

## On The Convergence of Insurance and Finance Research

Clifford W. Smith, Jr.

### Introduction

When the topic of the potential interrelation of research in finance and insurance arises, I hear people assert, "That area has little to offer; they don't really understand the *real* problems." The ironic aspect is that this observation seems as frequently offered by people in finance about insurance research, as by people in insurance about research in finance. I believe that both positions are basically incorrect — that the statements reflect an incomplete understanding of the respective areas, and that closer interaction between the areas would prove beneficial to both. To facilitate this understanding, it is useful to have some historical perspective about the development of each area.

As Robert Witt [77, p. 10] indicated in his ARIA Presidential Address, the insurance profession has "evolved from one with a broad institutional and descriptive orientation over 25 years ago to one with a more analytical and economic orientation today." In many ways, financial economics has experienced a similar evolution.

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In his 1985 Presidential Address Robert Witt stated that "To upgrade the academic skills of our members and to broaden our focus, I think it is essential that ARIA develop and sponsor some high-level pedagogical seminars on developments in related risk management fields." At its 1986 mid-year meeting the ARIA Board of Directors accepted this recommendation unanimously. At the 1986 ARIA annual meeting Professor Smith, a distinguished professor of finance at the William E. Simon Graduate School of Business Administration, University of Rochester presented this paper at the first annual pedagogical seminar. In addition to having strong financial credentials, Professor Smith is a member of the American Risk and Insurance Association, an active participant in the Risk Theory Seminar, and the co-author with David Mayers of a research paper to be published in the March, 1987 issue of this *Journal*.

Prior to the mid-1950s finance consisted largely of institutional description and policy prescription; it lacked systematic scientific analysis. Corporate finance focused on optimal financial, dividend, and investment policies, while books on capital markets primarily dealt with identifying undervalued securities. Little attention was given to the nature of equilibrium in financial markets or its implications for individuals' portfolio decisions and firms' policy choices.<sup>1</sup>

In the 1950s, a fundamental change in focus occurred in finance. The traditional normative questions (of the "What should . . . ?" form) were displaced by positive questions (of the "What is . . . ?" form). Thus, researchers started asking questions like "What are the effects of alternative financing policies on the value of the firm?" rather than "What should corporate financial policy be?" This reorientation is important because as Jensen [33] argues, answers to those normative questions in which we all are ultimately interested cannot be obtained without the explicit or implicit use of positive theories. Without an understanding of how alternative actions affect the outcome, you cannot choose an optimal action and expect your objective to be achieved. For example, an optimal financial policy cannot be chosen without understanding the effect of more debt on the firm's expected tax liability as well as other variables that affect firm value. Moreover, using incorrect or incomplete positive theories induces decisions with unintended consequences.

From the mid-1950s to the mid-1970s financial economics was constructed almost exclusively within perfect capital markets (capital markets where all assets are costlessly marketable). Within this framework the primary normative questions that can be addressed have to do with asset pricing. With perfect capital markets all assets have to be priced so that those with the same risk offer the same expected return. In finance, this proposition has a number of pragmatically important implications. In capital markets, it prompts discussion of market efficiency, effective portfolio diversification and risk-return trade-offs; in corporate finance, it leads to an understanding of the opportunity cost of capital and capital budgeting under uncertainty.

However, with perfect capital markets, it is difficult to talk about an optimal financial contract. With no contracting costs, alternative contracts are equally costless and thus, equally efficient. In corporate finance, with perfect capital markets financial policy, dividend policy, leasing policy, and hedging policy are all irrelevant — in perfect capital markets, their choice does not affect the market value of the firm.<sup>2</sup> Hence an analysis that assumes perfect capital markets provides no basis for useful normative answers to an entire range of potentially interesting questions.

More importantly for purposes of this discussion, with perfect capital markets financial institutions, themselves, are irrelevant. For example, in a perfect capital market, potential investors are indifferent between investing in

<sup>1</sup> See Jensen/Smith [36].

<sup>2</sup> See Fama [21].

a mutual fund and directly constructing a portfolio of stocks. This implies that to understand the specific nature of the demand for the financial instruments produced by a mutual fund (and to understand the comparative advantages of open-end versus closed-end funds or load versus no-load funds); it is necessary to understand the cost differences between the alternatives, as well as how the costs vary. This special case of a mutual fund readily generalizes to all financial intermediaries, including insurance companies.<sup>3</sup>

It was only in the mid-1970s that financial economics began to develop a set of tools that allows the systematic examination of contracting or agency costs. Agency cost analysis provides the framework for the study of the determination of optimal contracts. Only after the development of that theory could we answer questions like: Why are some firms organized as corporations, some as partnerships, and some as cooperatives? Why are some firms financed primarily with equity and others with debt? Why do some firms pay high dividends while others pay none? Why do some firms engage in extensive hedging activities while others do not? In sum, it is only within the last few years that financial economics has progressed to the point that it can reasonably address a range of pragmatically important insurance issues.

In this paper, I review the development of the basic building blocks of financial economics and indicate their implications for insurance research. Since I believe that one reason for the skepticism of some insurance researchers about the usefulness of financial economics involves a lack of familiarity with the relatively recent advances beyond a perfect markets framework, a major objective is to illustrate the application of agency analysis to some traditional insurance questions. By focusing on the corporate demand for insurance and the determinants of ownership structure choice in the industry, I hope to provide a convincing illustration of the potential richness of the analysis. I then offer some observations and suggestions on future directions in insurance research, especially focusing on the industry's regulatory environment.

## The Major Building Blocks of Finance

The major building blocks of financial economics have been developed over the past thirty years. They are: (1) efficient markets theory, (2) portfolio theory, (3) capital asset pricing theory, (4) option pricing theory, and (5) agency theory. Each has implications for insurance research.

