The Competitiveness of the Property-Casualty Insurance Industry: A Look at Market Equity Values and Premium Prices

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The insurance "liability crisis" has led to a debate over whether the recent dramatic increases in commercial liability insurance premiums represent an attempt by insurance firms to fix prices above market levels to recover past pricing mistakes or, rather, an attempt to price insurance at a level commensurate with expected cash flows. A search for the underlying causes of the crisis has led to an examination of the financial health of the industry. The property-casualty insurance industry[1] claims that the increases in premiums are a direct result of the dramatic increases in current and expected future corporate liability exposure.[2] Consumer and trial

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1. The different lines of the property-casualty insurance industry are as follows:

Insurance Line	Pct. of Premiums Written (1986)	Insurance Line	Pct. of Premiums Written (1986)
Allied Lines	1.3%	Medical Malpractice	2.0%
Commercial Auto	9.2%	Private Passenger Auto	32.4%
Commercial Multiple Peril	9.2%	Reinsurance	4.5%
Fire	2.6%	Surety	1.0%
General Liability	11.0%	Workers' Compensation	11.6%
Homeowners Multiple Peril	8.6%	All Other	4.4%
Inland Marine	2.2%	Total	100.0%

A.M. BEST CO., BEST'S AGGREGATES AND AVERAGES: PROPERTY-CASUALTY 88–91 (1987) [hereinafter BEST'S AGGREGATES AND AVERAGES 1987].

While this Article speaks of the liability crisis in the property-casualty insurance industry, it is recognized that not all its insurance lines are equally associated with the liability crisis. In Part III, *infra*, the study will focus on general liability and medical malpractice, because these lines are most often associated with the liability crisis.

2. Representatives of the property-casualty insurance industry argue that symptoms of the crisis include increased numbers of product-liability cases filed in federal court, increased average damage awards, and increased uncertainty regarding future suits and awards. *See* U.S. DEP'T OF JUSTICE, TORT POLICY WORKING GROUP, AN UPDATE ON THE LIABILITY CRISIS 32–46 (1987) [hereinafter TORT POLICY UPDATE]. The Justice Department reports that for certain liability lines the expected jury award in the early 1980s was double or triple the entire increase over the prior twenty years. *Id.* at 35.

lawyer groups argue that the crisis has been manufactured by collusion within the property-casualty insurance industry,[3] resulting in price gouging by property-casualty insurance firms.[4] These analysts generally measure the financial performance of the property-casualty insurance industry in terms of the profitability of firms in the industry.[5] By focusing on profitability, however, participants in the debate have failed to recognize that profitability itself has inherent shortcomings as a measure of industry performance.

This Article argues that market equity value, rather than profitability, should be used to measure the financial performance of property-casualty insurance firms. Market equity value is superior to profitability because it is a prospective and long-term measure which captures both the expected future and the current financial performance of property-casualty insurance firms.[6] By developing a model of the relationship between cash flow

3. *See* Hunter, *The Insurance Industry is to Blame*, Wash. Post, Apr. 13, 1986, at C7, col. 2; ; *cf.* Glaberson & Farrell, *The Explosion in Liability Lawsuits is Nothing But a Myth*, BUS. WK., Apr. 21, 1986, at 24-25; Lauter, *Report Says Litigation Explosion is a "Myth"*, NAT'L L.J., Apr. 28, 1986, at 46.

The collusion argument is strengthened by the fact that the insurance industry is generally exempt from federal antitrust law. McCarran-Ferguson Act, 15 U.S.C. §§ 1011-1015 (1982). McCarran-Ferguson expressly provides for regulation at the state level. *Id.* § 1012(a). If a state does not regulate its insurance industry, then the industry may be subject to federal antitrust laws. *Id.* § 1012(b). For an analysis of the McCarran-Ferguson Act and an argument that it promotes collusion within the property-casualty insurance industry, see Angoff, *Insurance Against Competition: How the McCarran-Ferguson Act Raises Prices and Profits in the Property-Casualty Insurance Industry*, 5 YALE J. ON REG. 397, 402-06 (1988). *But see* Clarke, Warren-Boulton, Smith & Simon, *Sources of the Crisis in Liability Insurance: An Economic Analysis*, 5 YALE J. ON REG. 367, 377-84 (1988).

Recent charges by eight state attorneys general both illustrate the potential for antitrust legislation to be applied to the insurance industry and define the terms of the debate over the legitimacy of the liability crisis. *See* Fischer, *States and Insurance Industry Battling on Liability Coverage*, N.Y. Times, Mar. 23, 1988, at A1, col. 1. While the state attorneys general have claimed manipulation of the availability and price of commercial liability coverage, the insurance companies involved have characterized the accusations as "unfounded and meritless." *Id.* at D4, col. 4.

