

# Market Discipline and Government Guarantees in Life Insurance

by

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PRELIMINARY DRAFT

## Abstract

This paper studies the effects of company risk and state government guarantees on the behavior of ordinary life policyholders during the 1988-1998 period. Consistent with market discipline, it finds a strong positive relationship between company default risk and policyholder termination rates. The paper finds only weak evidence of a decline in market discipline following the creation of government-backed guaranty funds.

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# 1 Introduction

The extent to which consumers “discipline” financial institutions and how such discipline is affected by the presence of government guarantees are issues of vital importance for regulators. Government deposit insurance and guaranty funds<sup>1</sup> protect consumers in the event of company default and may help to prevent destabilizing runs on financial institutions. However, they may also mitigate incentives for consumers to monitor their financial institutions, leading to excessive risk-taking and other well-known moral hazard problems. If consumers care about company risk, market discipline can be viewed as an important restraint on risk-taking by firms, even in the presence of government guarantees.

This paper presents direct evidence of market discipline by U.S. ordinary life policyholders and estimates the impact of the government guarantees on that behavior. It uses detailed company-level data from statutory reports made between 1988 and 1998, as well as company financial strength ratings from A.M. Best over the same period. To identify market discipline behavior, it studies the relationship between changes in policyholder terminations and changes in company risk (i.e., changes in A.M. Best ratings). To identify the effect of government guarantees, it exploits the fact that 12 states were late in their adoption of life guaranty funds. These states had no consumer protections in place at the end of 1987; it was not until the end of 1992 that all states had enacted guaranty funds. This enables us to see how policyholder responses differed between states without guaranty funds and those with guaranty funds, and how that difference changed when guaranty funds were eventually in place in all states.

Briefly, the paper finds a strong association between increases in company risk and increases in voluntary termination of policies. However, the paper finds only weak evidence to suggest that guaranty funds have affected the policyholder response.

The vast majority of the empirical literature on market discipline has been produced in studies of depository institutions (see Flannery [7] for a review). Insurance offers at least two major advantages over banking studies. First, the assessment of company risk is simplified by the use of the A.M. Best rating, a summary statistic that offers an attractive alternative to

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<sup>1</sup>Guaranty funds are set up at the state level for the purpose of paying the claims of policyholders of insolvent insurance companies.

inference based on financial ratios. Second, the staggered timing of guaranty fund adoption across states during the sample period offers a unique opportunity to exploit both cross-sectional and time series variation in consumer protection within the same data set. Banking studies have usually only been able to exploit the former (e.g., Goldberg and Hudgins [9], Park and Peristiani [13], Peria and Schmukler [14]) and have thus been hampered in their ability to identify the effects of consumer protection.

Previous studies using insurance data have generally focused on indirect evidence of market discipline, such as premium growth (Epermanis and Harrington[6], Bohn and Hall [3]), pricing margins (Sommer [15]), asset allocation (Lee, Mayers, and Smith [10]) and reserving practices (Lee and Smith [11]). By using policyholder termination rates, this paper uses a direct measure of consumer behavior; thus, it provides direct evidence of consumer preferences for financial quality and how these preferences were affected by guaranty funds. The identified effects are difficult to interpret as anything other than consumer market discipline at work, whereas effects seen in insurance pricing or premium growth variables could be interpreted as forms of risk management behavior by firms.<sup>2</sup>

The rest of this paper is organized as follows. Section 2 uses a simple theoretical framework to provide basic results on the expected relationship between company quality, government guarantees, and policyholder terminations. Section 3 describes the data, empirical specifications, and results. Section 4 concludes.

## 2 Conceptual Framework

This paper studies the termination rate in ordinary insurance. Ordinary insurance is whole life insurance and term insurance held by individuals. In 1998, ordinary insurance accounted for about 60 percent of the \$15 trillion of life insurance in force in the United States (ACLI [2]). Ordinary contracts are multi-year contracts that may be voluntarily terminated by the policyholder through *surrender* (cashing in a whole life policy before maturity) or *lapse* (failing to pay premiums due). The voluntary termination rate, or *lapse*

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<sup>2</sup>The theoretical literature admits both possibilities. Doherty and Tinic [5] and Cummins and Danzon [4] (among others) emphasize the importance of consumer preferences for quality in guiding risk management behavior, while Froot and Stein [8] rely on the firm's concern with costly external financing.

*rate*, represents the fraction of the average ordinary policies in force that were terminated due to surrender or lapse in a calendar year period. It is widely followed as an indicator of a company's health.

Terminating a policy involves costs for the consumer. These include surrender charges levied at the time of termination, the costs of switching to another policy or carrier, and the forfeiture of favorable terms later in the contract.<sup>3</sup> The consumer weighs these costs against any benefits of termination, which could arise from a number of sources. For example, the consumer's needs or means may change over time, leading to a desire for a different policy or no policy at all. Company risk may contribute to the termination decision, and the level of the contribution may be affected by the presence of government guarantees.