### *Efficient Markets Theory*

Efficient markets theory is ultimately just a statement of the pricing implications of competition in speculative markets. It hypothesizes that economic profits are impossible from trading on available information. This proposition has been extensively tested and is amazingly robust.<sup>4</sup> It implies that security

<sup>3</sup> See Benston/Smith [4].

<sup>4</sup> See Fama [19,20] and Jensen [32] for a review of the evidence on efficient markets theory.

returns are appropriate measures of firm performance. Hence researchers can use observed security returns to estimate the effects of various events on the market value of the corporation. For example, Mayers/Smith [49] document that stock prices on average rise by over 50 percent with the announcement of insurance firms' decisions to mutualize. This provides strong evidence that stockholders are not harmed, on average, by mutualization.

### *Portfolio Theory*

Portfolio theory examines the optimum security selection procedures for an investor's entire portfolio of securities. Markowitz [43, 44] notes that if security returns are not independent, then it is important to explicitly recognize the return dependency when allocating wealth across various securities. Mayers/Smith [48] and Doherty [16] analyze insurance purchases within a portfolio framework, building on Mayers' [45] analysis of the demand for securities when human capital is non-marketable (contracts to sell equity claims on human capital are unenforceable). In the traditional analysis of the demand for insurance, only one source of uncertainty facing the individual is assumed (for example, the hazard of a fire or an accident) and a specified insurance policy is the only asset available for hedging the risk. Thus, the traditional analysis implicitly assumes the insurance decision is separable. If payoffs to insurance policies are orthogonal to those of marketable securities, the consumer's gross human capital, and the payoffs to other insurance policies then insurance purchases are separable portfolio decisions. This analysis suggests that there are potentially important covariances in payoffs across various insurance policies and that these potentially help explain bundling of coverage within standard homeowners, health, automobile and life policies.<sup>5</sup>

### *Asset Pricing Theory*

Capital asset pricing theory addresses the determinants of asset prices under uncertainty. Sharpe [60] and Lintner [40] solve for equilibrium security prices, given that investor demands for securities are implied by the Markowitz mean-variance portfolio selection model. Their valuation model, (illustrated in Figure 1) demonstrates that although portfolios are evaluated on total risk (or variance), prices and expected security returns are related to marginal risk (or covariance).<sup>6</sup> In insurance, the capital asset pricing model has been employed by Hill [28] and Fairly [18] to provide a potentially objective basis for pricing decisions by the regulators in the rate-setting process. However, as noted by Cummins/Harrington [13] the estimated underwriting betas appear less stable than the stock-return betas estimated in traditional capital market applications.<sup>7</sup>

<sup>5</sup> See also Doherty/Schlesinger [17] and Schlesinger/Doherty [59].

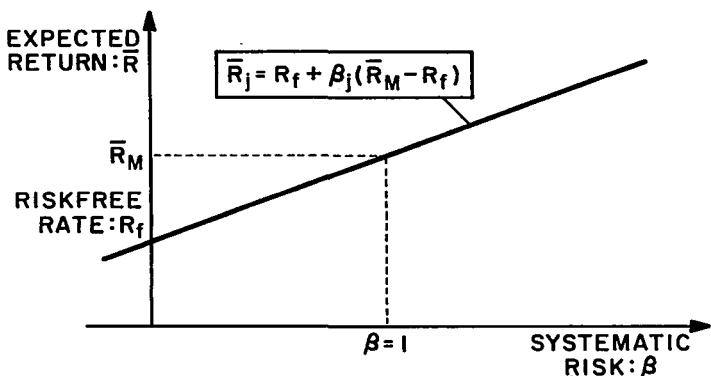
<sup>6</sup> See Jensen [31] for a survey.

<sup>7</sup> See also D'Arcy/Doherty [15] and the papers in Cummins/Harrington [14].

## Option Pricing Theory

Option pricing theory involves the analysis of the determinants of the prices of contingent claims, the simplest of which are call options. While the capital asset pricing model explains equilibrium expected returns, and thus relates today's asset price and that asset's expected future price, the option pricing model links today's value of a contingent asset with today's value of the underlying asset. Black/Scholes [6] derived the solution (illustrated in Figure 2) to this valuation problem for calls. Perhaps the greatest research impact of the option pricing model has been in its application to value other contingent claims. In insurance, Hite [29], Smith [67], and Walden [73] analyze a whole life insurance policy as a package of options. It also has been applied to value other assets such as deposit insurance by Merton [53], equity-linked life insurance policies by Brennan/Schwartz [8] and guarantee funds by Cummins [12].<sup>8</sup>

fig. 1.



The Capital Asset Pricing Model implies that the expected return for a security,  $\bar{R}_j$ , is the riskfree rate,  $R_f$ , plus a risk premium which is the difference between the expected return to the market,  $\bar{R}_M$ , and the riskfree rate times the beta,  $\beta_j \equiv \text{cov}(R_j R_M) / \text{var}(R_M)$ , of the security.

## Agency Theory

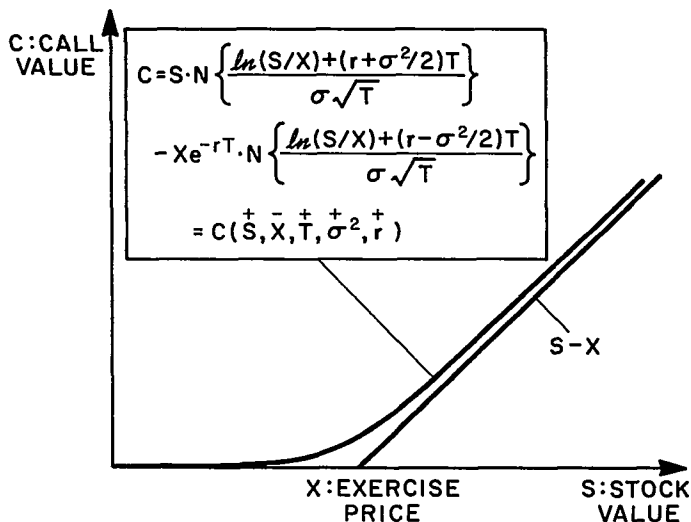
Jensen/Meckling [34] provide a framework for the analysis of contractual relations; they call their framework agency theory. In their terminology, an agency relation is defined through an explicit or implicit contract in which one or more persons (the principal[s]) engage another person (the agent); the contract involves delegation to the agent of some decision-making authority. Although usually stated in terms of this hierarchical relation, the analytical framework can be applied to virtually any cooperative activity. Agency costs

