received an average of five or so dollars per week. Given turn of the century absence rates and pay scales, the expected value of the insurance turned out to be

very close to the value of dues payments, making it a reasonably fair exchange (Murray 2007).

Funds saw adverse selection and moral hazard as two separate problems that could be mitigated with different solutions, probationary periods before joining for the former and waiting periods before benefit payments for the latter. Not only did they report this belief in explicit language, they confirmed it implicitly with their approach to workplace injury. Because the extent to which injuries could be foreseen was far less than the extent to which poor health might be foreseen by a worker with a chronic condition, selection was less likely to occur along the dimension of injury probability. Thus, the NICB recommended (1923, 127) that, relative to sickness, "there is not the same reason for the postponement of benefits in case of accidents. An accident is not preceded by symptoms that may be detected after the lapse of a certain period. Neither do members join an association in order to obtain benefits for an anticipated accident. Benefits should therefore be paid for accidents occurring on the day the member joins the association." Indeed, the NICB continued, some sickness funds they had surveyed reported no waiting period for injury benefits, and others reduced the waiting period for injuries to less than that for sickness because they thought benefits were less likely to induce a moral hazard in the case of injury than in the case of sickness (NICB 1923, 134). It is easier to imagine a sick worker spending an additional day or two in bed to collect benefits than it is to imagine the prospect of time off at half pay leading a worker to daydream while operating a large and dangerous piece of machinery.

Indeed, whether moral hazard and adverse selection were valid concerns was a subject of public debate as well. Promoters of compulsory government insurance schemes emphasized the lack of adverse selection in universal insurance. "

Relative to the problems appearing in the recent empirical literature, sickness insurance funds offer a good environment for tests of asymmetric information. Employment may be endogenous in the sense that workers in poor health may have sought employment specifically to gain insurance (Cardon and Hendal 2001, 424). However, the test (described below) for such selection biases is simply whether membership in the insurance fund was voluntary or compulsory. To a potentially ill worker who wanted insurance as much as a job, whether he had to buy insurance or was able to buy insurance led to the same result: he became insured. Thus all firms in the sample should have been about equally attractive to a worker with unobservable information about his health status. Within each type of fund, such potentially ill workers would have comprised a disproportionate share of voluntary fund membership relative to compulsory fund membership. The hypothesis that voluntary funds would have higher claim rates all else constant remains a fair test of adverse selection.

Data source

To consider first, whether early health insurers were subject to adverse selection and moral hazard, and second, whether their attempts to mitigate these problems worked, this study relied on a survey of such insurers from the early twentieth century. The United States Commissioner of Labor canvassed some 1,200 insurance societies in 1908, collecting information for fiscal year 1907 for most societies, 1906 for some, and for a

few from 1905 or 1908. The set of funds with the most detailed data were those sponsored by employers, or establishment funds. Of these funds, 429 provided the temporary disability benefits of interest, and within this set, 394 funds provided a complete set of necessary responses (U.S. Commissioner of Labor 1909). The *Report* published line by line responses by insurance funds to the Commissioner's questions, which included the age of the fund and number of members, values of entrance fees, dues, and benefits, durations of probationary and waiting periods, and availability of medical benefits. The present day researcher can test for correlations between membership requirements and the value of benefits on the one hand, and claiming behavior on the other.

Table 1 reports mean values of relevant variables, distinguishing between funds with compulsory and voluntary membership, as well as pooled data. Voluntary and compulsory funds differed considerably from each other, most obviously in their size. While compulsory funds accounted for only about 11 percent of all funds in this survey, a figure consistent with other surveys, they were on average three times larger than voluntary funds, and so accounted for 30 percent of covered workers. Indeed, weighting the means by the number of workers in each fund offers comparisons between the situation of the average fund and of the average worker in the surveyed funds. The share of members who made a claim differed little between voluntary and compulsory funds (0.23 vs. 0.20), but the probability of the average worker making a claim was half again as high in voluntary funds (0.25 vs. 0.16). While only a sixth (0.16) of funds offered medical benefits, the average worker in compulsory funds received medical services paid for by fund. Thirty five percent of voluntary funds offered immediate admission, with no

waiting period. The larger funds were more likely to have such policies, so of workers covered by voluntary funds, the share who could join immediately was 58 percent. The general differences suggest that the size of the fund was an important influence on its characteristics, and on the claiming behavior of its members.

