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THE EFFECT OF FIRM TRAITS ON LONG-TERM CARE INSURANCE PRICING

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ABSTRACT

Financing long-term care is an issue of concern to many Americans, yet private long-term care insurance product sales have experienced slow growth. Pricing problems may in part explain this phenomenon. This study provides the first empirical evidence on pricing in the long-term care insurance market and analyzes the relationship between insurer operating characteristics and premium. The results suggest that prices vary across firms due to size, organizational form, default risk, and tenure in the market, but not due to differences in distribution system. The evidence is also consistent with significant price differences due to contract design variables that control moral hazard and adverse selection.

INTRODUCTION

Financing long-term care has become an issue of increasing concern to many Americans. Long-term care includes a range of social and medical services needed by individuals unable to care for themselves due to physical or cognitive disability. Care may be provided in nursing homes, at home, in other residential facilities, or at adult day care centers for the elderly or disabled. People of all ages use long-term care, but the need is especially acute for the elderly (i.e., those over age 65). Private long-term care insurance is one solution to the financing issue. However, this product has ex-

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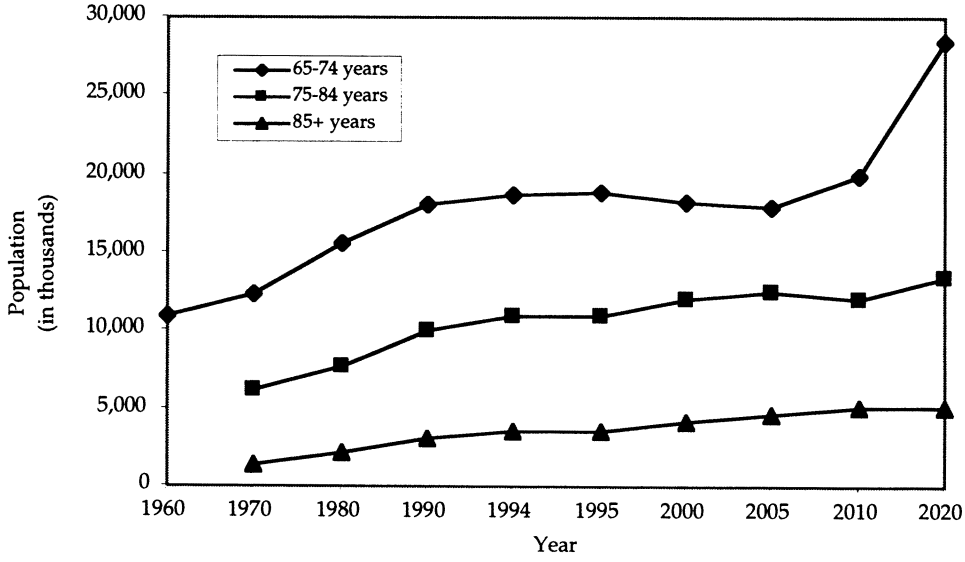
perienced relatively slow growth in recent years, possibly because price and policy characteristics are not sufficiently appealing to generate strong sales. This study analyzes the relationship between insurer operating characteristics and the price of insurance. In particular, the importance of insurer organizational form, size, financial strength, distribution system, and tenure in the market is documented and analyzed. Moral hazard and adverse selection effects with respect to particular policy design features are also examined.

This article begins with a review of the context in which long-term care insurance is sold. Next, the research methods used in the study are discussed, and the data set and the expected results are described. The empirical results are then reported, followed by a discussion of the major conclusions and implications of the study.

THE LONG-TERM CARE INSURANCE MARKET

Concern about long-term care financing has increased for several reasons. First, demographic trends show that the elderly are the fastest growing age group in the nation. Figure 1 depicts past and projected growth trends for the elderly to the year 2020. Kemper and Murtaugh (1991) estimate that 43 percent of the elderly will use nursing home care, that over half of those in nursing homes will stay for at least one year, and that 20 percent will remain five years or longer. The concern about paying for nursing home care will become more pronounced in the future, as the proportion of younger persons relative to older persons decreases, thereby making family care less feasible for many. Extended life expectancies, due to advances in medical science and increasingly healthy lifestyles, further increase the likelihood that long-term care outside of the family unit will be needed.

FIGURE 1
Growth in the Elderly Population of the United States



Source: *Statistical Abstracts of the United States* (1991, 1992, 1995, Middle Series).

Concern about long-term care financing arises not only from increasing utilization of services, but from the high cost of such services. Typical nursing home costs range from $35,000 to $65,000 or more per year, and costs are rising faster than inflation. Community-based residential care or home care is less expensive, but can still be prohibitive for middle- and-lower-income families. In 1995, national aggregate long-term care expenditures exceeded $100 billion annually, of which 44 percent was paid by Medicaid, 16 percent by Medicare, and 30 percent by individuals and their families. Private long-term care insurance represented only about 2 percent of benefit payments.[1] Reductions in state Medicaid funding are likely to have a significant impact on the financing of long-term care in the future, and another public sector solution to the problem of funding long-term care is unlikely, given efforts to control federal spending.

