On the Corporate Demand for Insurance

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I. Introduction

Insurance contracts are regularly purchased by corporations. The Insurance Information Institute reports that "business insurance accounted for approximately 54.2 percent of the $79,032,923,000 in direct property and liability insurance premiums written in the United States in 1978" (1979, p. 9). Yet even though annual premiums exceeded $42.8 billion,[1] the importance of these contracts has been largely ignored by the finance profession. For example, the topic of insurance is completely absent from the index of virtually all corporate finance textbooks.

The insurance literature is little better. The risk management area in the insurance literature examines corporate purchases of insurance, but the literature assumes the underlying source of corporate demand for insurance is risk aversion. Although risk aversion is unquestionably at the heart of the demand for insurance by individuals, it provides an unsatisfactory basis for analyzing the demand for insurance by corporations. The

We provide a positive analysis of the set of incentives for the purchase of insurance policies by corporations which is consistent with the modern theory of finance. We show how the corporation's insurance contracts can (1) allocate risk to those of the firms' claimholders who have a comparative advantage in risk bearing, (2) lower expected transactions costs of bankruptcy, (3) provide real service efficiencies in claims administration, (4) monitor the compliance of contractual provisions, (5) bond the firm's real investment decisions, (6) lower the corporation's expected tax liability, and (7) reduce regulatory costs.

corporate form provides an effective hedge since stockholders can eliminate insurable risk through diversification. Thus, the purchase of insurance by firms at actuarially unfair rates would represent a negative net present value project, reducing stockholder wealth.

Because risk reduction does not provide an obvious basis for a specific demand for insurance by corporations, we analyze the set of incentives for the corporate purchase of insurance which are consistent with the modern theory of finance.[2] Our analysis treats insurance purchases by corporations as just another part of the firm's financing decision. Modigliani and Miller (1958) show that given investment policy, with no contracting costs or taxes, corporate financing policy is irrelevant. Thus if the firm's financing policy is important it is so because of (1) taxes, (2) contracting costs, or (3) the impact of financing policy on the firm's investment decisions. We examine each as an explanation of observed insurance purchases by corporations.[3]

Overview of the Paper

In Section II, we examine the optimal allocation of risk among the firm's claimholders and suggest that those with divisible claims and access to capital markets have a comparative advantage in risk bearing over such claimholders as employees and managers.

In Section III, we discuss that set of real services which insurance firms have a comparative advantage in providing, such as processing and administering claims and loss-prevention project assessment. With a comparative advantage in these areas, resulting cost efficiencies favor the purchase of insurance. We also demonstrate how the inclusion of insurance among the corporation's set of contracts can control particular incentive conflicts. We suggest that insurance firms have a comparative advantage over outside stockholders, bondholders, customers, etc., in monitoring certain aspects of the firm's real activities, so that a firm which purchases insurance will engage in a different set of activities than a firm which does not.

In Section IV, we examine the implications of specific insurance-

2. We are specifically concerned with the purchase of insurance by corporations with diffuse ownership. Closely held corporations are more likely to purchase insurance (essentially for the same reasons individuals purchase insurance) than corporations with less concentrated ownership. Insurance contracts allow owners of closely held corporations to specialize in risk bearing only in specific dimensions in which they have specialized expertise and thus a comparative advantage (see also Arrow 1974, chap. 5).

3. The corporation is a set of contracts among various parties who have claim to a common object; these parties include stockholders, bondholders, managers, employees, suppliers, and customers. The bounds of the corporation are defined by the set of rights under the contracts. Our analysis demonstrates how the addition of insurance contracts can increase the firm's market value. Implicitly, Alchian and Demsetz (1972) view the corporation this way; Jensen and Meckling (1976) and, more recently, Fama (1980) are explicit. Although our grouping of parties is somewhat arbitrary, it is convenient for the distinctions we want to make.

related provisions within the tax code. We indicate the conditions under which these provisions can motivate the corporate purchase of insurance by reducing the corporation's expected tax liability. Finally, we examine the effects of regulation on the corporate demand for insurance. Rate regulation establishes incentives for firms to purchase insurance, and statutes like workmen's compensation laws effectively require some firms to purchase insurance.

We present our conclusions in Section V.