Most funds recognized that their potential membership included workers who were highly skilled, and thus highly paid, as well as humbler laborers who earned much less. And so many offered membership at different levels, a low level of dues and benefits for the latter group and more expensive membership with correspondingly more valuable sick pay benefits for the former. Maximum benefit levels differed little between compulsory and voluntary funds, but minimum benefit levels differed greatly. The mean among voluntary funds was $4.78, and the mean among compulsory funds was $3.74. Unfortunately the survey did not ask about wages and earnings, and so it is not possible to estimate replacement rates for these workers.

Asymmetric information and claims for benefits

The data in the 1908 fund survey can address the question of informational asymmetries and variations in claim rates. Tables 2 and 3 below report regression coefficients for several regressions of the log of the number of claims divided by the number of members in each fund. The discussion that follows uses the Table 2 results; Table 3 results were reported to indicate the robustness of the findings. These regressions were weighted by membership. Results relevant to the present purposes are robust to not weighting and all results were robust to specification differences such as regressing the log of the share of membership that made claims on the same independent variables. The weighted

regressions produced much higher adjusted R^2 values, and may be interpreted as reflecting the experience of the average covered worker rather than the typical fund, as in an unweighted regression. In the several regressions that had heteroskedastic errors, White heteroskedastic-consistent standard errors were reported.

The regressions begin with variables that report the separate effects of adverse selection and moral hazard on claim rates. While all funds may have been subject to adverse selection, the voluntary funds should have been relatively more burdened. In them, relatively healthy employees could opt-out and save the value of their entrance fees and weekly dues, which could not happen in workplaces where fund membership was compulsory. Thus, we would expect voluntary membership to be associated with a higher claim rate, and in fact Model 1 indicates that all else equal, voluntary funds had claim rates a significant 21 percent higher than compulsory funds did. Since the primary benefit of sickness funds was sick pay, more valuable benefits would induce greater absenteeism. Thus, we would expect variables for sick pay and claims to be positively associated. Models 2 through 8 show that was the case only for the minimum benefit payments, which may indicate that the most poorly paid workers were the most subject to moral hazard in absenteeism. In magnitude terms, using the coefficients from Models 2 through 8, a one standard deviation increase in minimum sick benefits resulted in a 9.35% increase in the claim rate. Alternatively a 10% increase in sick benefits from the mean induced a 2.34% increase in claims, indicating an elasticity of claims with respect to benefits of 0.234.

To see how attempts to mitigate these information asymmetries might have worked, models 4 and 6 introduce variables for countermeasures. Regression 4 includes

a dummy variable set equal to 1 if the fund admitted members immediately, with no waiting period, and Regression 6 includes a variable for the number of days a member had to wait before receiving benefits. Regression 4 indicates that immediate membership was associated with a 20 percent greater claim rate, *ceteris paribus*. It might also be useful to know if the effect of a probationary period was linear in its duration, rather than simply appearing for funds with immediate membership and not for a trial period of any duration. Thus, Table 3 reports the same regressions with a linear variable for length of probationary period; the results are similar, but the interpretation of the dummy variable is simpler, as shown below.

Model 6 indicates the effect of a waiting period. The waiting period coefficient was negative and significant at the 0.01 level. Its interpretation might be made easier by considering the effect of a one standard deviation increase in the minimum benefit level. Such an increase ($1.87 per week, from Table 1) would lead to an increase in the claim rate of 9.4 percent. An increase in the waiting period of just under two and one-half days (less than one standard deviation in the length of the waiting period) would reduce the claim rate by about the same amount. Thus, in terms of the magnitude of efforts to counter moral hazard, a one standard deviation change in the waiting period was about equal to the opposite effect of a standard deviation change in minimum benefits. Model 7, in which all of the variables discussed so far were included, yielded the same results as examining the moral hazard and adverse selection variables separately.