Given the aging of the population, the rising cost of care, and efforts to reduce Medicaid and Medicare expenditures, sales of long-term care insurance have been notably limited. Randall (1993) estimates that only 5 percent of the elderly and 1 percent of the population at large have long-term care insurance. Coronel (1998) reports that long-term care policies purchased as of December 1996 totaled only 4.96 million. For comparison, the American Council of Life Insurance (1998) reports that there were 140 million ordinary individual life insurance policies in force in 1996.

Although the long-term care market is relatively undeveloped, insurers appear reluctant to enter this line of business. Approximately 125 insurers market long-term care insurance, compared to 1,679 marketing life insurance in 1996.[2] There also has been significant turnover among insurers marketing long-term care coverage, which may be due to low margins in the health insurance industry. Uncertainty about federal regulation may also explain insurer reluctance to enter the market.[3] Insurer reluctance and turnover have resulted in relatively few insurers having significant market power: In 1996 approximately 12 insurers sold about 80 percent of all individual and group association policies.[4]

The apparent lack of interest in the long-term care market by both buyers and sellers is somewhat puzzling, given that private insurance appears ideally suited for financing this risk. There are several possible explanations for slow growth. Kunreuther (1978) shows that consumers ignore low-frequency, high-severity events that have not occurred recently, although Hershey et al. (1984) indicate that this tendency is less problematic with health insurance. Similarly, consumers may inaccurately as-

[1] The remaining 10 percent was paid by various private, state, and federal sources. Health Insurance Association of America (1995), p. 7.

[2] American Council of Life Insurance (1998), p. 56.

[3] Passage of the Health Insurance Portability and Accountability Act of 1996 (HIPAA) clarified the tax treatment of long-term care insurance in that favorable tax treatment is awarded to policies meeting prescribed standards. These "qualified" policies tend to provide broader coverage for consumers. However, consumers may find it difficult to meet underwriting requirements to qualify for this broader coverage. Several states have approved the sale of more restrictive policies but consumers do not get favorable tax treatment for purchase of these policies. Additional clarification of this and other aspects of the federal regulation is anticipated.

[4] Coronel (1998), p. 27.

sess the probability that they will need long-term care or the cost of such care. Some consumers mistakenly believe that Medicare or Medicare supplement policies routinely cover long-term care. The only government program routinely covering custodial long-term care is Medicaid. Only the categorically eligible poor qualify for Medicaid nursing home benefits, and middle-class elderly must exhaust resources or transfer assets to family members in order to become eligible for Medicaid long-term care benefits. Another explanation for the slow rate of growth is that some potential insureds accumulate sufficient savings or equity to cover the cost of long-term care. Pauly (1990) and Zweifel and Struwe (1998) assert that others may refuse private insurance coverage since it primarily protects bequests and/or makes it too easy for children to substitute formal care provided outside of the home for informal family care. Murtaugh et al. (1995) argue that medical underwriting prevents some interested buyers from obtaining coverage.

Davis and Rowland (1986) cite pricing problems, adverse selection, and moral hazard to explain slow growth of the long-term care insurance market. Observed behavior also suggests that this market is characterized by pricing problems. For example, consumers offer anecdotal evidence that similar long-term care policies are sold at significantly different prices across insurers. However, there has been no empirical evidence to date on the relationship between insurer operating characteristics and the price of insurance. This study documents insurer pricing practices and provides empirical evidence of the impact of firm traits on long-term care insurance premiums.

RESEARCH METHODS

In this section, the model forming the basis for the study is presented. The specific hypotheses for testing are outlined, followed by the empirical methods used for analysis. The data are then described, and the expected results are discussed.

Model

The hedonic pricing model developed by Lancaster (1966), Muth (1966), and Rosen (1974), and applied by Hite (1980), Smith (1982), Walden (1985), Puelz and Kemmsies (1993), and Cox and Gustavson (1995) to insurance markets, describes products as composites of multiple characteristics, such that product demand reflects consumer demand for the particular traits of the product. Here, long-term care insurance policies are composed of insurer operating characteristics with controls for policy design differences. All else being equal, greater insurer strength and service are expected to increase premium. The pricing model is specified as:

$$p_i = f(x_{ij}, c_{ik}),$$

where

p_i = price of the ith long-term care insurance policy

x_{ij} = jth characteristic of the insurer for the ith policy

c_{ik} = kth policy contract provision of the ith policy

Stated in null form, insurer differences in organizational form, size, financial strength, distribution system, and tenure in the long-term care insurance market do not explain price variations across long-term care insurance policies. Additional explanation of the insurer characteristic variables, including measurement issues and expected results, is included in a later section of the article.