Formally, assume policies are described by the financial quality (strength) of the issuing company  $q$  and an annual premium  $p$ .<sup>4</sup> Consumer  $i$ 's net valuation of the policy at time  $t$  depends on these variables, as well as a vector of personal characteristics  $\mathbf{z}_{it}$ , and the level of guaranty fund protection  $g$ . The net valuation is then expressed as:

$$V(\mathbf{z}_{it}, q, g) - p.$$

Valuation will be increasing in quality ( $V_q \geq 0$ ) and in the level of guaranty fund protection ( $V_g \geq 0$ ). Guaranty fund protection is more likely to come into play for low quality policies and, if anything, makes company quality less important:  $V_{qg} \leq 0$ .

Now consider a consumer with an existing policy at time  $t$ . The premium ( $p^0$ ) is fixed, but the quality of the issuing company ( $q_t^0$ ) may have changed with time. The consumer's net valuation of the current policy at time  $t$  can be expressed as:

$$V_t^0 \equiv V(\mathbf{z}_{it}, q_t^0, g) - p^0. \tag{A}$$

In addition to changes in issuing company quality, the consumer's situation (as measured by the vector  $\mathbf{z}_{it}$ ) may be different that it was at the time the

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<sup>3</sup>For example, term insurance contracts feature level premium payments throughout the contract term despite the fact that mortality risk is increasing in age. The consumer "overpays" (relative to mortality risk) early in the contract, but enjoys discounted premiums later in the contract.

<sup>4</sup>The assumed annual premium simplifies the actual situation, where premium payments could stop after a specified period of time (as might be the case with certain whole life policies).

policy was bought. Suppose the market for new policies is competitive, with price being a function of company quality. The consumer’s “ideal” policy at time  $t$  may then be expressed as:

$$V_t^* \equiv \max_q \{V(\mathbf{z}_{it}, q, g) - p(q)\}. \quad (\text{B})$$

If switching were costless, then the consumer would simply terminate the old policy and buy the policy indicated by (B). However, switching costs (such as those described above) are present and represented by  $s$ . Thus, the decision to switch can be boiled down to an evaluation of the net value of switching:

$$N_t(\mathbf{z}_{it}, p^0, q_t^0, g) \equiv V_t^* - V_t^0 - s. \quad (\text{C})$$

If  $N_t > 0$ , the consumer terminates his existing policy. If  $N_t < 0$ , the consumer retains it. The key quantities of interest here are the effects of current company quality and government protection on the net value of switching,  $\frac{\partial N_t}{\partial q_t^0}$  and  $\frac{\partial N_t}{\partial g}$ . A positive value is interpreted to mean that the parameter under consideration *increases* consumer propensity to terminate.

The effect of current company quality is easily deduced. The consumer’s net valuation of the current policy is increasing in company quality,  $\frac{\partial V_t^0}{\partial q_t^0} > 0$ , while the net valuation of the “ideal” policy is unaffected— $\frac{\partial V_t^*}{\partial q_t^0} = 0$ . Thus, the net value of switching is clearly decreasing in current company quality,  $\frac{\partial N_t}{\partial q_t^0} < 0$ . Higher company quality is associated with lower rates of policyholder termination, *ceteris paribus*.

The effect of government guarantees is more complex. An increase in government protection raises both net valuations,  $\frac{\partial V_t^0}{\partial g} > 0$ ,  $\frac{\partial V_t^*}{\partial g} > 0$ , implying that the effect on the net value of switching is ambiguous. Intuitively, the effect would seem to depend on the level of company quality. The  $V_{qg} < 0$  assumption implies that the importance of quality differences among policies drops when government protection is increased. Thus, holders of high quality policies might be *more* inclined to terminate and “downgrade” to a cheaper policy if a need arose. However, holders of low quality policies might be *less* inclined to terminate for two reasons. First, the marginal value of an upgrade is smaller. Second, the value of keeping the policy has increased relative to the “no insurance” option.

This intuition is confirmed with additional structure. Suppose that  $V_{qq} \leq 0$ ,  $p(q)$  is increasing and convex, and that company quality lies in the interval  $[\underline{q}, \bar{q}]$ . In this case, a simple application of the envelope theorem shows that  $\frac{\partial N_t}{\partial g}$  is monotonically increasing in current quality, weakly negative when evaluated at  $q_t^0 = \underline{q}$ , and weakly positive when evaluated at  $q_t^0 = \bar{q}$ . Thus, there exists some quality level  $\tilde{q}$  in  $[\underline{q}, \bar{q}]$  such that 1) for  $q \leq \tilde{q}$ ,  $\frac{\partial N_t(\mathbf{z}_{it}, p^0, q, g)}{\partial g} \leq 0$  and 2) for  $q \geq \tilde{q}$ ,  $\frac{\partial N_t(\mathbf{z}_{it}, p^0, q, g)}{\partial g} \geq 0$ . In other words, the quality space can be divided into two parts—a “low” quality interval in which terminations are discouraged by an increase in government guarantees, and a “high” quality interval where terminations are encouraged by such an increase.

