Economies of Scale and Sorting in Pure vs. Mutual Insurance Societies: Evidence from Historical Data*

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Abstract

Based on unique Swedish historical panel data on voluntary Swedish sick insurance societies 1902–1910, we test the hypothesis of economies of scale in sick insurance provision. We report results indicating that pure insurance societies charging only premiums *ex ante* do not exhibit returns to scale, while mutual insurance societies, who levy both an *ex ante* premium and an *ex post* assessment, do. We argue that this is due to a sorting mechanism implying that pure insurance societies attract high risk workers as they expand.

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Keywords: Friendly societies, sick insurance, health insurance, returns to scale.

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1 Introduction

In this paper we use unique historic panel data to test the hypothesis that adminstration costs per member decrease with increasing membership. There is no previous empirical examination of this question in the literature. Arrow (1963) introduced the idea that as administration costs within insurance societies are largely composed of selling costs, there should be 'enormous economies of scale in the provision of insurance'(page 963). In the later academic discussion on compulsory social insurance, the lower transaction costs (i.e., administration and selling costs) of comprehensive insurance systems is pointed out as an argument for compulsion. These arguments are based on the assumption of large fixed administration costs and homogeneous members. There is however a variable cost component that depends not only on the number of members but also their risk profiles. As such, expansion in terms of increasing membership does not necessarily imply falling average costs.

An administration subsidy was instated for sick insurance societies who freely registered with the Swedish government in 1891 (Law of Registered Sick Insurance Societies of 1891). In order to be eligible for the administration subsidy, insurance societies were obliged to register and provide annual balance-sheet reports to the authorities. As such, detailed information on societies became available. This provides the background for a panel data set over sick insurance societies in Sweden from 1892 to 1910 compiled first by the Department of Public Administration and later by the National Board of Trade. After 1910 commenced the process of centralization which ultimately led to public health insurance in 1955. This rich data set, with information on both financial and policy variables, therefore provides a unique opportunity for testing insurance theory in a framework characterized by a decentralized insurance market.

The purpose of this paper is to test empirically the hypothesis of economies of scale among insurance societies. Using data for the period 1902-1910, this paper will focus on the impact of increasing membership on average administration costs, testing if type of financing or region influences the results. This period is chosen because it is the only time period where the performance of an (almost) unregulated, free entry sick insurance market in Sweden can be investigated. Government regulation was minimal implying that the Swedish health insurance market at this time was characterized by a large number of competing societies.

In order to test the premise of economies of scale in insurance provision, we use some of the data that the 1891 law resulted in; balance sheets over financial variables and policy statues of the societies. We use data from two regions; (i) Stockholm City and (ii) Östergötland County. Our data cover a time period, 1902-1910, during which registration of sick insurance societies was increasing yet government intervention remained minimal. Throughout the period, society registration remained voluntary. Since this data material has never earlier been used we can also make a contribution to the description of the sick insurance societies during this period.

Our main results are that economies of scale differ by the type of financing system employed by the insurance society. Societies utilizing a fixed *ex ante* premium only, so called *pure insurance* societies do not experience economies of scale. *Mutual insurance* societies, who in addition to a fixed premium, are free to charge *ex post* assessments, do. We argue that differences in the risk profiles of incoming members between these insurance types, i.e., a sorting of workers, render these results.

The paper is organized as follows. The historical background is given in Section 2. Section 3 provides a brief discussion of the theories concerning insurance societies' choice of financing system and the potential implications on membership risk profiles. Section 4 contains a description of the data and the empirical set up. We present the empirical analysis and our results in Section 5 and the paper is concluded in Section 6.

2 Historical Background

The late 1800's marked a surge in the establishment of sick insurance societies in Sweden attributable to this period's rapid industrialization and urbanization. The 1891 law was aimed at stimulating this development, i.e. of extending the provision of sick insurance to a greater proportion of the working population.[1]

The administration subsidy, paid to insurance societies who voluntarily registered with the government, was based on each society's previous years premium-paying membership - see Table 1. In return, the societies had to supply information to the government concerning their financial results, policy variables and membership. By the end of 1896, only about one third of active sick insurance societies had registered. To further encourage registration, the subsidy was increased in 1897 and 1899. By 1905, approximately 85 percent of active sick insurance societies were registered. The subsidy encouraged the establishment of especially small insurance societies, giving larger subsidies per member to societies with smaller membership.[2]

– Table 1 about here –

[1] In 1884 a committee was established (*Arbetareförsäkringskommittén*) to analyze the accident insurance market for workers, health insurance and pensions were also considered. The committee's proposals led to 1891's Law of registered health insurance societies (*Lagen om registrerade sjukkassor*).