II. Corporate Insurance and Risk Shifting

Corporations regularly enter into explicit and implicit long-term contracts (e.g., bond contracts, labor contracts, product guarantees, and service contracts). The bondholders, employees, customers, and suppliers will make rational forecasts of the payoffs under their respective contracts, reflecting the forecasts in their reservation prices.

In a Coase (1960) or Fama and Miller (1972) world, the value of the firm is unaffected by the assignment of property rights through these contracts. With no contracting costs, the set of potential securities spans the state space; the packaging of securities is irrelevant because individuals can costlessly repackage them. For example, if the firm chooses to purchase liability insurance, thus reducing the probability of contract noncompliance, bondholders', customers', suppliers', and employees' demand prices change to reflect the different expected payoffs. With zero contracting costs, the loading fee for the insurance contract is zero; moreover with costless marketability of all assets, customers, suppliers, and employees would charge only the expected opportunity cost of contract noncompliance, discounted to reflect marginal risk. Consequently, the sum of the contract price changes must equal the insurance premium, and the value of the firm is not affected.

Comparative Advantage in Risk Bearing

If the contracting process is expensive, incentives exist to allocate risk to those agents who have a comparative advantage in risk bearing. The equityholders and debtholders of the corporation have divisible claims which are traded in organized secondary markets. The resulting ability to diversify risk implies that these claimholders have a comparative advantage in risk bearing over such other classes of claimholders as employees, managers, customers, or suppliers. Since the ability to diversify claims on human capital is limited, risk-averse individuals for whom labor contracts represent an important component of their cash flows will use higher discount rates in setting their reservation prices, reflecting the level of uncertainty associated with the contract payments. Thus, shifting the risk bearing within the corporation to those

claimholders who will bear the risk at lowest cost increases the value of the firm.

If the equity and debt claims of the corporation were large enough, the firm could simply shift risk to stockholders and bondholders providing the optimum level of risk for the firm's other contracts. But the amount of risk that can be allocated to the stockholders and bondholders is limited by the capital stock of the firm. Insurance contracts allow the firm to shift risk to the insurance company, achieving an efficient allocation of risk for the firm's other claimholders.[4] The reduction in the required compensating differential in contract prices can be sufficient to cover the loading fees of the policy. This is a risk-shifting incentive for the purchase of insurance by corporations.[5] Thus, our analysis suggests the higher the employees', customers', and suppliers' fraction of the claims to the firm's output, the higher the probability that the firm will purchase insurance.

Transactions Costs of Bankruptcy

The existence of transactions costs of bankruptcy can induce firms with widely dispersed ownership to purchase insurance against some risks. The probability of incurring the costs is lowered by shifting the risk associated with certain hazards to the insurance company (even if the insurance price is actuarially unfair). For example, if a large fraction of a firm's assets were represented by one plant, fire insurance might be optimal. Although Warner's (1977) evidence suggests that transactions costs associated with bankruptcy are a small fraction of a large firm's assets, even small transactions costs of bankruptcy will be sufficient to induce large firms to purchase insurance if the present value of the reduction in expected bankruptcy costs is greater than the present value of the contract's loading fees.

Warner's evidence also indicates that the transactions costs of bankruptcy are less than proportional to firm size. Therefore small corporations are more likely to purchase insurance to reduce the probability of incurring these costs than are large firms. For example, assume the density function of dollar losses for a particular risk is the same for

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4. We must also assume that it is more expensive for the employees, suppliers, and customers to purchase this insurance than for the firm. This occurs both because of economies of scale in contracting and because employees, customers, and suppliers are unlikely to have an "insurable interest" in the firm (because of moral hazard, they are unlikely to be able to purchase insurance).

5. Although models of asset pricing with transactions costs imply that higher residual variability should imply lower stock prices, convincing empirical verification of this hypothesis has yet to be offered. However, if the present value of the loading fee were less than the present value of the expected reduction in trading costs imposed on security holders, the purchase of insurance would be value increasing. Again, what is fundamental is risk shifting to agents who have a comparative advantage in risk bearing, even if no agent will bear it at a zero price.

small and large corporations. This implies the probability of bankruptcy is greater for a small corporation than a large one. Assuming the present value of the contract's loading fees is the same for small and large firms, the present value of the reduction in expected bankruptcy costs from purchasing insurance will also be greater for the small corporation.[6]