For control purposes the model also includes various policy design features that affect the richness of the benefit provided by the contract. The specific contract features are the duration of the benefit period, the length of the elimination period, the interaction of benefit period with elimination period, a preexisting condition limit, inflation coverage, a nonforfeiture option, the benefit trigger, coverage of home health care, and the upper age limit at which a policy will be issued. Additional explanation of these features, including measurement issues and expected results, is included in a later section of the article.

Empirical Methods and Data

The hedonic pricing model is estimated using ordinary least squares.[5] The model is specified as:

$$P_i = X_i\ \alpha + C_i \beta + e_i,$$

where P_i = the natural log of the policy premium amount for the ith long-term care policy with a $100 per day benefit

X_i = a vector of independent insurer operating characteristics for the ith policy

α = a vector of regression coefficients for the insurer operating characteristics

C_i = a vector of policy design variables for the ith policy

β = a vector of regression coefficients for the policy design variables

e_i = the random error term.

To document current long-term care insurance pricing practices, in February 1996 we surveyed the chief actuaries of U.S. insurers selling long-term care insurance policies. Names of insurers were obtained from the most recent Health Insurance Association of America annual survey, which lists 118 companies selling long-term care insurance as of December 1993.[6] Of these insurers, we did not survey the 14 that are subsidiaries marketing the parent companies' long-term care policies. Of the 104 companies contacted, 19 reported not selling long-term care insurance,[7] 10 provide long-

[5] Jones (1988) finds that this approach is robust over non-linear price functions and different market structures.

[6] See Coronel and Fulton (1995).

[7] The majority of companies listed by HIAA as long-term care insurers that reported not selling long-term care insurance are Blue Cross and Blue Shield Association (BCBS) organizations. HIAA does not directly contact these companies but receives market information from the BCBS Association for member organizations. This may account for the discrepancy.

term care insurance only as a rider to a life insurance policy, and 4 sell only *group* long-term care coverage. Thirty-four companies provided useful information on *non-group* or *individual* long-term care insurance policies, and one provided incomplete information. For purposes of the study we focus on the *individual* long-term care insurance market since in 1996 approximately 80 percent of the 4.96 million long-term care policies sold were in the individual and group association market.[8] Thus the response rate to the survey was 65.4 percent.

The information from the mailed survey was supplemented by telephone calls to the chief actuaries for clarification or additional information where needed, and policies were collected to further allow product comparisons across companies. Supplemental information about the insurers, namely organizational form, firm size, a risk-based capital measure, distribution system, and tenure in the market was collected from the National Association of Insurance Commissioners (NAIC) annual statements, tapes, and telephone interviews as well as from *Best's Reports*. When data collection was complete, full information usable for the study was available for 762 individual long-term care insurance policies across 27 insurers. Market share information shows that these particular 27 insurers represent 80 percent of the individual long-term care insurance market.[9] Characteristics of the insurers in the sample are summarized in Table 1. Among the insurers selling individual long-term care insurance, nearly 75 percent were stock companies, and about 44 percent marketed coverage through captive agents. About 22 percent had been in the market for 5 years, 66.6 percent had been in the market between 6 and 10 years, and only 11 percent had been in the market for more than 10 years.

TABLE 1
Characteristics of Nongroup Long-Term Care Insurers (Sample Size of 27)

Insurer Characteristics	*Number of Insurers*
Organizational Form	
Stock Insurers	20
Mutual Insurers	7
Distribution System	
Captive Agents (primarily)	12
Brokers	15
Year of Entry in Nongroup Market	
1965	1
1978	1
1985	1
1986	3
1987	3
1988	5
1989	4
1990	3
1991	6

[8] See Coronel, 1998, p. 5.

[9] KPMG Peat Marwick reports market share by company.

An important aspect of this study is the unique nature of the data set obtained. The relative newness of the long-term care insurance product has made empirical analysis difficult to date, and these data allow the first empirical investigation of pricing and firm differences across insurers. To improve on accuracy of long-term care market information, all long-term care insurers were contacted directly about their products.[10] Premium information was also verified to ensure reliable empirical analysis. Further, information on product design control variables was collected in sufficient detail to allow meaningful cross-policy comparison. Finally, a sufficient number of insurers with sizable market share are included in the data set to allow reliable analysis which can be generalized beyond the sample.

Insurer Trait Variables

Five company traits are included in the analysis to investigate the effect of insurer efficiency, strength, and service on premium. These characteristics include organizational form, size, financial strength or default risk, type of distribution system, and tenure in the long-term care insurance market. The expected effects of all of the independent variables in the study are summarized in Table 2.

Organizational Form The organizational form variable distinguishes between stock and mutual insurers. There is no empirical evidence to date on the impact of organizational form on insurance prices in the long-term care insurance market. However, theoretical studies such as Mayers and Smith (1981) and Smith (1986) suggest that mutual firms have a comparative advantage in lines where less managerial discretion is required, i.e., where there are stable actuarial tables and long term contracts and where renewal options are relatively valuable. Thus given the relative newness of long-term care insurance in the market, the short track record for claim costs, and uncertainty about future long-term care costs, mutual insurers are not expected to have an advantage in this line. Stock companies may be able to offer the same quality product at a lower premium, all else the same. Here, an indicator variable, with a value of 1 for stock insurers and 0 for mutual insurers, distinguishes organizational form. We expect the sign of the coefficient to be negative.