4. For example, a recent report concluded:

> It is obvious to anyone who will look at the evidence and not be influenced by common misconceptions about the legal system that the recent problems of price and availability are due to cycles of profit and loss caused by a desire for market share and over-reliance on investment income to cover business pricing mistakes.
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> . . . .
>
> The insurance crisis is a study in deception. Price gouging and unavailability of insurance have been perpetrated by the insurance industry upon the American public and when asked to provide a reason, the industry has blamed the civil justice system. This must stop.

ASSOCIATION OF TRIAL LAWYERS OF AM., THE INSURANCE CRISIS: A STUDY IN DECEPTION 13-14 (1986).

In response, the property-casualty insurance industry criticized this report for formulating its conclusions around industry data for profitability that included all property-casualty insurance lines instead of isolating those insurance lines most susceptible to the crisis. INSURANCE INFORMATION INST., A CRITIQUE OF: THE INSURANCE CRISIS: A STUDY IN DECEPTION 1 (1986), *reprinted in* INSURANCE INFORMATION INST., AVAILABILITY CRISIS: RESPONSES TO CRITICS 40 (1987) [hereinafter INST. RESPONSE].

5. *See supra* note 4.

6. Market equity value reflects the market's assessment of the value of the firm given all known

and market equity values, this Article analyzes the correlation between premium increases and equity values. This Article concludes that the data is consistent with the hypothesis that the property-casualty insurance industry is competitive.[7]

Part I of this Article points out the weaknesses of profitability as a measure of financial performance for the property-casualty insurance industry and indicates that market equity value should be used in its place. Part II presents the market equity value models and illustrates how investors assess equity values in both competitive and noncompetitive markets. The model demonstrates that in competitive insurance markets business pricing mistakes cannot be passed on to new policyholders without a loss in market share. However, in noncompetitive insurance markets those mistakes can be passed on to consumers without a resulting loss in market share. Part III derives economic hypotheses concerning the competitiveness of certain lines of the property-casualty insurance industry from the cash flow simulations of Part II and correlates property-casualty premium growth with market equity values during the period from 1984 to 1987. Although based on the limited data available, the analysis suggests an inverse relationship between premium growth and market equity returns for the medical malpractice and general liability lines of the property-casualty insurance industry. This result is inconsistent with arguments of market collusion for those lines of the property-casualty insurance industry. This Article concludes by discussing some implications of the study's preliminary findings that those lines of the property-casualty insurance industry are competitive.

I. The Problems with Profitability as a Measure of Financial Performance

Profitability is a poor measure of financial performance for two general reasons. The first addresses the technical aspects of reporting profitability,

information concerning the firm, including its past, current, and expected future profitability. In assessing the value of the firm, the market considers the firm's past performance and the firm's expected future performance to determine the value of the firm. *See infra* Part II. These assessments continually change as new information becomes available, thus providing instantaneous valuations of the financial condition of the firm. Market equity value, therefore, must be superior to profitability because it includes profitability as well as all other information concerning the firm. Thus, even if one were able to improve the reliability of profitability as a measure of industry performance, *see infra* Part I, the reliability of market equity value as a measure of performance would also necessarily improve.

7. As indicated in the Justice Department's analysis of the competitiveness of an industry, *see infra* note 16, markets are not either perfectly competitive or completely noncompetitive. Rather, there is a spectrum of competitiveness along which markets fall. In attempting to characterize specific markets as competitive or noncompetitive, I mean only to suggest upon which end of the spectrum the market is likely to fall.

and the second concerns the conceptual information conveyed in measures of profitability.

A. *Profitability is an Ambiguous and Manipulable Measure*

One problem with profitability is that the lack of industry standards for measuring and reporting profitability makes it an ambiguous and manipulable measure of the financial performance of insurance firms. For example, reported accounting profit may or may not include unrealized capital gains.[8] Although including capital gains violates Generally Accepted Accounting Principles,[9] the National Insurance Consumer Organization included these gains for the property-casualty insurance industry in 1985 and reported a healthy profit of $6.6 billion.[10] In contrast, the Insurance Information Institute did not include unrealized capital gains in profit, resulting in a reported profitability figure of $1.7 billion for the same year.[11]

Another example of profitability's ambiguity and manipulability is the way loss reserves are reported. Loss reserves measure the insurer's liability for unpaid claims and are estimated through actuarial methods. Once appropriate levels for loss reserves are reported, however, reserves may be deliberately misstated in either direction. Understating loss reserves overstates profit and gives the impression that the firm is in better financial condition than it actually is. Thus, insurance firms that are suffering financially have an incentive to understate reserves and conceal the firm's financial distress. Correlatively, overstating reserves understates profit, reduces the insurer's tax liability, and increases the insurer's cash flow.