[2] The maximum total subsidy per society and year was 300 SEK. For comparison, note that the yearly income of a manual worker, who in addition had board on the employer's expense, was 172 SEK in current prices on average in Sweden in 1893; see Hamilton (1896, p. 48). The same year the gross domestic product was 323 SEK per capita and 757 SEK per worker in current prices; see Johansson (1967, Table 59).

Berge (1995) and Edebalk (1996) argue that by 1905, a large number of small sick insurance societies were competing with policies that were not based on insurance principles. This led to price cuts and uncertain insurance coverage to members as sick insurance societies were increasingly unable to meet their economic obligations.

A new law was established in 1910 replacing the 1891 law. This regulation centralized and unified both the organizational structure (i.e., increased the size of membership) and the insurance conditions. The motivation being that the small societies were poorly managed, faced severe competition, which prevented them from setting premiums necessary for covering costs, and that many competing entities multiplied administration and selling costs.[3] Regulation was introduced concerning minimum membership, insurance contract conditions, premiums and benefits. In addition the use of *ex post* assessments was prohibited except for temporary budget deficits. The 1910 law therefore marks the beginning of increased government regulation of insurance societies that was to continue throughout the first half of the 1900's. It also marks the end of mutual insurance options. Simultaneously the government's economic commitment steadily increased. It was not until 1955, however, that legislation making sick insurance compulsory and comprehensive was implemented.[4]

[3]Lindquist (1990, p.58ff), Berge (1995, p.113) and Edebalk et al. (1998, p.51).

[4]Several studies contribute to the history of the Swedish insurance societies, e.g., Lindeberg (1949), Lindquist (1990), Berge (1995), Edebalk (1996) and Edebalk et al. (1998). Recently the journal of the Archive and Library of the Swedish labor movement published a special issue on topic; i.e., Andersson (1999), Edebalk (1999), Grip (1999), Johansson (1999a), Johansson (1999b) and Edebalk (1999). All these contributions are in Swedish but Simonson (1996) provides an overview in English. The latter is published in van der Linden (1996) which provides a comparison between several European countries

3 Theoretical Background

There are two important aspects of the insurance societies that we are studying. First, the cost structure and in particular if there are returns to scale or not. Second, how the cost structure is affected by the fact that the insurance societies in our data differ in the manner in which they finance themselves.

We interpret returns to scale with falling administration cost per member as membership increases. Administration costs are to a degree fixed costs, such as costs for personnel, equipment, design of contracts etc. There are also variable costs that depend on membership size and risk characteristics. These are costs associated with administering insurance coverage to be paid to members, administering doctor's fees and medical bills, controlling for moral hazard variables and controlling for validity and duration of illness/accident. The number of such cases to administer naturally depends on both the number of members per se but also on their risk types. A larger proportion of 'poor' risk members, i.e., members with a higher probability of falling ill or less risk adverse behavior, increases administrative costs. Marginal members may therefore increase or decrease average administration cost depending on individual risk profiles and risk attitudes.[5]

Pure insurance is a transfer of risk at a price, a premium, paid *ex ante* in contrast to mutual insurance in which members pool risk by agreeing to share losses *ex post*. In other words, members in a pure insurance society know exactly the costs and benefits of purchased insurance contracts. Members in *mutual* insurance societies however are charged a proportion of the insurance societies annual costs *ex post* implying that individual insurance costs are to a large degree dependent on their own and their fellow members' health status,

[5]For related models of insurance see e.g. Mossin (1968), Smith (1968), Ehrlich and Becker (1972) and Sandmo (1970).

risk probabilities and risk attitudes.[6]