Size Since long-term care insurance is a relatively new product with limited market penetration, consumers may be aware of relatively few firms marketing the product. A larger firm may be able to charge a higher premium for name recognition, reputation, and perception as a financially strong insurer. Previous research in the property-liability insurance market suggests a positive relationship between insurer size and premium (see, for example, Sommer, 1996). Here the natural logarithm of insurer assets (LnAssets) is included to identify firm differences due to size, and we expect a positive relationship between LnAssets and premium.

Financial Strength An important insurer characteristic to consumers is the firm's financial strength and ability to pay claims. This trait is valuable with all insurance contracts, but is especially important in lines like long-term care insurance where claims may not occur for many years. Previous research in the property-liability in-

[10] As noted in footnote 7, the HIAA survey does not contact Blue Cross and Blue Shield insurers directly.

TABLE 2
Expected Sign of the Coefficients

Variable	*Measurement Values*	*Expected Sign*
Organizational Form	1 = Stock Co., 0 = Mutual	–
Size	Ln (Assets)	+
RBC Ratio	Total adjusted capital/authorized control level	+
Distribution System	1 = Captive Agent, 0 = Other	–
Tenure	Years in market	–
Four-Year Benefit Period	1 = Yes, 0 = 3 yr, unlimited	+
Unlimited Benefit Period	1 = Yes, 0 = 3 or 4 yr	+
Elimination Period 0 Days	1= Yes, 0 = 20,30,60,100 days	+
Elimination Period 20 Days	1 = Yes, 0 = 0,30,60,100 days	+
Elimination Period 30 Days	1 = Yes, 0 = 0,20,60,100 days	+
Elimination Period 60 Days	1 = Yes, 0 = 0,20,30,100 days	+
Interaction Terms:		
Four-Year, Elim Pd 0	1 = Yes, 0 = No	?
Four-Year, Elim Pd 20	1 = Yes, 0 = No	?
Four-Year, Elim Pd 30	1 = Yes, 0 = No	?
Four-Year, Elim Pd 60	1 = Yes, 0 = No	?
Unlimited, Elim Pd 0	1 = Yes, 0 = No	?
Unlimited, Elim Pd 20	1 = Yes, 0 = No	?
Unlimited, Elim Pd 30	1 = Yes, 0 = No	?
Unlimited, Elim Pd 60	1 = Yes, 0 = No	?
Preexisting Condition	1 = Yes, 0 = No	–
Inflation Coverage	1 = Yes, 0 = No	+
Nonforfeiture Option	1 = Yes, 0 = No	+
ADL Trigger	X of Y Required	–
Home Health Coverage	1 = Yes, 0 = No	+
Age Limit at Issue	Age (in years)	+
Age 65	1 = purchased at age 65, 0 = 55 or 75	+
Age 75	1 = purchased at age 75, 0 = 55 or 65	+
Preferred Rate	1 = preferred rate, 0 = standard rate	–

surance industry (see, for example, Sommer, 1996; Cummins and Danzon, 1997; Phillips et al., 1998) suggests a positive relationship between the measure of a firm's financial strength and premium (i.e., stronger firms command higher premiums). We would expect a positive relationship between financial strength and price, assuming that firm pricing strategy does not vary significantly across lines. This assumption would not hold if life-health insurers have a unique pricing strategy (e.g., punitive pricing or loss-leader pricing) for their long-term care products. Here financial strength of the insurer is proxied using the risk-based capital measure (RBC

Ratio) of total adjusted capital to the authorized control level (or required capital), such that the larger the ratio, the greater the financial strength of the firm. We expect a positive relationship between RBC Ratio and premium since consumers value financial strength in an insurer.

Other proxies for financial strength were used in preliminary tests. Prior studies suggest that the RBC Ratio with Best's ratings could provide more efficient predictors of life insurer insolvency than either factor used alone (see, for example, Ambrose and Carroll, 1994; Carson and Hoyt, 1995; Pottier, 1998). We used the RBC Ratio with Best's ratings as well as Best's ratings alone to proxy financial strength, with no change in our empirical results.[11] We also used net premiums written to surplus as a proxy, with no change in the empirical results.