### 3 Data, Methodology, and Results

All financial data are taken from the annual statutory reports made by life-health insurance companies for the 1988 through 1998 calendar years. In addition to balance sheet, income, and cash flow statements analogous (though not identical) to GAAP statements, these reports include detailed information on insurance operations by line of insurance. In particular, at the company level, they contain the number and face value of ordinary policies in force, issued, lapsed, and surrendered. At the company-by-state level, they contain the number and face value of ordinary policies in force during the year and issued during the year. Unfortunately, less detail on lapses and surrenders is available at the state level. Analyses of lapsation at the company-by-state level can use 1) the amounts paid for surrendered policies, or 2) “other” changes to in force insurance, which include amounts lapsed and surrendered. This paper uses the former.

The “risk” measure for each company is a yearly letter rating issued by A.M. Best. In cases where A.M. Best issued more than one rating for a company in a year, only the latest rating was available. A.M. Best refined its rating system in 1992 with the introduction of “A++”, “B++”, “C++”, “D”, and “E.” Accordingly, these were treated as being equivalent to “A+”, “B+”, “C+”, “C-”, and “F,” respectively. Only firms that qualified for a letter rating were included in the analysis, and all analysis was done at the individual company (rather than consolidated group) level.

The year of guaranty fund adoption for each state was determined using

the date published in *Best's Insurance Reports - Life/Health*. State guaranty fund protections are usually granted only to resident consumers of state-licensed companies, with some highly restrictive exceptions.<sup>5</sup> This analysis assumes that residents of states without guaranty funds had no recourse in the event of a company insolvency. Estimated effects are driven by the twelve states (listed in Table 6) that adopted guaranty funds after 1987.

### 3.1 Terminations and Company Risk

The cross-sectional evidence in Table 1 suggests a connection between terminations and company risk. Of course, the higher termination rates at riskier companies may merely reflect differences in product mix or clientele. To address this possibility, we estimate a fixed-effects model of the termination rate for firm  $i$  in year  $t$ :

$$T_{i,t} = \alpha + \mu_i + \phi_t + \beta' \mathbf{q}_{i,t} + \gamma' \mathbf{o}_{i,t} + \epsilon_{i,t}. \quad (\text{D})$$

$$I_{i,t} = \alpha + \mu_i + \phi_t + \beta' \mathbf{q}_{i,t} + \gamma' \mathbf{o}_{i,t} + \epsilon_{i,t}. \quad (\text{E})$$

Here,  $T_{i,t}$  is the ratio of the policies surrendered or lapsed during the year to average policies in force<sup>6</sup> during the year;  $I_{i,t}$  is the ratio of *insurance* (that is, the total *face value* of policies) surrendered or lapsed during the year to average insurance in force during the year. The company and time effects are represented by  $\mu_i$  and  $\phi_t$ , respectively. Company quality is captured in a vector of ten dummies  $\mathbf{q}_{i,t}$  corresponding to the letter-based ratings issued by A.M. Best, while  $\mathbf{o}_{i,t}$  is a vector of other company-specific variables. Table 2 describes the variables and presents summary statistics.

The regression results are reported in Table 3, with heteroscedasticity-consistent standard errors in parentheses and statistically significant (at the

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<sup>5</sup>Typical laws extend coverage to non-residents when 1) the company is domiciled in the state, 2) the company has never held a license in the non-resident's state, 3) the non-resident's state has similar guaranty fund protections in place, and 4) the non-resident is not eligible for protection in another state.

<sup>6</sup>"Average policies in force" means the average of policies in force at the beginning of the year and policies in force at the end of the year. This is the standard definition of the lapse rate.

90% level) coefficients in bold.<sup>7</sup> The first through third specifications are based on (E), while the fourth through sixth refer to (D). The coefficients listed for each rating class show the increase in the lapse ratio expected when moving from the top rating class (A++/A+) to that class. Specifications (1), (3), (4), and (6) show clear evidence of higher terminations associated with lower ratings. Termination increases (relative to the top rating class) appear as early as the “A-” level and appear to become progressively larger as the rating drops. Figure 1 below depicts the estimated differences, with the error-bars representing 95% confidence intervals.