Mutual insurance societies developed when uncertainty about risk, a lack of actuarial information, made insurance options expensive or altogether unavailable. One option then was to pool risk within a mutual insurance framework. Skogh (1999) shows that it is sufficient that risk sharing is based on the presumption that all in the pool share the same risk.[7] The simplest form of this type of insurance is an implicit or explicit guarantee between members to support each other in the event of an accident or illness. As such, the mutual insurance form is based on trust between members and is expected in groups with similar risks, common knowledge of possible moral hazard and repeated exchange, reputation or some other form of social control. The mutual insurance form thus differs theoretically in two respects. Each mutual insurance pool attracts individuals with similar risks. In addition, low risk insurance purchasers can signal their type by purchasing participating contracts of mutual insurance societies. The participating contract, i.e., that members share the profit risk due to uncertainty, is also an optimal way to induce members to engage in costly efforts to reduce loss probabilities. The mutual insurance form can thus control for both adverse selection and moral hazard problems. In addition, mutual insurance societies are presumed to attract a clientele committed to risk reduction and the control of moral hazard.[8]

The pure insurance form, in turn, attracts high risk insurance purchasers who prefer contracts with fixed premiums. This as individuals know their own risk probabilities and will presumably not buy into contract solutions where costs are directly dependent on individual health status. Without direct controls for moral hazard problems, the pure insurance form also serves a

[6]See Marshall (1974) and Skogh (1999) for the basic argument and Wu (2000) for extensions to asymmetric information.

[7]See also Marshall (1974).

[8]See, e.g., Smith and Stultzer (1995).

clientele lacking the incentive to minimize risk probabilities.

In this study, we investigate whether sick insurance societies exhibit economies of scale, focusing particularly on differences between mutual and pure insurance societies. An absence of economies of scale can be interpreted as an indication of increasing sick rates associated with marginal joining members that occurs as societies attract workers with higher risks during expansion. As mutual insurance societies are presumed to control that incoming members have risk profiles similar to those already in the risk pool, we expect the presence of economies of scale to be more prevalent among mutual insurance societies. On the other hand, use of various control mechanisms among pure insurance societies can serve to prevent the demise of scale economies.

4 Data and empirical setup

The data, first published by the Department of Public Administration (*Civildepartementet*) up to 1900 and then by the National Board of Trade, (*Kungliga Kommerskollegiet*), cover all registered health insurance societies in Sweden during the years 1892-1910. The data were compiled as a result of the 1891 law requiring health insurance societies to register in order to receive administration subsidies.[9]

The primary data are in two parts: financial accounts and policy statutes. The financial accounts contain detailed information on income and expenses, number of members, sick days, sick cases (all by gender), assets and debts. The statutes yield information concerning optional/mandatory membership, number of policy categories, age and sex of members, fees, assessments, regulations concerning benefits as well as amounts of both sick and funeral coverage.

We chose to use the data for two regions: Stockholm and Östergötland. The

[9]National Board of Trade (1905-1912).

choice of these two regions reflects a desire to include both a larger metropolitan area as well as a more rural area.[10] The data from the period 1892-1901 are dropped due to poor registration compliance. However, one should note that during the period 1902–1910 the registered societies also faced competition from some small unregistered societies for which no data are available (see Berge (1995)). Our data consist of annual information on 493 registered sick insurance societies: 275 from Stockholm and 218 from Östergötland.

Sample statistics are reported in Table 2. On average, mutual insurance societies are larger, in terms of membership, than pure insurance societies and more expensive to administer. Stockholm societies are larger than those from Östergötland and more expensive to administer. In terms of administration costs per member, mutual insurance societies and Stockholm societies show higher mean levels than pure societies and Östergötland societies. The same pattern holds true for average variable costs.

– Table 2 about here –

Note that there is a fairly even distribution of both insurance types in each region although the pure insurance form is slightly more prevalent in Östergötland where 58 percent of the insurance societies are of the pure insurance type. An even 50 percent of Stockholm societies are pure insurance societies. There are only small differences in the mean levels of registered average sick cases where mutual insurance societies show slightly higher levels.