Given the lack of industry standards and the consequent ambiguities[12] in the reporting of loss reserves and capital gains, it is misleading to use profitability as a measure of financial performance for the property-casualty insurance industry. Even if there were industry standards, how-

8. Including unrealized capital gains increases operating profit when bond and stock markets are rising and reduces operating profit when bond and stock markets are falling.

9. RESEARCH AND DEVELOPMENT ARRANGEMENTS, Statement of Financial Accounting Standards No. 12, § 11 (Fin. Accounting Standards Bd. 1975).

10. INSURANCE INFORMATION INST., NADER-HUNTER CHALLENGE ON 1985 PROFIT/LOSS IN P/C INDUSTRY 1-3 (1986) [hereinafter NADER-HUNTER CHALLENGE], *reprinted in* INST. RESPONSE, *supra* note 4, at 103-05.

11. NADER-HUNTER CHALLENGE, *supra* note 10, at 4, *reprinted in* INS. INFO. INST. RESPONSE, *supra* note 4, at 106. Including unrealized capital gains does not fully account for the difference between the two profitability figures. In addition to capital gains ($1.2 billion), the difference in reported profitability is accounted for by tax credits ($1.6 billion) and dividends to policyholders ($2.1 billion). *Id.*

12. Another example illustrating the ambiguities inherent in reported profitability is the failure of reported income to discount future claims payments. For a discussion, see S. Harrington, Prices and Profits in the Liability Insurance Market 16 (June 15, 1987) (unpublished paper presented at Brookings Institution Conference on Legal Liability) (on file with author).

ever, profitability still would be an inadequate measure of financial performance.

B. *Profitability is a Retrospective Measure that Does Not Accurately Account for Cash Flows*

The most significant problem with profitability is that it is a summary of a firm's business performance over the recent past, rather than a comprehensive summary of the firm's overall financial condition. This renders profitability inadequate in two ways. First, profitability is not a measure of all cash flows accruing to the firm but, rather, the result of business performance over an arbitrary period of time. It provides information concerning only some of the firm's cash flows during that period because profit is reported as it is earned rather than when it is received and capital expenses are not deducted from revenue but are depreciated over a number of years. As a result, profit includes some cash flows and excludes others, and then deducts depreciation, which is not cash flow at all.[13] This means that profitability reveals very little about the actual financial condition of the firm.

Second, profit is a short-term measure of past business performance that fails to include any information regarding a firm's expected future performance. The insurance industry is different from industries that supply other commodities because insurance firms price their commodities in the present based on estimates of uncertain future cash flows.[14] Because of the unpredictability of those uncertain future cash flows, a long-term prospective performance measure is of particular relevance to property-casualty insurance firms. Since profitability is a retrospective performance measure, it fails to address that uncertainty. In contrast, the market equity value of the firm, defined as the discounted value of all expected future cash flows accruing to the firm, measures both short- and long-term financial performance.[15]

13. For a discussion of the difference between cash flow and accounting profits, see R. BREALEY & S. MYERS, PRINCIPLES OF CORPORATE FINANCE 85-96 (2d ed. 1984).

14. For example, it has been estimated that for general liability insurance, only 12% of claims are paid in the same year that the insured event occurred. INSURANCE INFORMATION INST., RODINO INVESTIGATION ON CASH FLOW OF PROPERTY-CASUALTY INSURANCE INDUSTRY 2 (1986), *reprinted in* INST. RESPONSE, *supra* note 4, at 2.

15. It is actually possible for a firm to report an increase in profitability while its market equity value falls. This would occur if, given new information, the market were to reassess negatively its estimate of future cash flows accruing to the firm.

II. Market Equity Values and Cash Flow Simulations

The models discussed in this Part describe the relationship between market equity value and financial performance. The simple model introduces the concept of present value of equity as a projection of future cash flows, and it demonstrates how equity values are determined in a market in which all claims are filed and paid in the policy year. The complex model, while still a simplification of the real world, differs from the simple model in demonstrating how equity values are determined in a market that permits claims to be filed and paid after the policy year.

Both market equity models initially assume competitive conditions in property-casualty insurance markets.[16] Thus, the models imply that property-casualty insurance firms must price policies at competitive levels or risk losing market share. The assumption of competitive conditions will be relaxed in a later consideration of the complex model to examine the potential implications of collusion in the property-casualty insurance market.