Distribution System Insurers distribute long-term care policies either through captive agents or agents and brokers representing more than one insurer. In this study, an indicator variable is used with a value of 1 if the coverage is marketed primarily through captive agents and 0 otherwise. Previous research suggests that independent agency insurers have higher expense margins than captive insurers and may be less efficient (see, for example, Joskow 1973; Cummins and VanDerhei, 1979; Barrese and Nelson, 1992; Regan, 1997). Critics argue that higher expenses reflect the cost of providing better service, but the evidence on this is mixed (see, for example, Cummins and Weisbart, 1977; Doerpinghaus, 1991; Barrese et al., 1995). Some research on expense ratios by line has been done (see Regan, 1999), but this has not included the long-term care insurance line. Given the evidence to date in other lines of insurance, we expect a negative relationship between the distribution system variable and price due to potential efficiency advantages of captive insurers.

Tenure Tenure, or the time in the market, measures the number of years an insurer has been active in the individual long-term care insurance market. In recent years, many insurers have entered the market and have subsequently stopped selling policies after only a brief time. Those insurers that have stayed in the market consistently over a substantial period of time can develop efficiencies that are reflected in their pricing. Thus, a negative relationship is hypothesized between Tenure and premium. This variable may also serve as a proxy for market share.[12] All else

[11] It was not feasible to use NAIC IRIS ratios since all but two insurers "passed" the ratio tests. Data were also collected from Duff & Phelps and Standard & Poor's on insurer ratings. Duff & Phelps ratings are based on claims paying ability and Standard & Poor's ratings are based on claims paying ability as well as solvency. The majority of the insurers were not rated by Duff & Phelps. With Standard & Poor's, the majority of the insurers received solvency ratings only (which is consistent with insurers suppressing claims paying ratings), so insufficient data from both rating bureaus made it impossible to use these measures as proxies for financial strength.

[12] A direct measure of market share, i.e., written premium, was requested on the survey. However, insurers used different accounting measures of premium volume so that the information collected was not comparable across companies. Another possible measure, the number of policies in force, was reported by some companies on the NAIC annual statements. The reporting was inconsistent, however, and proved difficult to verify. Preliminary tests using number of policies yielded results that were not statistically significant.

the same, insurers with lower priced products would have greater market share, again suggesting a negative relationship between the market share variable and premium.

Policy Design Control Variables

The policy contract control variables are summarized in Tables 3 and 4. In addition to the traits noted in Tables 3 and 4, all policies in the sample had a two-year incontestability period, guaranteed renewability, and a waiver of premium provision. All policies also cover skilled nursing facilities (i.e., nursing homes) as well as adult day care.

Four-Year and Unlimited Benefit Periods Long-term care insurance policies are written for varying benefit period lengths. Table 3 shows the range of benefit periods included in the sample. We expect policies paying for longer duration (i.e., unlimited duration, versus three or four years) to have higher premiums. Here two indicator variables, Four Year and Unlimited Benefit, identify policies other than the benchmark three-year contract. A positive relationship is expected between longer benefit periods (i.e., Four-Year and Unlimited Benefit) and price.

TABLE 3
Policy Design Characteristics
(N = 762)

Policy Traits	*Percent of Policies*
Benefit Period	
3 years	17.3
4 years	30.0
Unlimited	52.7
Length of Elimination Period (in days)	
0 days	12.5
20 days	19.3
30 days	23.8
60 days	7.9
100 days	36.5

Moral hazard and adverse selection may also have an effect on how benefit period affects price. Since benefit periods begin at the time of loss (following any elimination period), an alternative view for using them is to reduce *ex post* moral hazard.[13] That is, incentives exist for someone who has become ill or disabled to malinger. This results in a welfare loss to other insureds. The benefit period, however, sets a time limit on malingering, thus reducing *ex post* moral hazard. The effects of *ex post* moral hazard would be consistent with a positive relationship between a longer benefit

[13] Huberman, Mayers, and Smith (1983) examine *ex post* moral hazard and show that the optimal contractual form incorporates a deductible with full coverage of losses above the deductible limit. However, they do not consider multiple benefit periods.

period and premium. Adverse selection, however, may play a role, too. Long-term care insurance allows for multiple episodes of care or multiple benefit periods as long as the sum of the benefit periods is less than or equal to the total benefit period allowed by the contract (for contracts that do not have unlimited benefit duration). This provides incentives for the insured to practice loss reduction so that benefits are available for future episodes of care. The cost of loss reduction, however, is greater for higher risk insureds, and thus they choose different levels of loss reduction activities, which affects their probabilities of loss. This results in a welfare loss also. Stewart (1994) models and simulates simultaneous moral hazard and adverse selection effects, and shows that each offsets the welfare loss of the other. As the risk level among insureds becomes greater, the offset increases. Stewart observes that given the offsetting effects on welfare loss, the welfare effects of these problems may be less serious than previously suggested.