<sup>8</sup>For a review, see Smith [61,62] and Cox/Rubinstein [11].

are the total costs of structuring, administering, and enforcing contracts. They can be decomposed into: (1) monitoring costs, (2) bonding costs, and (3) the residual loss. Monitoring and bonding costs are the out-of-pocket costs of structuring, administering and enforcing contracts paid by the principal and agent, respectively. The residual loss is the opportunity cost associated with the deviations in the decisions. Therefore, their definition of agency costs contains as special cases all contracting costs frequently referred to as moral hazard costs, transactions costs, and information costs.

Because the contracting parties bear the associated agency costs of their interaction, they have incentives to structure contracts to reduce these costs. Any time the incremental out-of-pocket cost is less than the incremental gain from reducing the residual loss, then individuals have incentives to negotiate contracts specifying additional monitoring or bonding activities.<sup>9</sup>

fig. 2



The Black/Scholes option pricing model, illustrating the positive relation between the call price, C, and the stock price, S. Moreover, the call value is a negative function of the exercise price, X, a positive function of the time to maturity, T, the variance rate,  $\sigma^2$ , and the riskfree rate, r.

<sup>9</sup> See Jensen/Smith [37]

I believe that the systematic application of agency theory has the potential to provide a rich set of implications in insurance research. In insurance many of the interesting questions involve the optimal structure of complex contractual arrangements. Examples are: the insurance supplier's specification of ownership rights within the firm implicit in choosing to charter as a stock, a mutual, or a Lloyds; the specification of the relation between the firm and its sales force implicit in using independent insurance agents, direct writers, or brokers;<sup>10</sup> and the determination of the indemnity function in the choice of including upper limits, deductibles, coinsurance, or exclusions.<sup>11</sup>

### Corporate Insurance Purchases

One example of an insurance application of agency analysis is the corporate demand for insurance. In this case since the demand for the policy arises, not from an individual but from a corporation, agency analysis offers a quite productive framework for analysis. Until recently, corporate insurance purchases received little attention in financial economics in spite of the fact that annual insurance premiums paid by corporations are roughly the same magnitude as corporate dividend payments. In contrast, the insurance literature has paid insufficient attention to the fundamental differences between individual and corporate purchasers.

A primary function of an insurance policy is to transfer the risk of loss from the insured to the insurer. For this transfer to be mutually beneficial, the insurance company must have a comparative advantage in riskbearing over the policyholder. While this condition is readily met for individuals or for principals of private or closely-held corporations; it is less obviously met in the case of large, widely-held corporations. Although the owners of a widely-held corporation are risk averse, portfolio theory tells us that they hold portfolios of securities to garner the benefits of diversification. By combining many securities into portfolios, investors eliminate most insurable risks. (Since insurable risks, almost by definition, have little discernible correlation with broad economic cycles, they primarily represent diversifiable risks.) And if investors can cheaply eliminate insurable risks through diversification, they will not pay the corporation to do it for them. Thus, the logic of corporate finance says that the risk aversion of the owners does not provide a satisfactory explanation for observed corporate insurance purchases.

### *Insurance and Corporate Financial Policy*

To better understand why a large, widely-held corporation would rationally insure some risks, I believe it is useful to analyze the purchase of insurance as simply a special case of corporate financial policy. The foundation for our understanding of corporate financial policy is the Modigliani/Miller [54] proposition. They demonstrate that given the firm's investment policy, with no taxes and no contracting costs, the firm's choice of financing policy does

<sup>10</sup> See Mayers/Smith [46].

<sup>11</sup> See Arrow [2], Raviv [58] and Huberman/Mayers/Smith [30].

not affect the current market value of the firm.<sup>12</sup> An equivalent statement of this proposition is that if financing policy in general — or a corporate insurance purchase specifically — is to affect the current market value of a corporation, then it must do so through changes in tax consequences, through changes in contracting costs, or through important interdependencies between the choice of financing policy and future real investment decisions. Each provides a partial explanation for the corporate demand for insurance.<sup>13</sup>

### *Contracting Cost Efficiencies*

Closer examination of the range of services provided under an insurance policy aids in our understanding of corporate insurance purchases. In addition to the risk-shifting aspect of the policy discussed above, insurance companies (because of specialization and scale economies) develop a comparative advantage in claims administration and settlement. Thus if insurers can settle claims at lower cost than the corporation against which the claim has been filed, then the relative expertise and efficiency of the insurer in claims administration provides a partial explanation for corporate insurance purchases.

Important confirmation of this explanation is provided by “claims-only” policies. Under a claims-only policy, the insurer provides only claims-management services — the firm pays all claims. For a company with a high claim frequency, a claims-only policy allows the insurer to more intensively employ its network of claims administrators. However, it does reduce the insurer’s incentive to negotiate the best available settlement, since the policyholder (not the insurer) indemnifies the claimant. Yet when claims are numerous, the law of large numbers allows the policyholder a low-cost mechanism for monitoring the insurance company’s effort in claims settlement.