A. *The Simple Model: Claims-Made Policies*

Consider Fadeaway Insurance Company (Fadeaway), a newly formed property-casualty insurance firm founded by ten shareholders who invest equally in the business.[17] The shareholders agree that the firm will operate for ten years, after which it will terminate and distribute all accumulated earnings to the shareholders. Shareholders may sell their interest in the firm prior to the termination date. To reduce uncertainty over the estimation of claims payments, Fadeaway honors only those claims filed during the year for which the policy was written.[18] This claims payments policy allows cash flows in a given year to be fully determined by claims based on policies written for that year. This eliminates the "long tail"

16. This is a realistic assumption. The Antitrust Division of the Justice Department analyzes a number of industries in order to determine their competitiveness. It reports its findings in the form of the Herfindahl-Hirsch Index (HHI), which ranges from near 0 (extremely unconcentrated) to 10,000 (total monopoly). The HHI for the property-casualty insurance industry was 229 in 1985, indicating low levels of concentration. TORT POLICY UPDATE, *supra* note 2, app. at 9-10. This suggests that significant barriers to entry do not exist in the property-casualty insurance industry. Thus, new entrants can underbid firms that price policies above competitive levels. *See also*, R.A. Winter, *The Liability Crisis and the Dynamics of Competitive Insurance Markets*, 5 YALE J. ON REG. 455, 463 n.37 (1988); Blair & Makar, *The Structure of Florida's Medical Malpractice Insurance Market: If It Ain't Broke Don't Fix It*, 5 YALE J. ON REG. 427, 438-46 (1988).

17. The shareholders of Fadeaway are also its managers. This eliminates any conflicts of interest between the two groups.

18. The assumption of restricted claims payments is made to illustrate the effects of changing expectations on cash flows and will be relaxed in the complex model. An implicit assumption is that Fadeaway will have sufficient policy demand under this restriction. It should be noted that such policies actually do exist. *See* Blair & Makar, *supra* note 16, at 444-46.

uncertainties in writing liability insurance.[19] The dollar amount of claims payments in any year is estimated as follows:

(1) Estimated Annual Claims Payments = (probability of an insurable event) × (estimated loss per claim) × (number of policies written)

Fadeaway determines its selling capacity to be 100 policies per year and forecasts its claims payments to be $670, based on an estimated loss per claim of $67 and a 10% probability of an insurable event occurring. The amount of $670 represents a forecast formulated from the information available to Fadeaway at the time of deliberation.

The firm estimates that, in addition to claim payouts, it will incur $230 in selling and administrative expenses regardless of the number of policies written. Given an estimated total cash outflow of $900, Fadeaway prices each policy at $9. Premium revenue of $900 is invested when received to generate $100 annually in investment income. Thus, the net annual cash flow earned from premium revenue is $100.[20] The shareholders of Fadeaway agree to reinvest the net annual cash flow of $100 each year rather than pay a dividend, and the reinvested funds are expected to earn 10% annually.

The present value (PV) of Fadeaway's equity would be determined through the following formula:

(2)
$$\text{PV of the Equity} = \sum_{t=1}^{n} [CF_t/(1 + r)^t]$$

where t is time in years, CF_t represents the expected cash flows through time, and r represents the risk-adjusted discount rate assigned to the cash flows. The discount rate can be thought of as the rate that investors would demand on similarly risky projects. Assigning a 10% discount rate to Fadeaway's cash flows, the present value of Fadeaway's equity would be:

19. The "tail" is the amount of time elapsed between the date corresponding to the end of the policy year and the actual date the claim is paid. A longer tail indicates greater uncertainty concerning the amount of the claim.

20. The model is simplified by assuming that property-casualty insurance firms are not taxed.

(3)

$$\text{PV of the Equity} = \sum_{t=1}^{10} [\$100/(1.1)^t]$$

$$= \$614.46$$

The amount $614.46 is the present value of a ten year annuity of $100 given a discount rate of 10%.[21] The present value of the equity represents the amount investors would be willing to pay today to hold a claim on Fadeaway's cash flow stream. As long as the entire market holds the investors' expectations, each share is worth $61.45 today.[22]

While the price per share today is $61.45, the cash flow stream supporting the share price actually could be more or less than expected. For example, suppose that nine insurable events instead of ten occur in the second year. If this were known today, then from equation (2) the new cash flow stream would have a present value of:

(4)

$$\text{PV of the Equity} = \$100/(1.1)^1 + \$167/(1.1)^2 + \sum_{t=3}^{10} [\$100/(1.1)^t]$$

$$= \$669.83$$

The difference between the equity value here and the value of the equity given in equation (3) is the additional amount of equity generated by the extra $67 received in year two, which has a present value of $55.37. If the firm were to make fewer claims payments than had been expected, equity