Elimination Period Elimination periods for long-term care policies affect claims cost in three ways: They reduce total claims paid, they reduce moral hazard since insureds share in the cost of a loss before benefits become payable, and the applicant's choice of elimination period serves as a signal of riskiness to insurers. Low-risk insureds know that they are less likely to have a claim and prefer longer elimination periods with lower premiums. Here the benchmark elimination period is 100 days and a series of indicator variables distinguishes policies with 0, 20-, 30-, and 60-day elimination periods. Following evidence in the automobile insurance market (Puelz and Snow, 1994) and in the disability insurance market (Cox and Gustavson, 1995), we expect a positive relationship between the shorter elimination period variable (relative to 100 days) and premium.[14]

Interaction Terms Eight interaction terms are included in the study to control for the effect of the joint relationship of benefit period and elimination period on price. Consumer choice of policy could be a function of the particular combination of these two design features. The interaction is also important since both variables are designed to control for moral hazard and adverse selection (as discussed above). It is important to note that all insurers do not offer all combinations of these two features and consumers are unlikely to search for insurers offering modest differences in coverage. For example, the price of a policy with a 20-day elimination period and a 3-year benefit versus one with a 30-day elimination period and 4-year benefit may not be perceived as sufficiently different to warrant price shopping. Thus we do not expect a strict ordering of statistically significant coefficient estimates across the interaction terms.

Preexisting Condition Preexisting condition clauses provide that claims due to a condition that existed before or at policy issue will not be covered until after the preexisting condition period expires. Table 4 shows that 15.3 percent of the sampel policies include a preexisting conditionclause. Here the variable equals 1 if the policy imposes a preexisting condition clause, and 0 otherwise. Since the preexisting condition clause does limit benefits in some instances, the expected sign of the coefficient is negative.

[14] Investigation of the relationship of the elimination period variable to the premium is consistent with the linearity assumption. Quadratic and logarithmic transformations of the elimination period variable did not yield statistically significant results.

TABLE 4
Policy Design Variables
(N = 762)

Policy Characteristics	*Percent of Policies*
Use of Preexisting Condition Clause:	
Clause Included	15.3
Policies with Inflation Protection	61.8
Policies with Nonforfeiture Option	25.2
Number of ADLs Required to Trigger Benefits	
1 of 6	1.2
2 of 6	7.9
2 of 5	79.9
3 of 7	4.7
3 of 6	6.3
Policies with Home Health Care Coverage	76.6
Age Limit for Policy Issue:	
75 years	3.1
79 years	11.8
84 years	46.5
84.5 years	4.7
85 years	18.9
89 years	2.4
99 years (unlimited)	12.6
Policies with Preferred Rates	15.4

Inflation Coverage Increases in the cost of long-term care services are expected, as with other types of health care. However, there is additional uncertainty about future costs since long-term care insurance is a relatively new product and there is little data on long-term care cost trends. The expected sign of the coefficient is positive.

Nonforfeiture Option The nonforfeiture option provides either a partial premium refund or a paid-up policy for reduced benefits to policyholders choosing to stop paying regularly scheduled premiums. This feature is valuable for insureds deciding they no longer need coverage (e.g., due to a change in financial condition or family situation). There are also possible selection effects since insureds choosing the nonforfeiture option may be more likely to opt out of the contract. Consequently, we expect a positive relationship between this policy variable and premium.

ADL Trigger Long-term care insurers pay benefits in the event of medical necessity, cognitive impairment (e.g., Alzheimer's disease), and the insured's inability to perform certain Activities of Daily Living (ADLs) such as bathing, eating, dressing, toileting, transferring, and continence. Although all policies pay benefits based

on medical and cognitive need, the ADL trigger varies across insurers, and companies sometimes use this difference as a way to promote their policies to prospective insureds. The lack of uniformity across policies makes cross-policy comparisons difficult for consumers. Prior research, however, suggests that differences in ADL triggers are important. For example, Alecxih and Lutzky (1996) assert that using two of five ADLs qualifies more individuals for coverage than the use of three of six ADLs. In this study, the benefit trigger is measured by the ratio of the number of ADLs required to trigger benefits to the total number of ADLs defined in the policy.[15] The smaller the ratio of ADLs required to trigger coverage to total ADLs, the more generous the policy benefit. Thus the expected sign of the coefficient is negative.

Home Health Coverage Home health care coverage pays benefits when the insured receives care at home (versus entering a skilled nursing facility).[16] Generally, the total cost of home care is less than that in a nursing home, resulting in lower claim costs for insurers in theory and lower premiums for insureds. However, since both home health care benefits and nursing home benefits equal the policy's per diem amount, the insurer's claim costs are likely to be no different. In fact, home health care coverage may positively affect premiums due to the influence of moral hazard. Pauly (1990) and Zweifel and Struwe (1998) argue that the presence of long-term care insurance could encourage the substitution of formal, reimbursable care for unpaid family care. Thus the expected sign of the coefficient is positive.

Age Limit at Issue The Age Limit at Issue provision is the latest age at which an insurer will underwrite an applicant for coverage. The expected sign of the coefficient is positive since insurers with low issue age limits exercise greater control of entry into the insurance pool, reduce the potential for adverse selection, and could offer lower premiums, all else being equal.