We depart from an error-component model: $ln(\frac{AC}{M})_{it} = \alpha M_{it} + \beta X_{it} + u_{it}$; $u_{it} = \nu_i + \varepsilon_{it}$, where AC and M denote total administration costs and number of members, and X is a vector of control variables for society i in year t. The error term u_{it} is composed of a time invariant society-specific individual effect

[10]The selection of just two regions is motivated by the large amount of data available in published tables that had to be set in a machine-readable format.

(ν_i) and a random disturbance ε_{it}. Regressions are run with log average administration cost (i.e., adminsitration cost per member) as the dependent variable and log number of members as the main independent variable.[11] A simple framework was chosen with two control variables aside from log members, average sick cases and average variable costs (AVC). We argue that average sick cases controls for the number of sick cases per sick insurance society that need to be administered. Average variable cost is presumed to capture the administrative costs associated with illness. This variable includes average expenses for sick benefits paid to members, funeral coverage, physician care, medicine and other related expenses. We examine whether results systematically vary across regions or by type of financing system, pure versus mutual.

The choice of estimation technique reflects difficulties encountered in specifying a model adequately determining administrative costs. A reason for this is the likely presence of unobserved society heterogeneity (the unobserved individual effects ν_i), which we cannot explicitly control for due to a lack of detailed information on the societies' administration routines. If this heterogeneity is correlated to the explanatory variables, then OLS yields inconsistent results. Breusch-Pagan and Hausman tests are run to test for the existence of time-invariant society-specific effects and their possible correlation to the explanatory variables in each of our model specifications. In presence of such a correlation, having a panel data set, we can control for time-invariant heterogeneity by means of fixed-effect models.

[11] Tests were carried out to insure that the variation in average administration cost depends on both the variation in administration costs and the variation of members per society. The data therefore supports the theoretical expectation that the relationship between average administration costs and members is not purely arithmetical.

5 Empirical Results

Results reported in Table3 indicate that economies of scale do exist, i.e., that there is a negative significant coefficient for log members. The Breusch-Pagan test for individual heterogeneity indicates that there are significant individual effects associated with the societies. This simply means that there are society-specific factors not included in our specifications that influence administration costs. Societies might differ in administration routines, management policies, administrative skills and other dimensions that affect costs.

– Table 3 about here –

It is important to remember that a non–negligible fraction of these health insurance societies had other organized activities besides insurance. Trade unions, religious societies, and temperance societies are three examples. As such, membership to an organization might extend to membership in its insurance schemes leading to lower administrative costs. According to results of the Hausman test, these society effects are correlated with the regressors. This implies that between society estimations are not reliable as they yield inconsistent estimates. Hereafter we focus on within estimates of the fixed effects specification since these are robust for correlated individual society effects.

Results reported in Tables 4 and 5 indicate that, in contrast to mutuals, pure insurance societies do not exhibit economies of scale. The coefficient for membership is negative and significant in all our specifications when estimating on data for mutuals while this coefficient is insignificant when run on data for pure insurance societies.[12]

[12] Our dataset is an incomplete panel since some societies disappear or emerge during this period. To check for sensitivity of our results with respect to selection bias, we performed estimations on the balanced panel yielding similar results. Including a variable measuring whether the society was observed in the preceding period or not (in our fixed effects models) controls for selection. Results indicate that there are systematic difference between societies

– Table 4 and 5 about here –

Though there are significant economies of scale in the global sample one might suspect that there exist differences across regions with respect to potential insurees and their characteristics. Due to larger number of societies per region, health insurers in densely populated areas might easier limit membership to certain categories of workers. Existence of alternative societies allows insurers to be more selective since unwanted insurees can be relegated to other societies. This might not be socially enforceable when alternative societies are not present in the near vicinity. Table A.1 and A.2 report the results by region. The coefficient for log members remains negative and significant in the within estimation for both regions, indicating no regional differences in terms of economies of scale.

We also ran regression by both region and type of financing system. Results reported in Tables A.3 – A.6 indicate that for Stockholm, the explanatory power of members is always significant for mutual societies while for pure insurance societies it is weak and insignificant. Instead, it is average sick cases and average variable cost that has significant explanatory power for pure insurance societies in Stockholm. Turning to the results for Östergötland, mutual societies show irrespective of model, negative significant coefficients for log members in the within estimation. For pure insurance societies in this region, the coefficient for log members is again negative, but small and insignificant.