21. The present value of the ten year annuity can be calculated alternatively through the following closed-form formula:

$$\text{PV of the Equity} = [\text{Annuity Amount}] \times [(1/r) - (1/(r \times (1 + r))^n)]$$

$$= \$100 \times [(1/.1) - (1/(.1 \times (1.1))^{10})]$$

$$= \$614.46$$

22. Note that the amount of Fadeaway's equity also can be stated in terms of its future value. At the end of year one, the value of Fadeaway's equity would be $100, an amount representing the cash flow generated in that year. If Fadeaway were to duplicate its performance during year two, the estimated cash flow from operations would again be $100 and total equity value would increase to $210, assuming reinvestment at 10%. If Fadeaway were to repeat its first year performance each year for ten years, it would produce a ten year stream of $100 cash flows and an equity value of $1593.74 at the end of the tenth year. The amount $1593.74 represents the future value (FV) of a ten year $100 ordinary annuity invested at 10% annually and can be determined using the following closed-form formula:

$$\text{FV of the Annuity} = [\text{Annuity Amount}] \times [((1 + r)^n - 1)/r]$$

$$= \$100 \times [((1.1)^{10} - 1)/.1]$$

$$= \$1593.74$$

Upon termination of the firm after ten years, each of the ten shareholders would be entitled to $159.37. The present value of receiving $159.37 in ten years, discounted at 10%, is $61.45, the per share value of Fadeaway.

values would have been underestimated. In contrast, if more claims payments than expected were to be paid, equity values would have been overestimated. Investors, however, are willing to trade at $61.45 per share because their cash flow estimates incorporate all relevant information available today.

If estimates of claims payments were to change, Fadeaway would adjust premiums to match costs. For example, suppose that the estimated loss per claim were to increase by 20% (from $67 to $80.40 per claim) so that the total estimated claims payments would increase to $804. In that case, Fadeaway would pass along the increase to new policyholders by raising premiums 14.9% (from $9.00 to $10.34 per policy), so that premium income would rise to $1034, covering all expected cash outflows. The change in the estimated loss per claim would not affect the residual cash flow, leaving the present value of the equity unchanged.[23]

B. *The Complex Model: Claims Filed After the Policy Year*

Consider now the effects of relaxing the simple model's filing restriction. Under the complex model, policyholders may file claims after the policy year, and claims are paid in the year that they are filed. To simplify the analysis, assume that the change in filing policy would not change Fadeaway's method of calculating its estimated annual claims payments.[24] The new claims filing policy would change the cash flow estimates of the previous discussion because competitive conditions in property-casualty insurance markets would not allow an increase in the estimated loss per claim for business written in past periods (old business) to be passed on to policyholders in present or future periods. Any attempt to pass on these additional costs to new policyholders would result in a loss of market share, because Fadeaway would be underbid either by new entrants or by other existing property-casualty insurance firms with fewer liabilities on old business.

To illustrate, suppose again that the estimated loss per claim rises by 20% in year two (from $67 to $80.40) and then remains at that level through year ten. Also, assume that 50% of the claims from year one are filed in year two. After year two we return to the simple model; that is,

23. Changing market interest rates might also affect cash flows by changing the amount of investment income. However, if the change in interest rates is driven by inflationary expectations and not by a change in real interest rates, then nominal cash flows will change but real cash flows will not. There is considerable empirical evidence supporting the view that most of the variation in nominal rates can be explained by the variation in inflationary expectations. *See generally* Fama, *Short-Term Interest Rates as Predictors of Inflation*, 65 AM. ECON. REV. 269 (1975) (concluding that definite relationship exists between nominal interest rates and inflation rates).

24. There is no reason to believe that the new claims filing policy will change the estimated annual claims payments shown in equation (1).

there are no long tail payments for policies written in years two through ten. In this case, Fadeaway would raise premiums in years two through ten by 14.9%, so that expected cash inflows from premiums would match cash outflows in those years. However, Fadeaway would not be able to adjust premium income in year one and would incur an additional liability in year two on the claims filed and paid that year on year one policies. Specifically, five of the ten year one policies would cost the firm $80.40 per policy instead of $67 per policy. This would result in additional cash outflow in year two and reduce the present value of the cash flow stream as follows:[25]

$$(5) \quad \text{PV of the Equity} = \$435/(1.1)^1 + (-)\$402/(1.1)^2 + \sum_{t=2}^{10} [\$100/(1.1)^t]$$
$$= \$586.77$$

The drop in the present value of the equity shows that in a competitive market the shareholders of Fadeaway bear the full cost of the unexpected cash outflow. The cost becomes greater as the estimated loss per claim increases and the tail on old business becomes longer. Conversely, a decrease in the estimated loss per claim would result in an increase in the residual cash flow stream and a higher equity value.[26]

In a noncompetitive market, Fadeaway's shareholders would not have to bear the cost of the unexpected cash outflow because Fadeaway would be able to fix premium prices above competitive market rates. In contrast to the example discussed above, in a noncompetitive market Fadeaway would not be constrained to limit its premium increases to the amount necessary to cover cash outflows (14.9%). For example, Fadeaway could meet its original investors' expectations by raising premiums in years two through ten by 15.5% (from $9.00 to $10.40). Cash flows in those years

25. The first two elements of equation (5) represent the cash flow that results from policies written in year one, while the third element of the equation represents the cash flows resulting from policies written in years two through ten.