Liability insurance offers another confirming example. Under a standard liability insurance policy, the insurer provides legal representation for the insured. This is because in the majority of cases when the claim is less than the policy limit, the policyholder has little incentive to mount a vigorous defense. In contrast, when the claim substantially exceeds the policy limit, the incentive problem is reversed. I believe that the understanding of the implications of this incentive reversal helps explain the purchase of retroactive liability coverage (for example, by the MGM Grand after their 1980 fire).<sup>14</sup>

Insurance companies also develop a comparative advantage in safety-project evaluation. For example, early in the development of the product, boilers were inspected by specially trained engineers. Later, the engineering

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<sup>12</sup> For a review of this irrelevance proposition, see Fama [21].

<sup>13</sup> See Mayers/Smith [47, 50] and Main [41].

<sup>14</sup> See Mayers/Smith [47]. Smith/Witt [68] also examine retroactive liability coverage. Their analysis focuses on tax-related incentives, but they note incentive problems which arose with that contract.

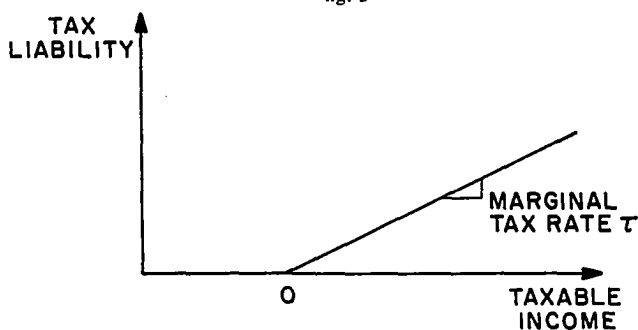


recommendations were merged with insurance coverage. By agreeing to indemnify the firm for any losses, the quality of the inspection is bonded.

## Taxes

The tax code provides opportunities for some companies to raise their after-tax expected net cash flows by purchasing insurance. The primary provisions which allow this reduction have to do with the progressivity of the tax code.<sup>15</sup> Figure 3 illustrates the basic point. Note that in this simple case, the tax function looks like the payoff to a call option — zero below some amount, positive afterwards. Option pricing theory shows that the value of this call that the government has on the firm through the tax code is greater the higher the volatility of the underlying variable — here, pre-tax income. Thus, corporate insurance purchases reduce the volatility of taxable income, thereby reducing expected taxes, hence increasing the corporation's expected after-tax net cash flow.

fig. 3



A simple tax function with a zero rate on losses and a positive rate,  $\tau$ , on profits.

Given the tax schedule is convex (as in Figure 3) expected taxes are less than the firm's tax liability would be if it generated the same level of expected taxable income with certainty. Thus reducing volatility of taxable income reduces expected taxes. It is important to note that provisions of the tax code specifying carry-backs and carry-forwards reduce this motivation for corporate insurance purchases by reducing the non-linearity of the tax schedule.

Applying the option pricing model to evaluate the implications of an insurance purchase raises a subtle issue regarding differences in risk characteristics in insurance and financial economics. Generally in finance, the distribution of payoffs is approximately symmetric. But in insurance, the payoff distribution is typically asymmetric. Since the Black/Scholes option pricing model assumes a symmetric (in the logs) distribution, there might be concern with its application in the analysis of corporate insurance. However,

<sup>15</sup> Mayers/Smith [47], Smith/Stulz [64] and Smith/Witt [68] examine these opportunities.

Merton [52], Cox/Ross [10], and Jones [38] have generalized the Black/Scholes analysis to account for "jumps" in value of the underlying asset of precisely the type that would be associated with a casualty loss. Their analysis implies that a call option is more valuable where the value of the underlying asset can jump — even if only downward in value — than if it cannot jump. This implies that an attempt to employ the Black/Scholes model to quantify this tax-related benefit will underestimate its value. However, since the qualitative results of the option pricing model are unaffected by this change in distributional assumptions, the basic analysis of this motivation for corporate insurance purchases is unaffected.

Taxes can also influence the choice of policy type. For example, taxes provide an alternative motivation for claims-only policies. Since the premium in a claims-only policy reflects just the administrative cost, not the expected indemnity payments, claims-only premiums are significantly lower than premiums for full-coverage contracts. Hence in states which impose a premium tax (usually about 2.5 percent of premiums) use of claims-only policies can reduce this effective tax liability.

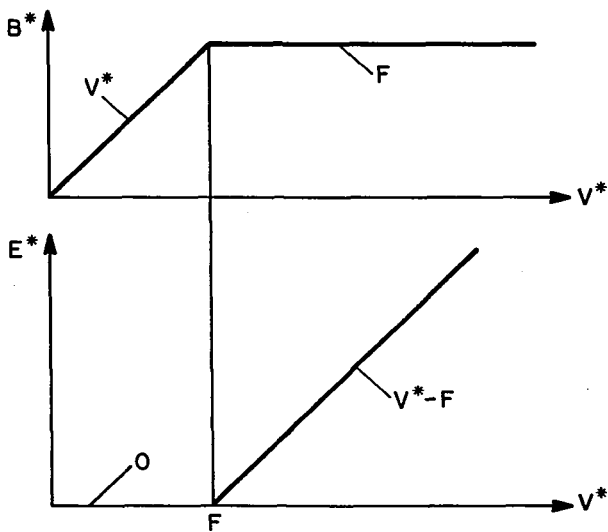
### *Investment Incentives*

Corporate bond covenants frequently specify that the borrower corporation will maintain insurance coverage over the life of the bond. This provision helps guarantee to lenders the nature of the firm's future investment decisions, thus providing lenders with more assurance about the coverage on their claims.<sup>16</sup> To better understand this point, let's take a closer look at the relation between the interests of the lender and borrower.