The observed pattern in the data indicates selection effects influencing economies of scale. Individuals' risk aversion behavior as well as their perceived risk of falling ill, are important when considering membership in a pure

(especially for pure societies) present during the entire period and other societies. Results controlling for selection are, however, qualitatively the same as those reported here. See also Nekby (2000).

or mutual insurance society. Individuals with higher probabilities of falling ill or less risk adverse behavior, due to either (known to the individual) pre-existing health conditions or high risk occupations, will choose the fixed premiums of the pure insurance form, this rather than contributing to increasing but unknown assessment levels charged *ex post* by mutual insurance societies. In addition, individuals with smaller economic means may choose pure insurance societies so as to avoid the possibility of an *ex post* assessment which might pose an unexpected strain on personal finances. Since the poor are also, on average, of relatively worse health condition, the two financing systems attract different insurees. Pure insurance societies in expansion would attract members associated with higher risks and thus will have to administer a greater number of on average more complicated and costly sick cases. The empirical support for this sorting effect is strengthened by the fact that both regions exhibit the same pattern regarding mutual contra pure insurance societies. Pure insurance societies clearly do not exhibit economies of scale.[13]

We also regressed administration costs per *sick case* on number of registered sick cases for pure and mutual insurance societies in order to check whether there are differences in the average costs of administering sick cases (to compare with the marginal costs associated with members). The argument is that systematic differences in administration technology between the two types of insurance systems may render the results reported previously. Within regressions yield results indicating that the coefficient for sick cases is negative and strongly significant for the entire sample. When we run separate regressions by type and region, the estimated coefficients are similar in all regressions. This means that there are no significant differences in administration technol-

[13]Member-weighted within estimates for log members are negative and significant for both types of societies. The coefficient for mutuals are twice the coefficient for pure societies. This indicate that economies of scale only exist within the class of larger pure societies and confirms that economies of scale is significantly smaller in pure societies as compared to mutuals.

ogy between mutual and pure insurance societies. In absence of systematic differences in technology, no economies of scale in pure societies is compatible with the hypothesis that pure insurance societies attract higher risk insurees as they expand membership.

Furthermore, we re-estimated our models including time dummies to check the importance of general time effects. There is a general pattern of increasing membership. Our interpretation of the results link the lack of economies of scale for the pure societies to membership growth together with sorting of high risk workers into these societies. Removing the general time effects removes this source of diseconomies of scale and any remaining correlation is due to pure technological effects. We checked the correlation between growth of the number of societies, total number of members as well as average membership for each type of society. Correlations are all far above 0.90 and highly significant. For example, average members per society in the pure and mutual societies has a correlation as high as 0.98. This implies that the general time effects do not differ across types. Our estimations for pure and mutual societies including general fixed time effects return negative and significant estimates for membership on average administration costs. This underlines, again, that the observed lack of economies of scale for pure societies is linked to the overall increasing trend in membership and that in this expansion (common across society types) pure societies seem to have attracted on the margin, increasingly higher risks compared to mutuals.

Due to this sorting of worker, the marginal member entering a pure society give rise to increasing average administration costs due to higher risk probabilities, i.e., due to a higher risk of falling ill and potentially, a higher probability of having a serious illness when falling ill, both of which lead to higher administration costs. This is verified in the within regressions where both average sick cases and average variable costs tend to have significant explanatory power for pure insurance societies. Mutual insurance societies on the other hand, attract individuals who according to theory, are homogeneous to those already in the risk pool and who are committed to risk reduction. Due to the nature of participating contracts, i.e., the use of *ex post* assessments, the mutual insurance society is presumably also attracting individuals who are relatively better off financially. A characteristic which may also be related to, on average, better health status. Mutual insurance societies can continue growing with economies of scale intact as long as the clientele remains relatively homogeneous. As indicated by the results, mutual insurance societies show economies of scale in the provision of sick insurance. The marginal member entering this type of society lowers average administration costs.