26. For example, assume the fact situation discussed above, but with the estimated loss per claim falling by 20% in year two. In that case, Fadeaway would lower premiums in years two through ten by 14.9% (from $9.00 to $7.66), allowing expected cash inflows from premiums to match cash outflows in those years. However, Fadeaway would not be able to adjust premium income for year one and would incur a smaller liability in year two on claims filed that year on year one policies. Specifically, five of the ten year one policies would cost the firm $53.60 per policy instead of $67 per policy. The present value of the cash flow stream would increase to:

$$\text{PV of the Equity} = \$435/(1.1)^1 + (-)\$268/(1.1)^2 + \sum_{t=2}^{10} [\$100/(1.1)^t]$$
$$= \$697.51$$

would rise to $105.25, and the present value of the equity would stay at approximately its original level:

$$(6) \quad \text{PV of the Equity} = \$435/(1.1)^1 + (-)\$402/(1.1)^2 + \sum_{t=2}^{10} [\$105.25/(1.1)^t] = \$614.25$$

By fixing prices above the level that would be set in a competitive market, and thus shifting the unexpected costs to new policyholders, the shareholders of Fadeaway would be able to benefit.

III. Property-Casualty Premium Growth and Market Equity Value

The models of Part II show that market equity values are determined by current and expected future cash flows. They further demonstrate that in insurance markets composed largely of long tail policies, the competitiveness of the market will affect the relationship between the changes in premium prices and market equity values.

A. *Economic Hypotheses Relating the Competitiveness of Property-Casualty Insurance Markets to Premium Growth and Market Equity Value*

Because the liability crisis concerns property-casualty insurance lines consisting largely of long tail policies, it is possible to formulate two economic hypotheses that relate the competitiveness[27] of those property-casualty insurance lines to the relationship between market equity value and premium growth:

Hypothesis One: If an insurance market is competitive then rising premiums will be accompanied by falling market equity values.

Hypothesis Two: If an insurance market is noncompetitive then rising premiums will be accompanied by market equity values that remain constant.

In the first hypothesis, the inverse relationship results from cash flows being unexpectedly reduced when the firm settles claims on old business at the same time that it attempts to increase premiums on new business.[28]

27. For an explanation of "competitiveness," see *supra* note 7.

28. Under the first hypothesis, an inverse relationship would be expected when claim losses decrease as the firm's cash flow is unexpectedly increased at the same time premiums are decreased for

The models in Part II explain why this is so.[29] If claim losses were to increase in a competitive market, then the firm would not be able to increase prices enough to keep cash flows at the level expected before the increase in claim losses. Therefore, even if the market were to permit some increases in prices, the firm's expected cash flow would be less than expected. Because the equity value represents the present value of the cash flow stream, the firm's share price would fall in response to the lower expected cash flow stream. Thus, in a competitive market rising premiums are associated with falling equity values.[30]

In the second hypothesis, market equity value is expected to remain constant, because the market is noncompetitive and the firm is not constrained in its pricing behavior. Thus, if claim losses were to increase, the firm would be free to increase prices enough to keep cash flows and market equity value constant.[31]

B. *A Preliminary Empirical Test of the Competitiveness of Certain Lines of the Property-Casualty Insurance Industry*

It is possible to examine the relationship between premium growth and market equity returns to test the two hypotheses.[32] The relationship is examined in Figure 1, which plots the change in premium growth against market equity returns for all property-casualty insurance, for general liability insurance, and for medical malpractice insurance from 1984 through the first half of 1987.[33]

new business. *See supra* note 26.

29. *See supra* text accompanying equation (5).

30. An implicit assumption is that premium prices increase only in response to increased claim losses. Premium prices, like market equity values, could increase for other reasons. *See infra* note 32.