III. Real Production and Incentive Contracting Aspects of Corporate Insurance Contracts

Real-Service Efficiencies

Insurance firms develop a comparative advantage in processing claims because of economies of scale and gains from specialization. For claims resulting from property losses or liability suits, insurance companies provide a range of administrative services associated with claims management. Claims management is frequently accomplished through a nationwide network of independent adjusters who are employed to negotiate certain types of settlements. The decisions are then reviewed by the claims department of the insurance firm. Furthermore, in liability claims, the insurance firm typically provides legal representation.[7] The insurance firm usually retains a local lawyer who has expertise in the defense of liability suits. Thus, the corporate demand for insurance reflects the insurance company's comparative advantage in providing claims administration services. In fact, "claims only" contracts are negotiated wherein the insurance company provides only claims management services, the firm pays all the claims. Our analysis suggests that for a given premium efficiencies in claims administration motivate the corporate purchase of insurance the higher the frequency of insurance claims.

We believe that this comparative advantage in claims administration also provides an explanation for the observed purchase of retroactive liability coverage. For example, the *Wall Street Journal* reports that "when fire hit the MGM Grand Hotel in Las Vegas last November 21, killing 85 persons, the hotel's owners had $30 million in liability insur-

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6. We arrive at the same result by assuming that the probability of bankruptcy with a particular risk is the same across firm size and that the transaction costs of bankruptcy are constant across firm size. This implies the present value of the reduction in expected bankruptcy costs from purchasing insurance will also be the same. However, holding the probability of bankruptcy constant implies the present value of the contract's loading fees should be less for the small corporation than the large. This assumes the loading fees are an increasing function of the size of the risk insured against. Thus, if (1) the density functions of dollar loss for a particular risk imply a probability of bankruptcy at least as great for the small corporation as the large, (2) the transactions costs of bankruptcy are constant across firm size, and (3) loading fees are positively related to the size of the risk, small corporations will more likely purchase insurance than large corporations.

7. See Mayers and Smith 1981.

ance. Since then the hotel company has increased its liability coverage to nearly $200 million. Significantly, the new insurance is backdated to November 1, or 20 days *before* the catastrophic blaze."[8] Without the additional coverage, the insurance company's adjusters' incentives to negotiate efficient settlements is limited because the total claims exceed the previous coverage limits.

Insurance and Monitoring

Jensen and Meckling (1976) and Fama (1980) discuss the conflict of interest between the owners and the managers of a corporation. They assume that the contracting parties form rational expectations and innovatively seek to maximize their individual expected utilities within the effective constraints implied by their contracts. Thus conflicts of interest arise among the contracting parties whenever discretionary behavior is authorized. Jensen and Meckling demonstrate that incentives exist to write contracts which maximize the current market value of the firm.

Conflicts of interest between the owners and the managers can provide a basis for the corporate demand for insurance. For example, the manager's working life is limited while the corporate form gives the firm an indefinite life; this difference in time horizons produces an incentive conflict. The manager's claim on the firm has a life which is related to the life of his job. If his compensation package includes a bonus based on reported earnings, postponing selected expenditures until after retirement can increase his expected compensation. Specifically, he might elect against maintaining a sprinkler system. But predictable behavior by management will be anticipated by the owners of the corporation, and the manager's overall compensation will be adjusted to reflect his anticipated actions. Because the adjustment will include anticipated avoidable costs, managers have incentives to make believable promises not to engage in these activities by allowing monitoring and offering to bond their actions.[9]

If the insurance company has a comparative advantage in monitoring the sprinkler system's maintenance, an efficient mechanism to control management can be the purchase of insurance.[10] Therefore, our analysis suggests that firms whose managers have greater discretion over the choice of hazard-reducing projects will be more likely to purchase insurance.

8. Tim Metz, "Why Insurers and Insured Like the Idea of Covering Disasters after They Happen," *Wall Street Journal* (May 12, 1981).

9. This provides another interpretation of actions analyzed by Ehrlich and Becker (1972).

10. Note that this incentive to purchase insurance to control the manager/firm conflict is in addition to the risk-shifting incentive resulting from manager's risk aversion, discussed above.