It may be the case that mitigating efforts had different effects depending on the magnitude of the informational asymmetry variable. That is, for example, immediate membership may have had a greater effect on claim rates in voluntary funds than in

compulsory funds which were not so subject to adverse selection in the first place. If so, interacting the asymmetry variables and the mitigating variables would be appropriate. Models 5, 8, and 10 indicate the effect of an interaction between immediate membership and voluntary membership. Since all three coefficients were significant in each regression, it might be easiest to show the differences in claim rates relative to a voluntary fund with some trial period. In Model 5, relative to a compulsory fund with no trial period, a voluntary fund with no trial period would see a claim rate about 40 percent higher. Imposing any waiting period would reduce this differential to 6 percent. In Models 8 and 10, the differential falls a roughly similar amount, from 38 percent to 6 percent in Model 8 and from 36 percent to 3 percent in Model 10. Imposing a trial period in a voluntary fund nearly eliminated additional claims due to adverse selection, as contemporary observers understood.

To see if the waiting period might have different effects on claims at different benefit levels, Models 9 and 10 included interactions between the waiting period and each benefit level variable. The inclusion of the voluntary fund and immediate membership interaction in Model 10 did not affect the results either for adverse selection or moral hazard. The benefit-waiting period interaction moved the moral hazard effect from the minimum benefit level to the maximum benefit level. That is, the only statistically significant benefit and waiting period coefficients in Models 9 and 10 were the maximum benefit level variable and the interaction between the maximum benefit level and the waiting period. Regarding magnitudes of these effects, consider Model 10, and we will ignore the very small and insignificant coefficient of the waiting period variable. Consider maximum benefit values of $4.60 and $7.00 per week, which are a

standard deviation apart, and centered at the mean. Increasing the waiting period from half a standard deviation below the mean (4.87 days) to a half a standard deviation above the mean (7.87 days) would reduce the probability of a claim by 16 percent at a maximum benefit value of $4.60 per week, and by 25 percent at the greater maximum benefit value of $7.00 per week. Thus, the imposition or increase in a waiting period was an effective way of discouraging moral hazard among workers receiving maximum sick pay benefits as well as (shown earlier) minimum levels.

Conclusions

The results in this paper lead to three main conclusions. First, insurance markets may well be characterized by both adverse selection and moral hazard. Second, evidence of such information problems may be detected with the right kind of data and sufficiently powerful (if common) statistical tests. Third, the insurers themselves may have been able to mitigate the effects of adverse selection and moral hazard by identifying and imposing on policy holders distinctive strategies to deal with each. Thus, the contributions of this paper are twofold. To the economics literature, it suggests that it is far too soon to conclude based on the empirical literature's findings thus far that insurance markets are not subject to adverse selection or moral hazard. To the history literature it adds more evidence to the recent claims that fundamentally the sickness funds were soundly operated.

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Table 1. Mean values (standard errors in parentheses)

	Unweighted			Weighted by membership		
Variable	Voluntary	Compulsory	Pooled	Voluntary	Compulsory	Pooled
Claims/ members	0.23 (0.25)	0.20 (0.14)	0.22 (0.24)	0.25	0.16	0.22
Members	564 (1894)	1,926 (2969)	712 (2078)	6,907	6,397	6,757
Share managed solely by members	0.84	0.35	0.79	0.50	0.13	0.39
Share with voluntary membership	1.00	0.00	0.89	1.00	0.00	0.71
Trial period (weeks)	6.91 (8.29)	3.37 (7.26)	6.53 (8.26)	3.72	3.18	3.56
Share imposing any trial period	0.65	0.28	0.61	0.42	0.29	0.38
Maximum benefit payment ($/week)	5.87 (2.47)	5.23 (1.93)	5.80 (2.42)	6.14	6.56	6.26
Minimum benefit payment ($/week)	4.78 (1.84)	3.74 (1.80)	4.67 (1.87)	4.32	3.41	4.05
Waiting period (days)	6.43 (2.97)	5.84 (2.85)	6.37 (2.96)	5.71	6.27	5.88
Share offering any medical benefits	0.14	0.35	0.16	0.38	0.52	0.42
N	351	43	394	351	43	394