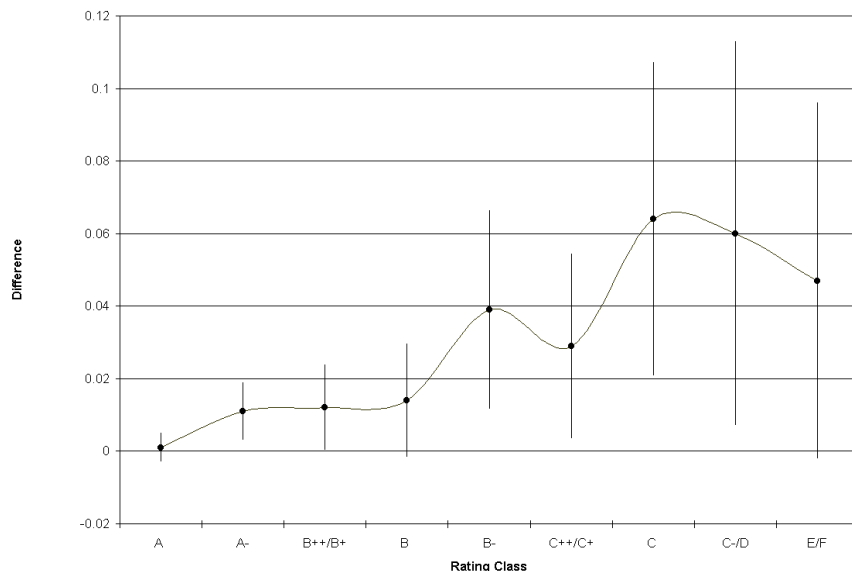


Figure 1: Lapse Rate Differences, Specification (4), Table 3

All specifications show a positive relationship between new policies (the “% new” variables) and terminations. Such a relationship is expected, as new policies are known to be especially susceptible to termination (see ACLI [2]).

Specifications (2), (3), (5), and (6) report the effect of controlling for the direction of rating movements. Previous research (see Epermanis and Harrington [6]) describes an asymmetric effect associated with rating changes,

<sup>7</sup>To be included in the analysis, the company-year was required to have nonnegative policy issuance, insurance issuance, insurance lapsation, policy lapsation, individual whole life insurance, and individual term life insurance.

suggesting that downgrades may have larger effects than upgrades. It also seems reasonable to expect a response to be most dramatic in the year of the downgrade, as quality-sensitive consumers might cancel immediately. For the most part, the signs of the estimated coefficients are consistent with these expectations, but do not meet the usual standards for statistical significance. The most noteworthy exception is the positive and significant estimate for the effect of an upgrade from the “E/F” level. This anomaly may be due to the suspension of activity (including withdrawals and lapses) associated with an “E” or “F” rating; companies with these ratings are either under regulatory supervision, court protection, or in liquidation.

A potential problem with the fixed effects approach is the changes in clientele that may occur after a rating change. For example, a company downgraded from “A” to “B” may subsequently attract a different kind of policyholder—and thus, for our purposes, become a different company. It is difficult to control for such changes in composition, but Table 4 provides a robustness check by estimating the model using differenced data. Although the coefficient estimates are different from those in Table 3, the overall message is unchanged.

### 3.2 Guaranty Fund Effects

To study guaranty fund effects, we turn to company-by-state level data. As previously discussed, data availability dictates a change in the dependent variable of interest: we now focus on the ratio of surrender benefits paid to average insurance in force (hereafter referred to as the *surrender ratio*). Due to a corrupted file, this data is not available for 1990. Thus, the analysis uses a panel with coverage from 1988-1989 and 1991-1998.

The cross-sectional evidence in Table 5 does not reveal a relationship between the surrender ratio and company risk,<sup>8</sup> which calls into question whether the ratio is an appropriate measure of termination behavior. However, the expected relationship between risk and terminations resurfaces once fixed effects controls are in place (see Tables 8 and 9).

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<sup>8</sup>Because this ratio 1) does not count lapses and 2) records the actual cash value paid in the numerator (rather than the face value of the policy surrendered), there are a number of possible explanations for the absence of a cross-sectional relationship. For example, differences in policy composition (more whole life in highly-rated companies) and differences in the policy turnover rate (whole policies being held longer in highly-rated companies) might lead to the observed relationship.

Moving on, Equation (D) is modified to reflect guaranty fund effects as follows:

$$S_{i,s,t} = \alpha + \mu_i + \rho_s + \beta'_1 \mathbf{q}_{i,t} + \beta'_2 (\mathbf{q}_{i,t} * t) + \gamma' \mathbf{o}_{i,s,t} + \theta' \mathbf{g}_{i,s,t} + \epsilon_{i,s,t}. \quad (\text{F})$$

Here,  $S_{i,s,t}$  represents the surrender ratio for firm  $i$  in state  $s$  at time  $t$ . State effects are represented by  $\rho_s$ . As argued in Section 2, the expected effect of guaranty fund protections on terminations depends on the quality level of the company. Accordingly, the effect is represented with  $\mathbf{g}_{i,s,t}$ , a set of variables interacting the quality of firm  $i$  with the presence of guaranty fund protection in state  $s$  at time  $t$ . The coefficients associated with these variables, which reveal the relationship between guaranty funds and termination behavior, are the key items of interest. The analysis generates estimates of the effect of guaranty fund enactment on terminations in companies rated “A-” or above (the “After” coefficient) and those rated below “A-” (the “After” coefficient plus the “After & Rated Below A-” coefficient).