Insurance and Bonding

Jensen and Meckling (1976), Myers (1977), and Smith and Warner (1979) indicate that actions available to the firm after bonds are sold can reduce the value of the bonds. For example, if the firm sells bonds for the stated purpose of engaging in low-risk projects and the bonds are valued at prices commensurate with that low risk, the aggregate value of the other claims on the firm rises and the value of the bonds falls if the firm substitutes projects which increase risk. Note that the mere exchange of low-risk assets for high-risk assets does not alter the value of the firm if both sets of assets have the same net present value; however, the purchase of negative net present value projects can increase the value of the nondebt claims if the increase in firm risk from accepting these projects is large enough. Even though such projects reduce the total value of the firm, ex post, the aggregate value of the other claims rises. Similarly, there are incentives to reject some risk-reducing positive net present value projects.

The purchase of insurance contracts can guarantee (or bond) a particular set of real investment decisions by the corporation. Prospective bondholders recognize the incentives to deviate from value maximization after the sale of the bonds. Consequently, bonds will be priced to reflect anticipated wealth transfers. Thus the existing claimholders of the firm are motivated to include provisions in the debt contract limiting the opportunities to transfer wealth from the bondholders. Bond indentures frequently contain covenants requiring the firm to maintain certain types of insurance coverage.[11] Our analysis suggests that these provisions reduce the incentive of the firm's other claimholders to accept certain risk-increasing negative net present value projects or to reject risk-reducing positive net present value projects after the sale of the bond issue.[12] Since potential wealth transfers from bondholders to the firm's other claimholders are increased the larger the fixed claims in the capital structure, we suggest that the probability of inclusion of insurance covenants will increase with the firm's debt/equity ratio.

Insurance covenants are regularly included in other corporate contracts. For example, subcontracting agreements between corporations regularly incorporate provisions requiring the subcontractor to main-

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11. See American Bar Foundation 1971 or Smith and Warner 1979.

12. For example, if fire insurance has been purchased, the variance of corporate cash flows (including indemnity payments) does not fall if the firm invests in a safety project such as a sprinkler system, and thus there is no wealth transfer to the firm's fixed claimholders. Moreover, as long as the insurance firm quotes premiums associated with various levels of loss prevention (such schedules are common; see Bickelhaupt [1974]), competition among insurance companies will insure only a normal rate of return for the insurance firm. Thus, the premium equals the expected cost of the insurance. This induces the firm to accept loss-prevention projects for which the present value of the reduction in insurance premiums exceeds the present value of costs.

tain an acceptable level of insurance coverage.[13] If an independent subcontractor were sued for a liability claim, the subcontractor might renege on the contract, go bankrupt, impose costs on the firm from contract noncompletion, and increase the liability of the firm. This is a form of ex post opportunistic behavior discussed by Klein, Crawford, and Alchian (1978). Thus we suggest that the purchase of insurance by the subcontractor bonds the promise that the subcontractor makes not to default on performance of his job. Moreover if the insurance company has a comparative advantage in monitoring the firm, the insurance policy will induce a different set of real activities than would occur if no insurance had been purchased.

There are other corporate examples of ex post opportunistic behavior that can lead to a demand for insurance. Since contracting is expensive, actions to be taken in unusual circumstances generally will not be specified, so the occurrence of an unusual circumstance can alter incentives. Suppose a fire destroys a large part of a single plant of a multiplant corporation. The firm might have an incentive to reduce employment, violating the anticipated allocation of risk bearing. Business-interruption insurance covering ordinary payroll would control the incentive. In this case, by guaranteeing the contract the reduction in the workers' reservation prices can be sufficient to cover the loading fee for the insurance policy.[14] Similar arguments can be made regarding product guarantees and service contracts where insurance bonds an agreement that under usual circumstances would be carried out.

Alternatives to Insurance

There are alternative contractual arrangements that could be used. For example, the firm could hire an independent consultant to prescribe loss-prevention measures, report to bondholders, and monitor management. But we believe the insurance firm is better suited for these jobs. First, the insurer bonds his appraisal by agreeing to indemnify the firm for any losses which occur. Competition from other insurance firms restrains the insurer from over- or underprescribing loss prevention. Second, the claimholders recognize that there are incentives to bribe the consultant to allow the firm to engage in actions which would result in wealth transfers. Therefore prior to entering these contracts it is in the firm's interest to choose an agent who is expensive to bribe because the reservation prices of the claimholders will reflect the probability of enforcement. Bribing an insurance firm is

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13. See *American Jurisprudence Legal Forms* 1973.
14. This appears similar to the risk-shifting incentive discussed earlier, but the rationale is different. In this case the firm can provide the optimum level of risk for the contract.

expensive; a large fraction of an insurance company's revenues is related to the sale of long-term financial contracts. These revenues will be reduced if the insurance company is discovered accepting bribes; further, the costs of accepting a bribe must be discounted over an infinite horizon.