Table 2. Dependent variable = log of claim rate (claims/members)

	1	2	3	4	5	6	7	8	9	10
Voluntary	0.21** (0.10)		0.17** (0.09)	0.19** (0.09)	0.40*** (0.07)	0.16** (0.06)	0.18*** (0.06)	0.38*** (0.07)	0.15** (0.06)	0.36*** (0.07)
Any trial period				-0.20* (0.09)	0.24** (0.10)		-0.20*** (0.06)	0.22** (0.10)	-0.20*** (0.06)	0.25** (0.10)
Voluntary* Any trial period					-0.58*** (0.11)			-0.54*** (0.11)		-0.58*** (0.11)
Maximum benefit payment		0.02 (0.02)	0.02 (0.02)	0.02 (0.02)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.01 (0.01)	0.06** (0.03)	0.07** (0.03)
Minimum benefit payment		0.06*** (0.02)	0.05*** (0.02)	0.05*** (0.02)	0.05*** (0.02)	0.05*** (0.02)	0.05*** (0.02)	0.05*** (0.01)	0.007 (0.04)	0.03 (0.04)
Waiting period						-0.04*** (0.01)	-0.04*** (0.01)	-0.04*** (0.01)	-0.03 (0.03)	0.002 (0.02)
Maximum benefit* waiting									-0.009* (0.005)	-0.012** (0.005)
Minimum benefit* waiting									0.009 (0.006)	0.005 (0.006)
Adj R^2	0.51	0.52	0.53	0.54	0.57	0.55	0.56	0.59	0.56	0.59

Regressions 5 through 10 had homoskedastic errors. Standard errors were corrected for heteroskedasticity in regressions 1 through 4. Regressions were weighted by number of members. Other independent variables included number of members, number of members squared, the age of the fund, the maximum number of weeks' benefit per member, dummies set to 1 if the fund was operated by its members and if it paid for medical benefits, and a vector of 28 industries.

Table 3. Dependent variable = log of claim rate (claims/members)

	4	5	7	8	9	10
Voluntary	0.15** (0.09)	0.26*** (0.07)	0.14** (0.06)	0.26*** (0.07)	0.11* (0.065)	0.23*** (0.07)
Probationary period	-0.010** (0.005)	0.014* (0.008)	-0.009** (0.004)	0.017** (0.008)	-0.009** (0.004)	0.017** (0.008)
Voluntary* Probation		-0.03*** (0.09)		-0.03*** (0.009)		-0.03*** (0.009)
Maximum benefit payment	0.02 (0.02)	0.01 (0.01)	0.01 (0.01)	0.007 (0.01)	0.07** (0.03)	0.06** (0.03)
Minimum benefit payment	0.05*** (0.02)	0.06*** (0.02)	0.05*** (0.02)	0.06*** (0.02)	0.003 (0.04)	0.004 (0.04)
Waiting period			-0.04*** (0.01)	-0.04*** (0.01)	-0.02 (0.02)	-0.03 (0.03)
Maximum benefit* waiting					-0.009* (0.005)	-0.01* (0.005)
Minimum benefit* waiting					0.008 (0.006)	0.009 (0.006)
Adj R^2	0.54	0.55	0.55	0.57	0.56	0.57

Standard errors were corrected for heteroskedasticity. Regressions were weighted by number of members. Other independent variables included number of members, number of members squared, the age of the fund, the maximum number of weeks' benefit per member, dummies set to 1 if the fund was operated by its members and if it paid for medical benefits, and a vector of 28 industries.