For a profitable company with substantial cash flow, the interests of bondholders and stockholders are generally coincident — those actions that are good for one group are also generally good for the other. However for firms facing some degree of financial distress, these interests can diverge. In some cases, actions (such as increasing the volatility of the firm's cash flows) benefit stockholders but reduce the value of outstanding bonds. To see this implication more clearly, let's examine a simple levered firm. Assume that: (1) The firm has one zero-coupon bond issue outstanding which prohibits any dividend payments over the life of the bonds. When the bonds mature in  $T$  periods, the bondholders are either paid the face value of the debt,  $F$ , or given the corporation's assets,  $V^*$ . (2) The distribution of the firm's assets after any time interval is lognormal with constant variance rate,  $\sigma^2$ . (3) There is a constant riskless rate,  $r$ . Under these assumptions, the payoffs to the equityholders ( $E^*$ ) and bondholders ( $B^*$ ) are illustrated in Figure 4. As can be seen, the payoffs to the equityholders are like a call option on the firm's assets. In essence, issuing bonds is equivalent to the stockholders selling the assets of the firm to the bondholders for the proceeds of the bond issue plus a call option to repurchase the assets with an exercise price equal to the face value of the debt issue and an expiration date corresponding to the maturity date of the

<sup>16</sup> See Smith/Warner [65] and Mayers/Smith [47, 50].

fig. 4



The payoffs to the equityholders,  $E^*$ , and bondholders,  $B^*$ , of a simple levered firm with one zero-coupon bond issue with face value,  $F$ , at the maturity date of the bonds as a function of the market value of the firm's assets,  $V^*$ .

bonds. Therefore, since higher volatility increases the value of a call, higher cash-flow volatility increases the value of the firm's equity and reduces the value of the bonds.

Now consider a company with substantial debt outstanding without covenants requiring the purchase of insurance. If faced with a potential safety project (for example, upgrading a sprinkler system) the stockholders might rationally object to the firm taking the project, even though it has a positive net present value, because of the implied reduction in cash-flow volatility. However, potential lenders have incentives to anticipate these incentive problems. The prices they are willing to pay for the bonds when they are originally brought to market is lower if incentive problems like this are not addressed. By purchasing insurance, cash-flow volatility is not affected by the firm's investment in a safety project; and hence, corporate insurance purchases eliminate this disincentive to take a positive net present value project. Since potential investors should value these bonds more highly when they are brought to market, this provides the firm with a motivation to promise to provide insurance coverage by including a covenant in the bond contract.

Additionally, a realized casualty loss produces option-like characteristics in real investment projects because the project's value then depends on further discretionary investment. With risky debt outstanding, shareholders can have

incentives to forego this discretionary expenditure, even though rebuilding the project has a positive net present value. This related incentive problem can be controlled through corporate insurance because the insurance indemnification payment eliminates the relation between the casualty loss and financial distress.<sup>17</sup>

### *Riskshifting Within the Corporation*

While thus far I have discussed the corporation from the perspective of its bondholders and stockholders, it is really a vast network of contracts among parties with common as well as conflicting interests. Certain claimholders in the corporation are different from the stockholders and bondholders of a large widely-held corporation in an important dimension — managers, employees, customers and suppliers are generally less able to effectively diversify firm-specific insurable risks. Thus, (like the owners of closely-held corporations) these claimholders' risk aversion can motivate corporate insurance purchases. However, especially in the case of corporate managers, to understand their incentive to purchase insurance it is important to consider the form of their compensation package and its specification of the payoff structure of their claims on the firm. For a manager primarily compensated through salary, his risk aversion will motivate lobbying for insurance coverage. But a manager with substantial compensation through stock options or bonus plans can have incentives to under-insure.<sup>18</sup> This incentive is produced by the option-like character of the payoffs under both stock option and standard bonus plans. Since insurance reduces expected cash flow volatility, the expected payoffs under incentive compensation plans are also reduced through insurance.

### *Summary*

I believe there are important insights available from the foregoing analysis — insights not available within the standard treatment of corporate insurance. While simply assuming corporations, like individuals, are risk averse motivates corporate insurance purchases, the policy implications for insurers are meager. They essentially reduce to “look for the more risk-averse corporations.” In contrast, the analysis outlined here identifies potentially observable characteristics which not only suggest empirical tests for insurance researchers interested in explaining observed variation in corporate insurance purchases, but also suggests sales strategies for insurance companies. The analysis implies that insurance purchases will be greater if: (1) the company is closely held; (2) uninsured losses are likely to take the corporation into lower tax brackets; (3) the leverage in the firm's capital structure is higher; (4) the fraction of the managers' compensation in the form of incentive compensation like bonus payments and stock options is smaller. These arguments not only have implications for the probability of purchase, they also have implications

<sup>17</sup> See Myers [55] and Mayers/Smith [47, 50].

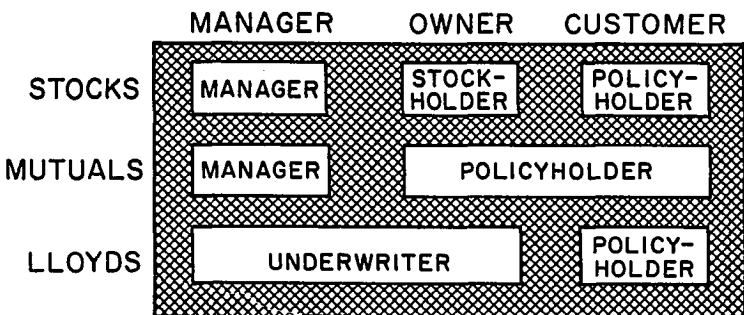
<sup>18</sup> See Smith/Watts [66].

for the degree of coverage purchased through, for example, the choice of a deductible.