IV. Regulation, Taxes, and Corporate Insurance

Provisions in the tax code establish incentives for the corporate demand for insurance;[15] in certain cases the corporation's expected tax liability can be reduced by the purchase of insurance.

Insurance-related Provisions of the Tax Code

Note the following provisions in the tax code:

1. A casualty loss (e.g., the loss of a building or machine in a fire) is a deductible business expense. The amount of the loss is the difference between the adjusted basis and its value after the casualty.

2. Insurance premiums are deductible business expenses.

3. Insurance indemnities reduce the deductible loss.

4. If the indemnity exceeds the adjusted basis of the property, the corporation has a gain. If the property is not replaced, taxes on the gain must be paid. If the indemnity does not exceed the original cost, the difference between the indemnity and the adjusted basis is taxed as ordinary income (recapture of depreciation). If the indemnity exceeds the original cost, the excess is subject to capital-gains tax.

5. If the property is replaced with a similar property on a timely basis, and the cost of the new property exceeds the indemnity payment, the firm can elect to not recognize a gain. However, the depreciable basis for the new property is cost adjusted for the difference between the indemnity received and the adjusted basis on the old property. (E.g., if the indemnity equals the replacement cost of the property, the adjusted basis of the new property equals that of the old property.)

The impact of these provisions is derived in the Appendix. As a benchmark with (1) zero loading fees, (2) a zero interest rate, and (3) a constant marginal tax rate, the sum of the expected depreciation charges plus the premium with insurance equals the sum of the expected depreciation charges and the expected casualty loss without

15. Although a firm can self-insure in the sense that it can establish reserves for anticipated losses, the tax code imparts no bias between self-insurance and remaining uninsured. Self-insurance reserves cannot be deducted as business expenses. This rule applies even if the corporation is unable to obtain insurance coverage and sets aside an amount equal to what might have been paid for insurance protection. Moreover, Financial Accounting Standards Board Statement No. 5 prohibits adjusting reported earnings for self-insurance reserves. Thus for both tax and reporting purposes, self-insurance and being uninsured are equivalent.

insurance. Thus from a tax standpoint the corporation would be indifferent between insurance and no insurance; the present value of the expected tax liabilities are equal. This indifference is broken by violations of any of the three conditions in the benchmark case. Since positive loading fees obviously favor self-insurance, we now concentrate on the implications of positive interest rates and nonconstant effective marginal tax rates.

Interest Rates and Tax Liabilities

Positive interest rates favor insurance for depreciable assets to be replaced. Although the undiscounted sum of the expected tax shields are the same whether insured or not, the required adjustment in the depreciable basis of the new property (for the difference between the indemnity and the basis on the old property) gives the expected tax shield sooner with insurance. Hence, the present value of the firm's expected tax liability is lower with insurance than without. Therefore, higher interest rates favor corporate casualty insurance purchases, and firms holding assets with long depreciable lives should be more likely to purchase insurance.

Tax Rates and Tax Liabilities

There are several provisions in the tax code which have the effect of changing the firm's effective marginal tax bracket so that the purchase of insurance is favored. First, there is a 3-year carry-back and a 7-year carry-forward provision in the tax code.[16] If an uninsured loss exceeds the sum of the most recent 4 years' earnings, the additional loss must be carried forward at a zero interest rate, and if the loss exceeds the earnings over the 11-year period, the excess casualty loss is lost.[17] Hence, if the magnitude of a potential loss is large compared with the firm's expected annual taxable earnings, the expected tax liability of a self-insured firm can be higher than for a firm with insurance.

Second, there is some progressivity in the corporate profits tax. If the loss reduces the corporation's taxable earnings so that the firm's marginal tax rate is reduced, the expected tax shield of self-insurance is reduced. Furthermore, when a firm employs the carry-back provisions the current year's tax must be totally offset before any of the previous year's taxes can be used. This further increases the firm's expected tax liability without insurance.