Another key difference is the inclusion of quality effect trends (coefficient vector  $\beta'_2$ ). This was necessitated by the finding that the relationship between the surrender ratio and quality was changing over time, and that this change was occurring both in states that had a law change during the sample period and in states that did not. Testimony to this fact can be found in Table 6, which shows the change in the *surrender ratio differential* (the difference between the surrender ratio in companies rated below “A-” and the surrender ratio in companies rated “A-” or above) before and after guaranty fund adoption. This table shows that surrender ratios in low-rated companies fell relative to those in high-rated companies, and that the change in states that adopted during the sample period was not consistently different from the corresponding change in a “control” group formed of the 39 other states. Analysis that does not control for these trends will find a spurious effect associated with guaranty fund enactment.

Table 7 shows summary statistics for selected variables, and Tables 8 and 9 show the regression results.<sup>9</sup> Both tables confirm a relationship between risk and surrenders, but the trend coefficients, which tend to be more

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<sup>9</sup>To be included in the analysis, the company-state-year had to start the year with at least \$1 million in force, as well as nonnegative values for year-end insurance in force, insurance issuance, surrender values, whole insurance, and term insurance. Large values for the dependent variable (surrender ratios in excess of 2) were discarded.

negative for lower quality levels, suggest that this relationship may be weakening over time. The results show a positive relationship between whole life insurance and the surrender ratio; this is to be expected, as surrender values are more often associated with whole life insurance than with term insurance. The results also show a negative effect associated with new business, which may be attributed to the fact that the surrender values associated with new policies are small (although new policies are more likely to be terminated).

The theory predicted that guaranty fund adoption would lead to a decrease in surrenders at low-rated companies relative to those at high-rated companies. However, the results show only weak evidence of an effect associated with guaranty fund adoption. The “After & Rated Below A-” coefficient is the expected negative sign, but fails the usual standard for statistical significance. The same is true for the “After & Downgrade” coefficient, which suggests that the reaction to a downgrade is mitigated in the presence of guaranty funds. However, although the null hypothesis cannot be rejected in either case, the point estimates are both fairly large relative to the sample mean.

## 4 Conclusion

This paper presented evidence of market discipline by ordinary life policyholders. It showed that policyholders care about company quality, but found only weak evidence that this preference was mitigated by the enactment of guaranty funds.

The latter finding should be interpreted with a great deal of care. The power of the test is limited, as the observation of behavior in the absence of guaranty funds was restricted to the early part of the sample and only a handful of states. In addition to statistical limitations, this raises the possibility that the enactment effect was underestimated due to consumer anticipation of the guaranty fund legislation.

Care should also be used when considering the results in any context broader than the current-day insurance market. For example, many states forbid insurance sellers to advertise the presence of guaranty fund protection to consumers. This contrasts with the situation for banks, where the level of protection is clearly specified with the “FDIC” stamp. Furthermore, since protection is provided at the level of the state, the strength of the guarantee

may be perceived as weak relative to that offered by the FDIC.<sup>10</sup> Finally, the spread of government guarantees is a relatively new phenomenon in life insurance. Most guaranty funds were enacted within the past several decades, while federal deposit insurance for banks appeared in the 1930's. It may take some time for the quality-conscious culture of the insurance market to change.<sup>11</sup>

On the other hand, recent evidence has found market discipline even by insured bank depositors. Consumer preference for quality in life insurance should come as no surprise in light of these previous findings.

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<sup>10</sup>This possibility resonates with the findings of Peria and Schmukler [14], who speculate that the perceived weakness of government guarantees in Latin American countries may be a reason why insured depositors are risk-sensitive.

<sup>11</sup>Change may be happening already. The paper showed some hints of a secular decline in the difference between the surrender rates at low-rated companies and high-rated companies.