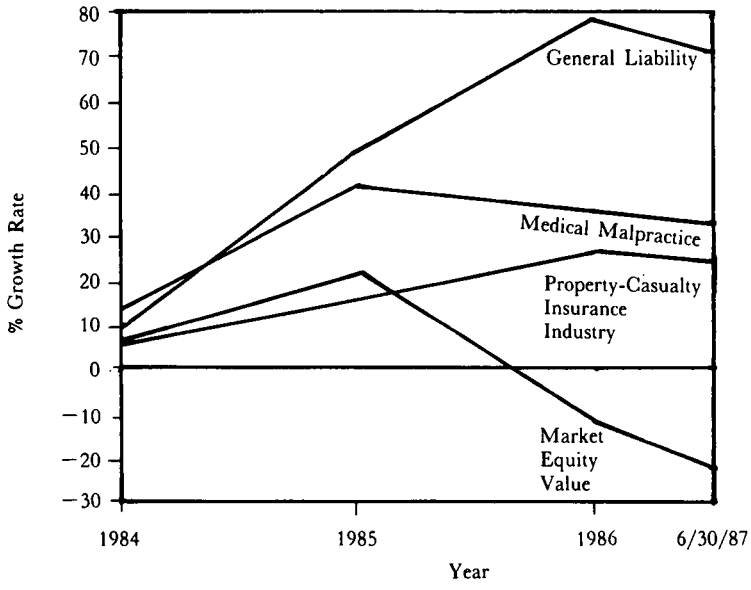
31. If a firm in a noncompetitive market were to attempt to increase market equity value, the relationship between market equity value and premium prices could be positive. The firm would be able to increase premium prices beyond the price that would keep cash flows constant. The firm would not suffer a loss of market share, and market equity value would increase rather than remain constant. For purposes of the empirical tests here, the models and hypotheses assume that firms will behave so as to maintain equity values at a constant level. *See supra* text accompanying equation (6).

32. While the following analysis provides one of the few opportunities to design a test of the competitiveness of specific lines of the industry, the analysis is admittedly limited in several ways. First, part of the data (premium growth across property-casualty insurance lines) is available only on an annual basis, thereby limiting the number of testable observations. Second, stock price data is limited to a relatively small number of insurance firms. *See infra* note 34. Third, because stock returns contain all known information about the firm, it is difficult to disaggregate the pieces of information from one another. *See supra* note 6.

In the context of the empirical test here, it is possible that the stock returns for any individual firm in any period are influenced by factors unrelated to expected changes in claims payments. For example, some unrelated factors could include the advent of new products or services, changes in management, and changes in the way property-casualty insurance firms are taxed. Factors such as these, however, are less significant when examining the entire industry. In any case, while the data is obviously limited, the analysis provides a framework for future empirical tests of the competitiveness of the property-casualty insurance industry.

33. The correlation study starts in 1984 because substantial increases in premiums were first

Figure 1[34]



The data show a similarity in premium growth across the various insurance lines, although the volatility in the growth rates varies. The graph shows a substantial increase in premiums starting in 1984 and continuing

recorded in that year. The correlation study includes general liability and medical malpractice insurance lines for the reasons stated *supra* in note 1. The comprehensive property-casualty insurance line is included for purposes of comparison.

34. Premium growth rate, represented in this study by growth in net premiums earned, is used as a proxy for price per policy. The reasonableness of this proxy can be seen by examining the year-by-year variability in net premiums earned for general liability and medical malpractice. While the data show little variability over the period 1977 through 1983, a significant increase in variability occurs from 1984 through 1986, the period characterized by rising insurance premiums. *See* BEST'S AGGREGATES AND AVERAGES 1987, *supra* note 1.

Growth in net premiums earned were derived from industry data. *Id.* Premiums for the first half of 1987 were set 10% below those of 1986 because renewal data for July 1987 signalled rate reductions of 10% to 15% for most types of liability insurance. *July Renewals*, BUS. INS., July 13, 1987, at 1.

Market equity returns for the period 1977 through 1986 were computed by taking the average of percent changes in year end stock prices for insurance firms included in A.M. Best's property-casualty and multiple-line indexes. *Insurance Stocks*, BEST'S REV.: PROPERTY/CASUALTY INS. EDITION, Feb. 1987, at 14. Equity returns for the period January through March, 1987 were taken from *Insurance Stocks*, BEST'S REV.: PROPERTY/CASUALTY INS. EDITION, Apr. 1987, at 7. Equity returns for the period April through June, 1987 were taken from *Insurance Stocks*, BEST'S REV.: PROPERTY/CASUALTY INS. EDITION, July 1987, at 10. The property-casualty index includes 18 firms, and the multiple line index includes five firms.

Market equity returns shown in Figure 1 are adjusted for general market influences by removing the S&P 500 return from the A.M. Best index return. If the general market return is not removed from the insurance index return, then it is not clear that the change in equity is unique to the performance of the insurance industry.

through 1987. Equity performance, also shown in Figure 1, has backed off considerably from a rather robust performance in 1985.[35]

The economic hypotheses in Part III, section A are tested by examining the contemporaneous movements, or the relationship, between premium growth and market equity returns. Correlation coefficients,[36] which measure the linear relationship between premium growth and market equity returns, are reported in Table 1.

Table 1[37]

Industry Line	Correlation Coefficient
All Property-Casualty	−.638
General Liability	−.543
Medical Malpractice	−.163

35. Note that no pattern (or cycle) of abnormal stock index performance is found over the time period. This is consistent with many published studies finding that such trends do not exist in equity values. *See, e.g.*, Fama, *Efficient Capital Markets: A Review of Theory and Empirical Work*, 25 J. FIN. 383 (1970). If equity values were to follow a trend, one would be able to earn abnormal returns by selling short at the onset of a downward trend and reversing the position at the turning point of the trend.