6 Conclusions

Using data covering a time period in Sweden in which the sick insurance market was decentralized and largely unregulated, this study has tested the premise of economies of scale in insurance provision, i.e., of decreasing administration costs per member. The empirical results indicate that the presence of economies of scale differs by type of financing system. Pure insurance societies do not show economies of scale whereas mutual insurance societies do. Both types of societies seem to have decreasing average cost of administrating sick cases, implying no significant difference in administration technology. This implies a sorting effect inherent in the differing financing forms. The marginal insuree joining a pure insurance society has a higher than average (society member) risk while the marginal insurees joining the mutual societies are similar to the average society member. Due to this sorting of workers, pure insurance societies reach a limit where they loose the advantage of economies of scale (measured in terms of additional members). Mutual societies on the other hand, can presumably continue growing with economies of scale in tact as long as the clientele remains relatively homogeneous.

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Tables:

Table 1. Administration subsidy per member (nominal SEK).

Membership size	1891	1899
$0-50$	1.00	1.50
$51-100$	1.00	1.50
$101-250$	0.50	1.00
$251-300$	0.25	1.00
$301-2600$	0.25	0.50
$2600-$	0.25	0.25

Table 2. Sample Statistics.

	All	Stock-holm	Öster-götland	Pure	Mutual
Members	313.5	419.7	186.6	253.6	383.3
	(835.5)	(1109.1)	(177.8)	(364.4)	(1160.4)
Avg. admin. costs	1.50	2.10	0.73	1.35	1.63
	(1.17)	(1.12)	(0.72)	(1.11)	(1.23)
Avg. variable cost	8.63	10.40	6.44	7.91	9.46
	(5.97)	(6.71)	(3.93)	(6.17)	(5.62)
Avg. sick cases	0.22	0.22	0.21	0.20	0.23
	(0.09)	(0.09)	(0.09)	(0.09)	(0.09)
Coverage per day	1.33	1.57	0.98	1.30	1.31
	(0.69)	(0.74)	(0.45)	(0.63)	(0.74)
Sick days per case	27	26	27	27	27
	(9.9)	(8.2)	(12.1)	(9.4)	(10.4)
Avg. sick days	5.6	5.7	5.5	5.3	6.0
	(2.8)	(2.4)	(3.3)	(2.7)	(2.8)
Average premium a)	8.2	10.2	5.8	8.1	8.3
	(3.9)	(3.1)	(3.4)	(3.7)	(4.1)
Number of obs. ($N.T$)	3843	2093	1750	2067	1776

NOTES:

a) Average assessments *ex. post* not included. This assessment was on average 2.5 SEK per member and did not differ across regions.

Table 3. Within estimations, all societies. Dependent variable log average administration costs. Standard errors in parenthesis.

	Model 1	Model 2	Model 3
Log members	-0.1643*	-0.1715*	-0.1752*
	(0.036)	(0.036)	(0.0361)
AVC	.	.	0.0067*
	.	.	(0.003)
Average sick cases	.	0.3408*	.
	.	(0.127)	.
Number of obs. ($N.T$)	3769	3769	3769
R^2 within	0.0064	0.0085	0.0085
R^2 between	0.0193	0.0166	0.0028
R^2 overall	0.0164	0.0128	0.0020
F-test, ind. effect= 0	F(491,3276)	F(491,2275)	F(491,3275)
	=32.34	=32.24	=27.83
prob>F	0.0000	0.0000	0.0000
Hausman Spec. test	chi2(1)=28.71	chi2(2)=29.40	chi2(2)=118.66
prob>chi2	0.0000	0.0000	0.0000
B-P test	chi2(1)=7869.38	chi2(1)=7785.31	chi2(1)=6629.32
prob>chi2	0.0000	0.0000	0.0000

Table 4. Within estimations, mutual societies (ex-ante fixed fees & ex-post assessments). Dependent variable log average administration costs. Standard errors in parenthesis.