Other Control Variables

The ages at which premium information was provided include ages 50, 65, and 75. In the study, the benchmark is age 50 and two indicator variables, Age 65 and Age 75, are included to control for premium differences due to timing of insurance purchase. Since the probability of needing long-term care increases with age, the expected signs of the coefficients are positive. Further, individuals purchasing long-term care policies at older ages are likely to have more information about their health status and need for long term services. This can result in adverse selection against the insurer. The potential for selection effects would also be consistent with positive coefficients.

Some insurers provided information on preferred rates for policies, rather than select or standard rates. Preferred rates are lower than select rates, and are offered to applicants viewed as preferred or lower risks. Thus the expected sign of the Preferred Rate coefficient is negative.

[15] In preliminary tests, we also defined the ADL trigger as the number of ADLs required to trigger benefits to the maximum number of ADLs in any policy (i.e., seven), with no change in our empirical results.

[16] Most insurers offer home health benefits equal to 50 percent or 100 percent of nursing home benefits. Home health benefits used in this study are equal to 100 percent of nursing home benefits.

EMPIRICAL RESULTS

The empirical result of the ordinary least squares regression estimation are presented in Table 5. White's correction for heteroskedasticity was used. Variance inflation factors for some of the explanatory variables revealed multicollinearity. To determine the extent to which this problem affects coefficient estimates two ridge regression methods were employed (Hoerl, Kennard, and Baldwin, 1975; and Thisted, 1976). The coefficient estimates from both ridge methods were very close to those from ordinary least squares. Diagnostics indicate that there are no high-leverage data points, no problem outliers, and that the standardized residuals are distributed approximately normally. The adjusted R^2 is 0.9374.

The empirical results confirm several of the hypothesized relationships about insurer characteristics and long-term care pricing. Prior research on organizational form suggests that stock insurers have a comparative advantage in lines of business where managerial discretion is required. The newness of the long-term care insurance product, together with its short claims history and the uncertainty surrounding future costs are all factors suggesting that more rather than less managerial discretion is likely required in the long-term care market. The organizational form coefficient is negative and significant at the .01 level, confirming the hypothesis that stock company efficiency advantages are reflected through lower price. The evidence suggests that premium is decreased by approximately 1.6 percent when the firm is a stock company rather than a mutual.

The expected positive relationship between firm size and price was confirmed and is statistically significant at the .01 level. The evidence here suggests that there is a 3 percent increase in premium for a 10 percent increase in firm assets. This finding suggests that consumers are willing to pay more for products sold by larger companies. This phenomenon may be due to reputational effects or perceived higher quality service. Likewise the results for insurers' tenure in the market yield the expected results. The coefficient is negative and statistically significant at the .01 level. For every 10 percent increase in tenure in the market, there is a premium decrease of 0.1 percent. This is consistent with insurers remaining in the market and developing efficiencies which are reflected in lower price.

With respect to Distribution System, the coefficient is not statistically significant at a reasonable level. There is no evidence consistent with efficiency differences across Distribution System in the long term care insurance line. The results for the RBC Ratio variable are unexpected. The RBC Ratio coefficient estimate is negative which is consistent with insurers with smaller RBC ratios (greater default risk) charging higher premiums for long term care insurance. This puzzling result holds across a variety of measures of financial strength,[17] and suggests the need for additional research. One explanation might be that life-health insurers with greater default risk may be less willing to take on risk in the long term care insurance line since there is less historical evidence on claims patterns. By-line punitive pricing could develop as

[17] As discussed above, other measures of default risk which were used included the RBC Ratio with Best's ratings, Best's ratings alone, and net premiums written to surplus. Using these other measures yielded the same empirical result.

TABLE 5
Ln(Prem) = Dependent Variable
(N = 762)

Parameter Estimate		*T-statistic*
Intercept	2.75	12.50
Organizational Form	–0.12	–5.09
Ln (Assets)	0.02	4.44
RBC Ratio	–0.01	–10.09
Distribution System	0.01	0.18
Tenure in Market	–0.01	–3.70
Four Yr Benefit Period	0.18	2.60
Unlimited Benefit Period	0.47	7.14
Elimination Period 0 Days	0.15	1.32
Elimination Period 20 Days	0.19	2.44
Elimination Period 30 Days	0.31	4.44
Elimination Period 60 Days	0.06	0.92
Four Yr, Elim Pd 0	–0.04	–0.33
Four Yr, Elim Pd 20	0.03	0.35
Four Yr, Elim Pd 30	–0.25	–2.91
Four Yr, Elim Pd 60	–0.09	–1.07
Unlimited, Elim Pd 0	–0.04	–0.36
Unlimited, Elim Pd 20	–0.01	–0.18
Unlimited, Elim Pd 30	–0.16	–1.99
Unlimited, Elim Pd 60	–0.02	–0.25
Preexisting Condition	0.12	3.82
Inflation Coverage	0.50	26.09
Nonforfeiture Option	0.35	16.02
ADL Trigger	–0.79	–3.23
Home Health Coverage	0.58	22.41
Age Limit at Issue	0.03	15.14
Age 65	0.90	44.85
Age 75	1.75	85.61
Preferred Rate	–0.27	–9.03
R-sq.	0.9397	
Adj R-sq.	0.9374	

a result. Future study of the relationship between life-health insurer financial strength and pricing *by line of coverage* would be helpful in exploring this result.[18]