## The Ownership Structure of Insurance Companies

A second example of an insurance application of agency analysis is the determinants of ownership structure in the industry. It is difficult to identify another major industry with a broader range of ownership structures. Stock firms employ the standard corporate form. Mutuals are more like cooperatives where the customers own the organization. Finally, Lloyds Associations are like flexible partnerships where syndicates of individual underwriters coalesce to offer policies. As illustrated in Figure 5, these organizations differ substantially in the manner in which they structure the manager, owner, and customer functions. (Managers are the decision makers — the administrators who quote rates, market policies, and manage claims; owners supply capital, receive the firm's residual income stream and bear the risk; customers receive a stipulated amount conditional on specified losses in return for policy premiums.) The different ownership structures create different incentives for the contracting parties, thus the different costs of controlling the resulting incentive problems lead to the efficiency of the various ownership structures across lines of insurance. Furthermore, variation in these costs is related to things like the variation in the degree of managerial discretion in setting rates across lines — typically, the greater the agent's discretion, the greater the

fig. 5



The Ownership Structure of Insurance Companies.

potential for exercising discretion for personal benefit at other claimholders' expense. Thus, different control mechanisms which limit individual's ability to operate opportunistically are associated with alternative ownership structures. I will focus on the net benefits of the different structures to better identify their respective comparative advantages.<sup>19</sup>

## *Stock Companies*

In a typical common stock insurance company, there is a virtually complete separation of the manager, owner, and customer functions. This separation allows increased efficiency through specialization. Offsetting this benefit is the increased cost of managerial control because of the separation of the owner and the manager. This incentive conflict between stockholders and managers is controlled in stock companies in several ways: (1) The manager's compensation package can include incentive programs which tie the manager's compensation to the performance of the firm's stock.<sup>20</sup> (2) The managers are appointed by a stockholder-elected board of directors.<sup>21</sup> (3) Most firms complement an external managerial labor market with a corresponding internal market through which executives compete.<sup>22</sup> (4) Restrictions in the corporate charter limit managerial behavior. (5) The external market for corporate control can discipline the firm's managers through outside takeovers if the firm is not run efficiently.<sup>23</sup>

Similarly, making the policyholder and stockholder separate parties creates incentive problems which are similar to the stockholder-bondholder problems mentioned earlier. Stockholders have incentives to change the firm's dividend, financing, and investment policies after the insurance contracts are sold to increase the value of the stockholder's residual claims at the expense of the policyholder's fixed claims. For example, if customers bought policies expecting the firm to maintain its dividend payment at its current level, equity value would rise at policyholder expense if the firm raised dividends financed by asset sales. Obviously, potential customers recognize these incentives and the prices they are willing to pay reflect these potential costs. Thus, by limiting their opportunities for expropriation, the demand price for the company's policies increases. Such limitations include: (1) restrictions on the assets in which the firm can invest, (2) limitations on the dividends which can be paid to stockholders, and (3) issuance of participating policies.<sup>24</sup>

## *Lloyds Associations*

In a Lloyds, individual underwriters are the insurers; thus this ownership structure merges the manager and riskbearer function. Syndicates of members typically underwrite policies; members are then personally responsible for that portion of the risk underwritten. Incentive problems between the manager

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<sup>19</sup> See also Anderson [1], Fama/Jensen [23], Fletcher [24], Frech [25], Hetherington [27], Kreider [39], Mayers/Smith [46, 49, 51], and Spiller [69]. Note that while differences in taxes or regulation also affect the comparative advantage of the respective ownership structures, that is not the focus of this discussion.

<sup>20</sup> See Smith/Watts [66].

<sup>21</sup> See Fama [22].

<sup>22</sup> See Baker [3].

<sup>23</sup> See Manne [42] and Jensen/Ruback [35].

<sup>24</sup> Participating policies in insurance markets act somewhat like convertible bonds in credit markets. See Smith/Warner [65] and Green [26].

and owner are naturally controlled by merging the functions. Because they bear the wealth effects of their decisions, Lloyds members have a comparative advantage in providing insurance where discretion in rating risks is important. However this benefit comes at a potentially substantial cost: (1) Merging the manager and riskbearer function reduces the gains from specialization. (2) By merging manager and owner functions, the opportunities for acting opportunistically with respect to policyholders is increased.

Underwriting through syndicates also raises the problem of controlling intra-syndicate conflicts. Typically, members have somewhat specialized roles within the syndicate; in some cases the organization looks like a partnership with general partners making most decisions and limited partners primarily supplying capital. And while historically syndicate managers' were also underwriters, more recently there has been a shift to syndicates run by professional managers. The costs of controlling intra-syndicate conflicts are reduced through: (1) Potential problems among syndicate members (as well as problems between owners and policyholders) are partially controlled through mutual monitoring by members. And since syndicate members have only the liability limitations included in the contracts, they certainly have incentives to monitor syndicate decisions. (2) Restrictions on membership, for example, net worth requirements, as well as mandatory audits and constraints on commitments limit member actions.<sup>25</sup> (3) Mechanisms like the central guarantee fund act like a central bond posted by the members. (4) Syndicates appear to be relatively stable, implying a form of long-run implicit contract.<sup>26</sup> I believe that the differential effectiveness of these control mechanisms helps explain reputational differences between London and American Lloyds.

Thus, compared to stock companies, there are both costs and benefits of Lloyds — this analysis implies that Lloyds should have a comparative advantage in lines where discretion in rate-setting is important.

### *Mutuals*

Customer and owner functions are merged in a mutual insurance company (although the rights of a policyholder in a mutual are generally less than the combined stockholder and policyholder rights in a common stock firm.)<sup>27</sup> By eliminating the stockholder group with its separate and sometimes conflicting interests, potential conflicts between the two functions over dividend, financing, and investment policy are controlled. This is the major benefit of the mutual ownership structure.

The benefits from control of the policyholder-stockholder conflict are offset by less effective control of the owner-manager conflict. A potentially impor-

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<sup>25</sup> See Bickelhaupt [5, p. 775-77] for additional discussion of membership restrictions.

<sup>26</sup> See Telser [71].