36. The correlation coefficient is calculated by:

$$r = \left[\sum_{i=1}^{n} (x_i - \bar{x})(y_i - \bar{y})\right] \div \left[\sum_{i=1}^{n} (x_i - \bar{x})^2 \times \sum_{i=1}^{n} (y_i - \bar{y})^2\right]^{1/2}$$

where x_i and y_i represent observations on random variables, and $\bar{x}$ and $\bar{y}$ represent the expected value of the same random variables. The values of the correlation coefficient are bounded between +1 and -1. In a simplified explanation of the meaning of the values of the correlation coefficient, a value of +1 can be thought of as indicating a perfect positive relationship between x and y. A correlation coefficient of -1 can be thought of as indicating a perfect negative relationship between x and y. Finally, a correlation coefficient of zero can be thought of as indicating the absence of a linear relationship between x and y. For discussions of correlation coefficients, see H. ALDER & E. ROESSLER, PROBABILITY AND STATISTICS 158-80 (3d ed. 1964); Y. MAKSOUDIAN, PROBABILITY AND STATISTICS WITH APPLICATIONS 270-93 (1969).

37. Given that these data represent a sample over a selected time interval, inferences on the population (assumed to be normal) are defined through the following test statistic:

$$t = [r] \times [(n-2)/(1-r^2)]^{1/2} \quad (n-2 \text{ degrees of freedom})$$

where r is the correlation coefficient and n is the number of observations. For a discussion of significance tests for correlation coefficients, see R. MILLER & D. WICHERN, INTERMEDIATE BUSINESS STATISTICS 210-14 (1977).

The null hypothesis in this test is that the correlation coefficient is zero. For the different lines tested here, the test statistics are:

Industry Line	Test Statistic
All Property-Casualty	−1.172
General Liability	−0.915
Medical Malpractice	−0.233

Given the number of degrees of freedom (df=2), the null hypothesis cannot be rejected at the 95% confidence level, where the critical value for the t-statistic is 2.92 at the .05 level.

The negative correlation coefficients are consistent with hypothesis one of competitive conditions for the general liability and medical malpractice lines of the property-casualty insurance industry.[38] An explanation consistent with these results is that the recent price increases are not enough to overcome the lower expected cash flows that result from increased claim losses. This suggests that property-casualty insurance firms are pricing new business at fair levels but are taking unexpected losses on old business. These losses are borne by the shareholders of the firm and are not passed on to new policyholders.

Conclusion

The most appropriate measure for determining the financial performance of the property-casualty insurance industry is the market equity value of firms in the industry. When insurance premium growth is correlated with changes in market equity values, the data, although limited in scope, do not support arguments that collusion exists within the medical malpractice and general liability lines of the property-casualty insurance industry.[39] This finding has important implications for insurance regulators.

The first and most important implication is that the markets for medical malpractice and general liability insurance fall on the competitive end of the competitiveness spectrum. This means that the recent increases in premium prices are generally justified. The increases are not an attempt to recover losses from past pricing mistakes but, rather, are an attempt to price insurance at levels commensurate with estimated cash flows.

A second implication follows from the first. State regulators should consider the property-casualty insurance market to be more competitive than noncompetitive and should formulate regulatory policy accordingly.[40] In determining fair prices, regulators are generally guided by the principle

38. Negative correlations between premium growth and market equity returns were also found over an extended period covering 1977–87. Once again, the null hypothesis is that the correlation coefficient is zero.

Industry Line	Correlation Coefficient	Test Statistic
All Property-Casualty	−.331	−1.053
General Liability	−.356	−1.076
Medical Malpractice	−.181	−0.519

Given the number of degrees of freedom (df=9), the null hypothesis cannot be rejected at the 95% confidence level, where the critical value for the t-statistic is 1.83 at the .05 level.

39. The fact that there is a lack of adequate data, *see supra* note 32, suggests that the insurance industry should collect and disseminate data that would aid in designing and conducting empirical tests for the competitiveness of the industry.

40. This is consistent with the Justice Department's analysis of the industry. *See supra* note 16.

that shareholders should earn a rate of return commensurate with the risk of their investment. The degree to which the property-casualty insurance industry is regulated should be linked with the extent to which the market falls short of perfect competition. In industries that are competitive, firms should be free to price insurance at the level needed to fulfill investors' expectations. As this Article demonstrates, the rate of return earned by a shareholder of a property-casualty insurance firm is linked to the present value of the firm's expected cash flow. Regulators should be concerned, therefore, with the level and trend of the market equity value of property-casualty insurance firms when determining the appropriate level of prices for their various insurance lines.