Third, the option of immediately recognizing the gain if the indem-

16. The carry-forward is 5 years for tax years before 1976. Regulated transportation companies are allowed a carry-forward of 9 years for tax years after 1975 (and 7 years before 1976).

17. If the uninsured loss forces the firm into bankruptcy which results in liquidation, any loss carry-forward will be lost.

nity received under the insurance policy exceeds the cost basis of the property further reduces the expected tax liability of the insured corporation. If the present value of the tax reduction from increasing the depreciation on the new property (from the adjusted basis to replacement cost) exceeds the taxes from immediately realizing the gain (recapturing depreciation plus paying capital gains tax on the difference between cost and original cost), then the firm's tax liability is reduced by realizing the gain on the property at the date of the casualty.

While the implications of our analysis are largely consistent with the notion that firms with large risks will insure while those with small risks will self-insure, the rationale is different; moreover, some distinction can be made. For example, consider two firms with equal expected net cash flow and equal expected casualty losses, but allow one firm to have lower expected taxable earnings because of an investment tax credit, perhaps. This firm would more likely purchase insurance while the other would more likely self-insure even though both have the same potential to "cover" their casualty losses. Large firms with spatially dispersed operations would be less likely to expect casualty losses that are large relative to their taxable earnings. For these firms positive loading fees outweigh the benefits derived from existing tax provisions and motivate self-insurance.

Tax Incentives for Liability and Indirect-Loss Insurance

Since liability claims are tax-reducing expenses to the corporation and indemnity payments under business interruption insurance are generally taxed at ordinary tax rates, with constant tax rates the expected tax liability is the same with insurance or without. There is no interest rate effect because the impact of interest rates works only through the adjustment to the assets depreciation basis. Thus, of the above considerations only the carry-back/carry-forward provision and tax rate progressively provide incentives for the corporate purchase of liability insurance or business-interruption (indirect-loss) insurance. An implication of the analysis of tax-induced incentives is that firms would purchase more complete casualty insurance coverage than liability coverage (e.g., firm's casualty insurance policies should have lower deductibles than their liability insurance policies).

A final provision of the tax code can provide an incentive for the firm to purchase liability insurance. The tax code limits the deduction of fines and penalties as ordinary business expenses while the premium a corporation pays for liability insurance, indemnifying the firm for penalties and fines in addition to ordinary liability claims, is deductible. Thus, the present value of the corporation's expected tax liability is smaller with insurance than without. Note, however, that some states (e.g., California) limit insurance contracts covering fines and penalties.

Insurance and Regulated Industries

Myers (1972) provides a simple characterization of the regulatory process. In his model regulators set prices which are expected to generate revenues covering the sum of expected costs plus depreciation plus a normal rate of return on the rate base. If the firm does not insure against a particular hazard, the expected-cost figure used in establishing allowed revenues and prices must reflect the probability and magnitude of the loss to yield a normal rate of return to the firm's owners.[18] Thus, the regulator must obtain an assessment of the loss distribution.

Consider the incentives this regulatory process provides to purchase insurance. First, the insurance company, because of specialization, should be expected to have a comparative advantage in assessing the distribution of losses. If so, it would be efficient for the regulators to "subcontract" this assessment by having the insurance firm reflect their assessment of the loss distribution in the insurance premium. Second, the loading fees also reflected in the premium are costs which, through the regulatory process, are shifted from the firm's owners to the customers. Note that this typically is not the case with an unregulated firm. For unregulated competitive firms output price and revenues will be determined in the market, independent of whether the firm insures.[19] Thus, our analysis suggests that a regulated firm would buy significantly more insurance than an unregulated firm with similar characteristics.

Compulsory Insurance Laws

Workmen's compensation laws have been enacted in every state. These laws essentially impose on employers the responsibility of providing no-fault insurance to their workers for job-related accidents. Although self-insurance is allowed in all but five states, to qualify for self-insurance under the law the firm must demonstrate that it has sufficient size and diversification of risks. Thus regulation will effectively constrain some firms to purchase workmen's compensation insurance policies. Further, the benefits suggested above involving real-service efficiencies, taxes, risk shifting, and monitoring provide additional incentives for corporations to purchase insurance rather than self-insure. In 1968, only 14% of all workmen's compensation benefits were provided through self-insurance programs.