<sup>27</sup> For example, limitation on ownership rights are greater on mutual policyholders than stockholders. A debate over the implications of these restrictions for policyholder control of mutuals has resulted. See Hetherington [27], Kreider [39] and Anderson [1].

tant control mechanism in stocks, the external market for corporate control, is largely eliminated in a mutual — tender offers are impossible without separately traded shares. Since the owner-manager conflict is less effectively controlled in a mutual, they should have a comparative advantage where little managerial discretion is required. Moreover, with long-term contracts, there are greater opportunities to change dividend, financing and investment policies. Thus, mutuals should have a comparative advantage in offering long-term contracts and contracts where renewal options are more valuable.<sup>28</sup>

### Summary

This analysis produces a number of implications. First, since mutuals have less effective mechanisms for the control of managers, more perquisite consumption should be observed in mutuals than stocks. Also, since mutuals do not have separately traded ownership claims, current management is limited in the mechanisms through which they can pass wealth to their children. Since nepotism is one of the more tax-advantaged mechanisms, members of the same family should be observed more frequently among managers of mutuals than stocks. Spiller [69] finds evidence consistent with these implications.

Second, since mutuals have survived in competition with other ownership structures they must be efficient.<sup>29</sup> Mayers/Smith [49] provide evidence on the potential efficiency of mutuals by examining the evidence from thirty life insurance companies that voluntarily switch from stock to a mutual ownership structure. On average the rate of management turnover declines, stockholders receive a premium for their shares, and premium income from policyholders is unchanged; thus, no group of claimholders appears to systematically lose among the firms which choose to mutualize.

Third, the analysis implies that mutuals have a comparative advantage in lines which require little managerial discretion, for example in lines with good actuarial data. This incentive is reinforced where there are long-term contracts and contracts where renewal options and non-cancellation provisions are important. This appears consistent with the substantial fraction of business by mutuals in the life and health lines.

Fourth, managerial discretion can also be limited by concentrating the business, both by lines of insurance and geographically. Mayers/Smith [51] find that stocks are less geographically concentrated than Lloyds or mutuals. Without adjusting for firm size, Lloyds are most concentrated by line-of-business, stocks are next, and mutuals appear least concentrated. When size is controlled, stocks and mutuals appear indistinguishable, and Lloyds are least concentrated.

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<sup>28</sup> Reciprocals are another major ownership structure within the industry. They can be analyzed in similar ways. See Mayers/Smith [51].

<sup>29</sup> In contrast, Spiller [69], O'Hara [56] and Frech [25], focusing only on dimensions where costs are higher, conclude that they are inefficient.



## On the Evolution of Research in Insurance

Although the evolution of financial economics I have described is similar to Robert Witt's description of the evolution of insurance, there are important differences. I believe that insurance research has a more descriptive, institutional focus and a less-well-developed set of positive theories underlying its normative analysis than is the case in finance. In explaining this difference in emphasis between finance and insurance research, I believe that it is important to recognize that research in the areas serves different audiences. Historically academic insurance researchers have enjoyed a stronger tie with the industry than has been the case in finance. But institutional sponsors naturally encourage attention to the richness of the contractual and organizational forms in the industry. Perhaps more importantly, however, industry regulation has produced a demand for normative answers. Research in financial economics developed to serve one primary constituency, other academic researchers, while insurance research has, in addition, served industry practitioners and regulators.

I believe that the influence of regulators, while subtle, is profound. The evidence from political economics suggests that regulators are not benign forces interested only in social-welfare maximization. Rather, they have their own agendas and use their discretion in the regulatory process in their own self-interest. The process produces a demand for normative theories — theories that prescribe and thereby justify the proposed regulation. Therefore, the regulators in choosing among alternative theories are apt to use significantly different criteria than would the academic community.

Let me illustrate first with an example from finance. Use of the dividend-growth model to determine the firm's cost of capital receives a two-page discussion in Brealey/Myers [7] and none in Copeland/Weston [9] — probably the two leading corporate finance texts. Yet the majority of the state regulatory agencies responsible for setting utility rates employ that model in their hearings. There seems to be a similar debate in insurance rate setting. The traditional approach to defining "fair" profits in the industry goes back to the National Association of Insurance Commissioners recommendation in 1921 of a standard profit formula with a profit rate equal to five percent of premiums. While the recommended rate has varied across lines and over time between two and six percent, it has apparently never been justified as anything other than a rule of thumb.<sup>30</sup> In contrast, Hill [28] and Fairly [18] building on asset pricing theory have derived an alternative model of fair pricing. Although it has great logical/theoretical advantages over the 1921 rule, the model has met with limited acceptance in regulatory proceedings around the country. This suggests regulators give greater weight to the implications of a theory, less to its internal consistency or empirical validity. I believe that regulators are, in essence, shopping for theories and they are more likely to accept a theory that justifies their preferred actions.

<sup>30</sup> See Venezian [72].

In this sense, I believe that insurance research has much in common with that in accounting. Moreover, I believe a line of academic inquiry which has proved quite productive in accounting could yield similarly interesting results if applied in insurance. Watts/Zimmerman [74, 75, 76] draw on work by Stigler [70] and Peltzman [57]. They explicitly recognize that the political process is a market place where various parties compete for wealth transfers. In this sense, regulation is endogeneous. Hence, an observation that regulation is favorable or unfavorable for a particular institution does not "explain" its observed use. Rather it prompts asking "Why does the regulation take that form?" To successfully answer that question requires a theory of the regulatory process. While a complete theory is probably unattainable at this time, I believe that some important elements can be identified and those elements point to interesting research questions. For example: (1) With respect to the latest major revision of the insurance tax laws, who lobbied for the various proposed tax provisions? (2) In the debate over accounting for investments, who lobbied for valuing bonds at market versus their amortized value? (3) In accounting for selling expenses, who lobbied for expensing versus amortizing the costs? (4) In the debate over determining the appropriate level of reserves, who lobbied for use of the absolute amount of expected future claims versus their present value? If we can explain insurance company lobbying by lines of insurance, firm size, or ownership structure, I believe that we will have a much richer understanding of the impact that these provisions have on various segments of the insurance industry.