With respect to the control variables, the empirical results confirm the positive relationship between longer benefit periods and price. Shorter elimination periods are

[18] Phillips et al. (1998) provide by-line evidence from the property-liability industry.

consistent with higher price (except where the period is zero or 60 days and the results are not statistically significant). The interaction variables measuring the joint relationship of the benefit period and the elimination period on price are for the most part not statistically significant. All insurers do not offer all combinations of elimination and benefit periods, and there is no evidence here of a strict ordering of price based on the joint relationship between elimination and benefit period across insurers. The result is also consistent with Stewart (1994) where the welfare losses of moral hazard and adverse selection are offsetting.

Counter to expectations, the sign for the estimated coefficient for Preexisting Condition is positive and statistically significant. The positive relationship between this design variable and price could result from insureds' lack of choice about preexisting condition periods since the insurer typically offers only one option. In addition, choice could be limited by state regulation. This lack of choice would be consistent with preexisting condition clauses doing little to control adverse selection. However, the positive and statistically significant coefficient is puzzling and suggests the need for additional research.

The signs of the estimated coefficients for the inflation and nonforfeiture options are as expected: positive and statistically significant. The premium is increased by approximately 7 percent when inflation protection is added to the policy. The policy price is increased by about 4.7 percent when the nonforfeiture option is added. Results on the effect of the benefit trigger on premium are as expected: the coefficient estimate is negative and statistically significant at the .01 level. This is consistent with previous research that found two of five ADLs a more beneficial trigger to buyers than three of six ADLs (see Alecxih and Lutzky, 1996). Results are consistent with buyer willingness to pay for sensitive triggers and insurer willingness to discount for more stringent triggers.

The positive coefficient on the Home Health Care trait suggests that, even though home health care costs are lower than nursing home costs, this differential does not outweigh the cost to the insurer. In fact, premium is increased by 8.2 percent when the home health care coverage option is added to the policy. This suggests that home health care may in fact be a complement rather than a supplement to nursing home care. Where home health care is a substitute, the potential for moral hazard increases total cost since insureds may be substituting paid home health care for informal nonpaid care where the policy allows it.

The positive relationship between premium and the age limit variable confirms our expectations. A 10 percent increase in the limit on age at issue results in a 3 percent increase in premium. The signs of the coefficients for the variables Age 65, Age 75, and Preferred Rate are as expected: policies issued at older ages are more expensive and policies issued at preferred rates are less expensive, all else the same. In fact, purchasing a policy at age 65 rather than age 50 results in a premium increase of about 7.9 percent. Postponing purchase until age 75 results in a premium increase of about 15.9 percent compared to what the premium would have been at age 50.

CONCLUSIONS AND FUTURE RESEARCH

This study documents current pricing practices across long-term care insurers and offers some empirical evidence about the market for this insurance product. The major conclusions of the study are that specific characteristics of insurers explain a substantial portion of premium differences. Pricing practices are also consistent with moral hazard and adverse selection effects with respect to particular policy design variables. Details of these findings are summarized in this section, followed by a brief discussion of future research possibilities.

Empirical results confirm the comparative price advantage of stock insurers in the long-term care insurance market, which is consistent with stock insurer efficiencies in lines of insurance requiring greater managerial discretion. Evidence is consistent with larger firms commanding larger premiums consistent with reputational effects in a relatively new line of insurance. Insurers with longer tenure in the market have a comparative price advantage, all else equal. The empirical evidence also suggests a positive relationship between firm default risk and premium. This result is counter to prior evidence in the property-liability insurance industry, and suggests the need for further *by line* investigation of the relationship between firm default risk and long-term care pricing strategy. The study does not find evidence of price variation due to efficiency differences in the insurer's distribution system.

The effects of moral hazard and adverse selection on price were examined relative to several design variables. Results of the study are consistent with the policy design benefit period variable controlling *ex post* moral hazard. The positive relationship between home health coverage and price is consistent with moral hazard and the substitution of paid long-term care services for unpaid family care. The positive relationships between shorter elimination periods, nonforfeiture options, and age limits and price are consistent with selection effects.

As the market for long-term care insurance matures and grows, it will present many other opportunities for additional research. Extending analyses to optimal insurance purchase decisions by consumers would be useful in understanding potential market development. Public policy research is warranted on the merit of educating consumers about the range of long-term care insurance products available in order to encourage growth of a private market risk-financing solution to a potential social problem. As researchers seek to study these and other questions involving long-term care insurance, however, data limitations may deter their initiatives, given the trend to increased market power by a small group of insurers.

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