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Rating	1988-1998 Sample Averages			
	Lapse Rate		Policies per Year (millions)	Companies per Year
	Policies	Face Value		
A++,A+	7.4%	9.1%	132.7	227
A	8.8%	10.1%	38.2	195
A-	12.2%	12.6%	9.5	83
B++, B+	10.7%	16.6%	5.9	139
B	8.3%	19.0%	1.7	57
B-	12.7%	25.9%	0.2	15
C++, C+	17.5%	18.0%	0.5	19
C	23.7%	25.7%	0.2	10
C-, D	17.9%	28.3%	0.3	4
E, F	10.7%	15.0%	0.3	9
Total	8.1%	9.9%	189.4	756

Table 1 Lapse Rates by A.M. Best Rating Class

Variable	Description	Num	Mean	Std	Min	Max
insurance lapse ratio	ratio of insurance lapsed to in force (average)	7739	.129	.126	0	2.191
policy lapse ratio	ratio of policies lapsed to in force (average)	7739	.101	.115	0	2.350
A	1 if company has the rating, 0 otherwise	7706	.261		0	1
A-		7706	.107		0	1
B++/B+		7706	.172		0	1
B		7706	.070		0	1
B-		7706	.019		0	1
C++/C+		7706	.026		0	1
C		7706	.012		0	1
C-/D		7706	.006		0	1
E/F		7706	.012		0	1
% new insurance	ratio of ordinary insurance issued to in force (at year start)	7739	.137	.135	0	.999
% new policies	ratio of ordinary policies issued to in force (at year start)	7739	.099	.119	0	.994
% whole	whole life divided by total ordinary insurance	7508	.617	.297	0	1
Log assets	log of the company's statutory assets	7638	19.3	2.05	12.1	25.6
Downgrade	1 if company downgraded, 0 otherwise	6653	.071		0	1
Upgrade	1 if company upgraded, 0 otherwise	6653	.049		0	1
Minor Downgrade	1 if company downgraded within A range, 0 otherwise	6653	.043		0	1
Minor Upgrade	1 if company upgraded within A range, 0 otherwise	6653	.018		0	1
Downgrade to E,F	1 if company downgraded to E/F, 0 otherwise	6653	.001		0	1
Upgrade from E,F	1 if company upgraded from E/F, 0 otherwise	6653	.000		0	1

Table 2 Variables - Section 3.1 Regressions

<b>Table 3: Company Level Fixed Effects Regressions</b>						
(Year and Company Dummies Omitted)						
Explanatory Variable	Dependent Variable					
	"Insurance" Lapse Ratio			"Policy" Lapse Ratio		
% new insurance	<b>0.111</b> (0.022)	<b>0.111</b> (0.025)	<b>0.113</b> (0.025)	-	-	-
% new policies	-	-	-	<b>0.163</b> (0.031)	<b>0.136</b> (0.027)	<b>0.137</b> (0.027)
log assets	-0.003 (0.003)	-0.006 (0.004)	-0.004 (0.004)	-0.005 (0.003)	<b>-0.007</b> (0.004)	-0.005 (0.004)
% whole	-0.003 (0.009)	0.003 (0.010)	0.002 (0.010)	-0.004 (0.009)	-0.004 (0.010)	-0.004 (0.010)
A	-0.001 (0.002)	-	-0.003 (0.003)	0.001 (0.002)	-	-0.002 (0.003)
A-	<b>0.008</b> (0.005)	-	0.006 (0.005)	<b>0.011</b> (0.004)	-	0.007 (0.005)
B++/B+	<b>0.014</b> (0.008)	-	<b>0.017</b> (0.008)	<b>0.012</b> (0.006)	-	<b>0.014</b> (0.006)
B	0.010 (0.009)	-	0.012 (0.009)	<b>0.014</b> (0.008)	-	<b>0.014</b> (0.008)
B-	0.018 (0.014)	-	0.014 (0.015)	<b>0.039</b> (0.014)	-	<b>0.042</b> (0.016)
C++/C+	0.023 (0.014)	-	0.020 (0.016)	<b>0.029</b> (0.013)	-	<b>0.028</b> (0.015)
C	<b>0.050</b> (0.022)	-	<b>0.061</b> (0.029)	<b>0.064</b> (0.022)	-	<b>0.062</b> (0.027)
C-/D	<b>0.070</b> (0.038)	-	<b>0.092</b> (0.032)	<b>0.060</b> (0.027)	-	<b>0.075</b> (0.026)
E/F	<b>0.037</b> (0.017)	-	<b>0.056</b> (0.030)	<b>0.047</b> (0.025)	-	<b>0.049</b> (0.030)
downgrade	-	0.016 (0.011)	0.009 (0.011)	-	0.005 (0.008)	-0.002 (0.008)
upgrade	-	-0.001 (0.006)	0.003 (0.007)	-	-0.006 (0.006)	-0.003 (0.006)
minor downgrade	-	-0.011 (0.012)	-0.004 (0.012)	-	0.002 (0.009)	0.008 (0.010)
minor upgrade	-	-0.001 (0.007)	-0.003 (0.008)	-	0.000 (0.007)	-0.001 (0.007)
downgrade to E/F	-	0.010 (0.023)	-0.031 (0.036)	-	0.013 (0.017)	-0.018 (0.034)
upgrade from E/F	-	0.181 (0.129)	0.163 (0.119)	-	<b>0.166</b> (0.098)	<b>0.156</b> (0.094)
Obs	7507	6508	6508	7507	6508	6508
Adj R-sq	0.53	0.53	0.54	0.47	0.48	0.48