	Model 1	Model 2	Model 3
Log members	-0.2711*	-0.2879*	-0.2800*
	(0.041)	(0.041)	(0.042)
AVC	.	.	0.0043
	.	.	(0.003)
Average sick cases	.	0.4502*	.
	.	(0.167)	.
Number of obs. ($N.T$)	1759	1759	1759
R^2 within	0.0276	0.0322	0.0289
R^2 between	0.0131	0.0118	0.0071
R^2 overall	0.0068	0.0050	0.0029
F-test, ind. effect= 0	F(222,1535)	F(222,1534)	F(222,1534)
	=41.83	=41.73	=36.03
prob>F	0.0000	0.0000	0.0000
Hausman Spec. test	chi2(1)=26.68	chi2(2)=30.11	chi2(2)=119.65
prob>chi2	0.0000	0.0000	0.0000
B-P test	chi2(1)=4366.56	chi2(1)=4314.80	chi2(1)=3621.79
prob>chi2	0.0000	0.0000	0.0000

Table 5. Within estimations, pure insurance societies (applying ex-ante fixed fees only). Dependent variable log average administration costs. Standard errors in parenthesis.

	Model 1	Model 2	Model 3
Log members	-0.0301	-0.0303	-0.0409
	(0.060)	(0.060)	(0.010)
AVC	.	.	0.0099**
	.	.	(0.004)
Average sick cases	.	0.3050	.
	.	(0.187)	.
Number of obs. $(N.T)$	2010	2010	2010
R^2 within	0.0001	0.0017	0.0035
R^2 between	0.0209	0.0096	0.0603
R^2 overall	0.0268	0.0075	0.0498
F-test, ind. effect= 0	F(270,1738)	F(270,1737)	F(270,1737)
	=26.44	=26.45	=22.97
prob>F	0.0000	0.0000	0.0000
Hausman Spec. test	chi2(1)=4.85	chi2(2)=4.89	chi2(2)=32.43
prob>chi2	0.0277	0.0866	0.0000
B-P test	chi2(1)=3636.35	chi2(1)=3624.26	chi2(1)=3100.38
prob>chi2	0.0000	0.0000	0.0000

Appendix A

Table A.1. Within estimations, Stockholm societies. Dependent variable log average administration costs. Standard errors in parenthesis.

	Model 1	Model 2	Model 3
Log members	-0.1569*	-0.1610*	-0.1701*
	(0.031)	(0.031)	(0.031)
AVC	.	.	0.0066*
	.	.	(0.002)
Average sick cases	.	0.1154	.
	.	(0.123)	.
Number of obs. ($N.T$)	2084	2084	2084
R^2 within	0.0143	0.0148	0.0200
R^2 between	0.0023	0.0020	0.0057
R^2 overall	0.0039	0.0038	0.0087
F-test, ind. effect= 0	F(274,1808)	F(274,1807)	F(274,1807)
	=25.95	=25.99	=25.54
prob>F	0.0000	0.0000	0.0000
Hausman Spec. test	chi2(1)=7.72	chi2(2)=9.18	chi2(2)=10.33
prob>chi2	0.0055	0.0101	0.0057
B-P test	chi2(1)=3998.90	chi2(1)=3999.96	chi2(1)=3932.22
prob>chi2	0.0000	0.0000	0.0000

Table A.2. Within estimations, Östergötland societies. Dependent variable log average administration costs. Standard errors in parenthesis.

	Model 1	Model 2	Model 3
Log members	-0.1785**	-0.1747**	-0.1849**
	(0.078)	(0.078)	(0.079)
AVC	.	.	0.0068
	.	.	(0.006)
Average sick cases	.	0.5766*	.
	.	(0.234)	.
Number of obs. ($N.T$)	1685	1685	1685
R^2 within	0.0035	0.0076	0.0043
R^2 between	0.0157	0.0085	0.0027
R^2 overall	0.0139	0.0045	0.0024
F-test, ind. effect= 0	F(216,1467)	F(216,1466)	F(216,1466)
	=15.04	=14.87	=12.15
prob>F	0.0000	0.0000	0.0000
Hausman Spec. test	chi2(1)=9.22	chi2(2)=8.87	chi2(2)=59.86
prob>chi2	0.0024	0.0119	0.0000
B-P test	chi2(1)=2055.96	chi2(1)=1975.92	chi2(1)=1285.95
prob>chi2	0.0000	0.0000	0.0000

Table A.3. Within estimation, pure societies in Stockholm. Dependent variable log avg. administration cost. Standard errors in parenthesis.