### *On the Perceived Quality of Insurance Research*

I believe that my analysis of the evolution of financial economics helps to provide insight into the difficulty in producing highly regarded work in financial institutions in general or insurance specifically. In addition to the analytical tools that are necessary to address the issues of structuring optimal contracts and organization forms, a detailed knowledge of the cost structure of the relevant alternative mechanisms for providing the various financial services must also be acquired. Too frequently, academics with detailed institutional knowledge have tended not to have the requisite analytical tools; while those with a command of the analytical tools tend not to have the requisite institutional knowledge. This situation is similar to the one our accounting group at Rochester decries — to successfully produce highly regarded accounting research, the analytical tools in financial economics and statistics must be mastered, but to teach accounting, you must also know "debits and credits". Unfortunately, it's rare to find individuals with both sets of tools.

Yet, in this respect, I believe that research in financial economics is inevitably moving in the same direction as accounting and insurance. More and more, corporate financial research is attempting to explain differences in financial, dividend, compensation, leasing, and hedging policies among firms. And I believe that to answer those questions successfully requires a detailed understanding of the underlying core businesses that make the firms

across those industries different. Therefore, while there is significant variation within the insurance industry that is worthy of study, I believe that systematic inclusion of insurance in more general corporate studies is especially valuable because of the added variation across observations. I believe that attempting an empirical examination of corporate financial policy looking only at manufacturing firms is like trying to estimate the relation between height and weight looking only at centers for NBA teams — you reduce the power of the test by restricting the variation in the observations. I believe that potentially important aspects of the determination of corporate policy choices are likely to be difficult to identify empirically if finance researchers confine themselves to manufacturing firms, yet will stand out more clearly if the study includes observations from insurance, banking, regulated utilities, etc. Of course, important independent variables like regulation differences and tax differences are likely to be added as well. Yet the end product is a richer theory with broader applicability.

This discussion underscores what is in my opinion the most exciting aspect of a convergence of finance and insurance research. For firms in most industries, finance researchers are in the process of collecting detailed data on the underlying industries. Yet, much of this type of data is already available for the firms in the insurance industry.

However, a notable limitation on insurance research has been the lack of an accessible, consistent database necessary to address certain types of questions. For example, while Best's has assembled vast amounts of accounting data on insurance firms, stock price data is less available. This primarily reflects the limited number of actively traded insurance shares, even including the OTC market. This limitation on data availability apparently explained by three considerations: (1) the prominence of mutuals and reciprocals in some lines of insurance, (2) the frequency with which stock insurers are owned by financial or non-financial conglomerates, and (3) the number of stock insurance firms which are closely held and infrequently traded. Nevertheless, I believe that the creation of a database of insurance company returns offers significant research opportunities, in spite of the above limitations on coverage and even though researchers would have to be careful to adjust for the low trading frequency of many of the shares. To assess the potential research impact, you only have to look at the establishment of the Center for Research in Security Prices (CRSP) sponsored by Merrill Lynch at the University of Chicago and their creation of accurate computer files of stock prices, dividends, and capital changes for NYSE and AMEX firms. It has had a tremendous far-reaching effect on empirical research in finance.

While accessible data on insurance firms is less than we might like, there is even less available data on customers. For example, while my discussion of the corporate demand for insurance has a number of testable implications, the requisite data on the number and kinds of policies purchased by corporations necessary to test those hypotheses is currently unavailable. Data on corporate insurance purchases typically are not disclosed. Since many corporations use brokers to assemble their coverage from a number of different insurers, no

single insurance company's records are likely to offer a complete picture of a corporate client's insurance purchases. Thus, the most promising avenues appear to be either obtaining data from major brokers or a direct survey of firms. Neither appears easy, but I believe such a database would encourage important research. Perhaps the Huebner Foundation could seek support to underwrite the assembling of such data into accessible databases.

### *Insurance Within the Financial Services Industry*

While I believe that corporate finance researchers would benefit substantially from more systematic attention to the institutional richness in the insurance industry, I also believe that it is becoming increasingly important for insurance researchers to acquire a broader perspective. The historic separation of insurance companies, investment banks, and commercial banks is being eroded — the Prudential-Bache merger is one of the more dramatic examples. Moreover, new products being introduced throughout the financial services industry are blurring distinctions among products. For example: (1) The Aetna Casualty and Surety Company has established a swap insurance program with the World Bank — Aetna assumes the default risk while the World Bank retains the interest rate or currency risk.<sup>31</sup> (2) Some financial institutions are considering offering conditional currency option contracts — a company bidding on a foreign project buys a currency option that it can only exercise if it wins the bid. (3) Several brokerage firms have introduced investment vehicles designed to meet the IRS minimum definition of life insurance to maximize the benefits from tax deferral of investment income (for example, Merrill-Lynch's Prime Plan). In the case of each of these products, there are aspects of insurance as well as more traditional non-insurance financial instruments.

These changes in suppliers and products are occurring because of (1) the rapid rate of technological innovation in the financial services industry, (2) the dramatic cost reductions in information processing, and (3) the deregulation of the industry (which I believe is largely another reflection of the first two points). If we are to understand the comparative advantages of the emerging financial supermarkets as well as the role of more specialized financial boutiques, and if we are to understand the production, valuation, and marketing of the emerging new products, then I believe that a broader perspective encompassing other financial services is crucial.

### **Conclusions**

I have attempted to outline the major building blocks of financial economics and illustrate their potential usefulness in addressing a range of important questions in insurance research, as well as to offer some observations on the evolution of insurance research and to suggest some potential future research directions. My objective has been to facilitate a greater mutual understanding between researchers in financial economics and insurance. I trust that the

<sup>31</sup> See Smith/Smithson/Wakeman [63].

foregoing analysis has clearly conveyed my belief that the two areas have much to offer each other. And I hope that this discussion contributes to closer interaction and a continuing dialog among researchers in the two areas.

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