<b>Table 4: Company Level Regressions (First Differences)</b>						
(Year Dummies Omitted)						
<b>Explanatory Variable</b>	<b>Dependent Variable</b>					
	<b>"Insurance" Lapse Ratio</b>			<b>"Policy" Lapse Ratio</b>		
% new insurance	0.040 (0.035)	0.042 (0.041)	0.043 (0.041)	-	-	-
% new policies	-	-	-	<b>0.086</b> (0.048)	0.054 (0.053)	0.053 (0.053)
log assets	0.0000 (0.000)	-0.0003 (0.000)	<b>-0.0003</b> (0.000)	0.000 (0.000)	<b>-0.001</b> (0.000)	<b>-0.001</b> (0.000)
% whole	-0.002 (0.025)	0.000 (0.027)	0.000 (0.027)	0.005 (0.024)	-0.004 (0.024)	-0.003 (0.024)
A	0.003 (0.004)	-	0.001 (0.007)	0.005 (0.004)	-	0.003 (0.007)
A-	0.018 (0.012)	-	0.015 (0.016)	<b>0.022</b> (0.012)	-	0.018 (0.015)
B++/B+	0.015 (0.021)	-	0.024 (0.025)	0.016 (0.017)	-	0.021 (0.020)
B	0.018 (0.022)	-	0.029 (0.027)	0.020 (0.016)	-	0.028 (0.021)
B-	0.032 (0.025)	-	0.039 (0.032)	<b>0.042</b> (0.023)	-	<b>0.051</b> (0.028)
C++/C+	0.025 (0.027)	-	0.037 (0.036)	<b>0.042</b> (0.022)	-	<b>0.055</b> (0.029)
C	0.019 (0.037)	-	0.015 (0.050)	0.035 (0.041)	-	0.008 (0.043)
C-/D	<b>0.093</b> (0.047)	-	<b>0.116</b> (0.055)	<b>0.084</b> (0.040)	-	<b>0.081</b> (0.044)
E/F	0.033 (0.035)	-	0.058 (0.053)	0.039 (0.028)	-	<b>0.067</b> (0.041)
downgrade	-	0.008 (0.010)	0.002 (0.009)	-	-0.003 (0.007)	-0.008 (0.008)
upgrade	-	0.004 (0.007)	0.008 (0.008)	-	-0.003 (0.007)	0.000 (0.007)
minor downgrade	-	-0.005 (0.011)	-0.002 (0.012)	-	0.007 (0.009)	0.008 (0.011)
minor upgrade	-	-0.013 (0.009)	-0.012 (0.010)	-	-0.009 (0.009)	-0.007 (0.009)
downgrade to E/F	-	0.024 (0.027)	-0.003 (0.037)	-	0.029 (0.021)	-0.005 (0.028)
upgrade from E/F	-	<b>0.212</b> (0.121)	0.156 (0.119)	-	<b>0.164</b> (0.086)	0.134 (0.082)
Obs	6356	5511	5511	6356	5511	5511
Adj R-sq	0.006	0.006	0.005	0.006	0.006	0.004

Rating	Sample Average Surrender Ratios: 1988-1998*	
	Aggregated	Averaged by Company by State
A++, A+	.005	.023
A	.006	.029
A-	.006	.032
B++, B+	.004	.030
B	.008	.029
B-	.006	.020
C++, C+	.004	.020
C	.005	.037
C-, D	.002	.019
E, F	.020	.034

\* Averages omit 1990.

Table 5 Surrender Ratios by A.M. Best Rating Class

	Change in Average Surrender Ratio Differential from Period Before to Period After Guaranty Fund Adoption		
	Adoption Year	State	“Control”
Missouri	1988	-.009	-.005
Arkansas	1989	-.009	-.008
Ohio	1989	-.016	
South Dakota	1989	+.016	
Tennessee	1989	-.007	
Alaska	1990	-.003	-.010
Wyoming	1990	-.006	
California	1991	-.009	-.010
Colorado	1991	-.017	
Louisiana	1991	-.010	
New Jersey	1991	-.047	
D.C.	1992	-.005	-.010

Table 6 Difference in Surrender Ratio Differential (SRD) averaged in all years after guaranty fund adoption and SRD averaged in all years before and including year of adoption. SRD measures the difference between the surrender ratio at companies rated B++ or lower and companies rated A- or higher.