	Model 1	Model 2	Model3
Log members	-0.0048	-0.0078	-0.0137
	(0.050)	(0.050)	(0.050)
AVC	.	.	0.0079*
	.	.	(0.003)
Average sick cases	.	0.3697**	.
	.	(0.169)	.
Number of obs. $(N.T)$	1047	1047	1047
R^2 within	0.0000	0.0053	0.0068
R^2 between	0.0000	0.0110	0.0147
R^2 overall	0.0002	0.0001	0.0239
F-test, ind. effect= 0	F(140,905)	F(140,904)	F(140,904)
	=26.81	=26.95	=26.14
prob>F	0.0000	0.0000	0.0000
Hausman Spec. test	chi2(1)=0.00	chi2(2)=2.54	chi2(2)=0.29
prob>chi2	0.9853	0.2813	0.8663
B-P test	chi2(1)=1967.32	chi2(1)=1966.90	chi2(1)=1897.55
prob>chi2	0.0000	0.0000	0.0000

Table A.4. Within estimation, mutual societies in Stockholm. Dependent variable log avg. administration cost. Standard errors in parenthesis.

	Model 1	Model 2	Model 3
Log members	-0.2549*	-0.2493*	-0.2710*
	(0.038)	(0.039)	(0.038)
AVC	.	.	0.0063*
	.	.	(0.003)
Average sick cases	.	-0.1060	.
	.	(0.180)	.
Number of obs. $(N.T)$	1037	1037	1037
R^2 within	0.0476	0.0480	0.0538
R^2 between	0.0125	0.0128	0.0156
R^2 overall	0.0200	0.0203	0.0231
F-test, ind. effect= 0	F(133,902)	F(133,901)	F(133,901)
	=24.83	=24.78	=24.72
prob>F	0.0000	0.0000	0.0000
Hausman Spec. test	chi2(1)=13.53	chi2(2)=12.98	chi2(2)=16.00
prob>chi2	0.0002	0.0015	0.0003
B-P test	chi2(1)=2028.63	chi2(1)=2031.85	chi2(1)=2030.66
prob>chi2	0.0000	0.0000	0.0000

Table A.5. Within estimation, pure societies in Östergötland. Dependent variable log avg. administration cost. Standard errors in parenthesis.

	Model 1	Model 2	Model3
Log members	-0.0650	-0.0627	-0.0798
	(0.118)	(0.118)	(0.1186
AVC	.	.	0.0141
	.	.	(0.009)
Average sick cases	.	0.2365	.
	.	(0.338)	.
Number of obs. $(N.T)$	963	963	746
R^2 within	0.0004	0.0009	0.0141
R^2 between	0.0086	0.0084	0.0208
R^2 overall	0.0158	0.0117	0.0283
F-test, ind. effect= 0	F(129,832)	F(129,831)	F(129,831)
	=11.21	=11.21	=10.14
prob>F	0.0000	0.0000	0.0000
Hausman Spec. test	chi2(1)=1.57	chi2(2)=1.79	chi2(2)=13.56
prob>chi2	0.2108	0.4082	0.0011
B-P test	chi2(1)=786.64	chi2(1)=784.28	chi2(1)=598.31
prob>chi2	0.0000	0.0000	0.0000

Table A.6. Within estimation, mutual socities in Östergötland. Dependent variable log avg. administration cost. Standard errors in parenthesis.

	Model 1	Model 2	Model 3
Log members	-0.3124*	-0.3095*	-0.3091*
	(0.096)	(0.096)	(0.097)
AVC	.	.	-0.0040
	.	.	(0.008)
Average sick cases	.	1.0788*	.
	.	(0.305)	.
Number of obs. $(N.T)$	722	722	722
R^2 within	0.0163	0.0354	0.0167
R^2 between	0.0204	0.0059	0.0309
R^2 overall	0.0109	0.0003	0.0182
F-test, ind. effect= 0	F(88,632)	F(88,631)	F(88,631)
	=23.15	=22.51	=16.28
prob>F	0.0000	0.0000	0.0000
Hausman Spec. test	chi2(1)=10.30	chi2(2)=10.15	chi2(2)=65.88
prob>chi2	0.0013	0.0062	0.0000
B-P test	chi2(1)=1341.48	chi2(1)=1268.17	chi2(1)=720.71
prob>chi2	0.0000	0.0000	0.0000