Variable	Description	Num	Mean	Std	Min	Max
surrender ratio	surrender values to insurance in force	157754	.022	.113	0	2.000
Below A-	1 if rated below A-, 0 otherwise	157314	.135	.115	0	1
A	1 if rating present, 0 otherwise	157314	.293		0	1
A-		157314	.118		0	1
B++/B+		157314	.088		0	1
B		157314	.025		0	1
B-		157314	.005		0	1
C++/C+		157314	.007		0	1
C		157314	.002		0	1
C-/D		157314	.001		0	1
E/F		157314	.007		0	1
% new insurance	ratio of insurance issued to in force	157754	.132	.135	0	.999
% whole	whole life divided by total insurance	156652	.637	.258	0	1
Log assets	log of the company's statutory assets	156931	20.5	1.8	14.5	25.6
Downgrade	1 if downgraded, 0 otherwise	139776	.080		0	1
Upgrade	1 if upgraded, 0 otherwise	139776	.064		0	1
After	1 if g-fund present, 0 otherwise	157754	.944		0	1
After & Below A-	1 if After & Below A-, 0 otherwise	157314	.129		0	1
After & Downgrade	1 if After & Downgrade, 0 otherwise	139776	.060		0	1
After & Upgrade	1 if After & Upgrade, 0 otherwise	139776	.064		0	1

Table 7 Variables - Section 3.2 Regressions

<b>Table 8: State-by-Company Level Regressions</b>		
(Company and Year Dummies Omitted)		
<b>Explanatory Variable</b>	<b>Dependent Variable: Surrender Ratio</b>	
% new insurance	<b>-0.013</b> (0.002)	<b>-0.010</b> (0.002)
log assets	<b>0.002</b> (0.001)	0.0005 (0.001)
% whole	<b>0.032</b> (0.003)	<b>0.029</b> (0.003)
Rated Below A-	<b>0.018</b> (0.003)	<b>0.024</b> (0.004)
Rated Below A- (trend)	<b>-0.002</b> (0.0002)	<b>-0.002</b> (0.0003)
Downgrade	-	0.007 (0.005)
Downgrade (trend)	-	-0.0002 (0.001)
Upgrade	-	-0.003 (0.003)
Upgrade (trend)	-	<b>0.0013</b> (0.0006)
After	-0.001 (0.001)	-0.001 (0.001)
After & Below A-	-0.003 (0.002)	-0.004 (0.004)
After & Downgrade	-	-0.007 (0.005)
After & Upgrade	-	-0.001 (0.003)
Obs	156135	138691
Adj R-sq	0.42	0.46

<b>Table 9: State-by-Company Level Regressions</b>		
(Year and Company Dummies Omitted)		
<b>Explanatory Variable</b>	<b>Dependent Variable: Surrender Ratio</b>	
% new insurance	<b>-0.013</b> (0.002)	<b>-0.010</b> (0.002)
log assets	<b>0.0028</b> (0.001)	0.0009 (0.001)
% whole	<b>0.031</b> (0.003)	<b>0.028</b> (0.003)
A	<b>-0.006</b> (0.001)	<b>-0.006</b> (0.002)
A-	-0.001 (0.003)	-0.004 (0.003)
B++/B+	<b>0.013</b> (0.003)	<b>0.018</b> (0.005)
B	<b>0.020</b> (0.004)	<b>0.023</b> (0.006)
B-	<b>0.021</b> (0.005)	<b>0.028</b> (0.006)
C++/C+	<b>0.021</b> (0.003)	<b>0.025</b> (0.004)
C	<b>0.021</b> (0.003)	<b>0.039</b> (0.007)
C-/D	<b>0.029</b> (0.008)	<b>0.040</b> (0.013)
E/F	<b>0.038</b> (0.008)	<b>0.049</b> (0.010)
downgrade	-	0.008 (0.005)
upgrade	-	-0.003 (0.003)
A (trend)	<b>0.0005</b> (0.0002)	0.0002 (0.0003)
A- (trend)	0.0005 (0.0004)	0.0007 (0.0004)
B++/B+ (trend)	<b>-0.0015</b> (0.0003)	<b>-0.002</b> (0.0003)
B (trend)	<b>-0.0014</b> (0.0006)	<b>-0.0015</b> (0.0008)
B- (trend)	<b>-0.0021</b> (0.0006)	<b>-0.003</b> (0.0007)
C++/C+ (trend)	<b>-0.0018</b> (0.0006)	<b>-0.002</b> (0.0007)
C (trend)	<b>-0.0024</b> (0.0006)	<b>-0.004</b> (0.0012)
C-/D (trend)	<b>-0.0036</b> (0.0016)	<b>-0.004</b> (0.0022)
E/F (trend)	<b>-0.00532</b> (0.0008)	<b>-0.007</b> (0.0011)
Downgrade (trend)	-	-0.0004 (0.0005)
Upgrade (trend)	-	<b>0.001</b> (0.0006)
After	-0.001 (0.001)	-0.001 (0.001)
After & Below A-	-0.0035 (0.0024)	-0.0046 (0.0037)
After & Downgrade	-	-0.006 (0.005)
After & Upgrade	-	-0.001 (0.003)
Obs	156135	138691
Adj R-sq	0.42	0.460