Also, in every state some form of automobile insurance law has been

18. Since uninsured casualty or liability losses are likely to be idiosyncratic rather than systematic, an allowed rate of return derived from some capital-asset pricing model would not be affected.

19. The exception is where the insurance in some sense bonds product quality to the consumer and thus can sustain a compensating differential in product prices.

passed to provide compensation for an innocent victim. These laws have taken several forms: (1) financial responsibility laws, (2) compulsory liability insurance laws, (3) unsatisfied judgment funds, (4) uninsured motorist endorsements, and (5) no-fault and compensation laws. Financial responsibility laws require that for continued registration of the vehicle after an accident the owner must provide evidence of liability insurance coverage or provide proof of financial responsibility for a stated period after the accident (usually 3 years). Some states (Massachusetts, New York, and North Carolina) have adopted compulsory liability insurance statutes requiring proof of liability insurance coverage prior to registration of a vehicle. Illinois requires all trucks registered in the state to be covered by liability insurance, with some minor exceptions.

V. Summary and Conclusions

Insurance contracts, regularly purchased by corporations, have received virtually no attention in the finance literature. Our purpose in this paper has been to analyze the set of incentives, consistent with the modern theory of finance, which motivate the purchase of insurance policies by corporations.

For the closely held firm the task is fairly simple: These firms are likely to purchase insurance for the same reasons individuals do. But for corporations with diffuse ownership risk aversion by the owners apparently provides no incentive for the purchase of insurance, since stockholders and bondholders with their access to capital markets can eliminate insurable risk through diversification. We argue that the corporate demand derives from the ability of insurance contracts to (1) allocate risk to those of the firm's claimholders who have a comparative advantage in risk bearing, (2) lower expected transactions costs of bankruptcy, (3) provide real-service efficiencies in claims administration, (4) monitor the compliance of contractual provisions, (5) bond the firm's real investment decisions, (6) lower the corporation's expected tax liability, and (7) reduce regulatory constraints on firms.

We believe each of these incentives for insurance purchases by corporations is relevant. For example, the existence of covenants in bond contracts and subcontracting agreements requiring the firm to maintain insurance coverage is important evidence favoring the incentive-conflict control hypothesis. Similarly, the existence of claims-only policies and retroactive liability insurance coverage are important evidence favoring the real-service efficiency hypothesis. Obviously the relative importance of the incentives will vary across corporations. For example, our analysis suggests that for large firms with spatially dispersed operations and short-lived assets the tax-induced incentives will be of relatively minor importance, while for

corporations with large debt-equity ratios the acquisition of bonding services would provide an important incentive.

We believe our analysis also has important implications for the study of insurance purchases by individuals. Our focus on insurance purchases by large corporations with diffuse ownership largely eliminates risk aversion as the source of the demand for insurance and allows us to highlight other incentives, such as the real-service efficiencies provided by the insurance companies. These incentives generally apply to the purchase of insurance by individuals, yet have been overlooked.

Appendix
Tax Incentives for Corporate Insurance Purchases

In this Appendix, we provide a more formal discussion of the results presented in Section IV. We first consider the simple case of liability insurance. The present value of the expected cash flows for insurance and self-insurance can be represented as

Period	0	1
Insurance	$-P(1 - \tau)$	0
Self-insurance	0	$-\dfrac{\pi L(1 - \tau')}{1 + r}$

where P is the insurance premium; π is the probability of the loss; L is the loss; τ is the effective marginal tax rate; τ' is the effective marginal tax rate conditional on the loss; and r is the interest rate. For insurance with no loading fee, the premium will equal the present value of the expected loss, $P = \pi L/(1 + r)$. Thus with a constant tax rate there is no tax advantage to insurance. However, if conditional on the loss the effective marginal tax rate is lower, $\tau' < \tau$, then the present value of the expected tax advantage of insurance over self-insurance, Φ, is $\Phi = [\pi L(\tau - \tau')]/(1 + r)$. Thus the tax advantage is greater (1) the larger the expected loss, (2) the greater the difference in effective tax rates.

We now examine casualty insurance. We assume that there are no partial losses and that the policy is for one period. The present values of the expected cash flows for insurance and self-insurance can be represented as

Period	0	1
Insurance	$-P(1 - \tau)$	$\dfrac{\pi\{(I - C') + \tau[C' - I + (C - \Sigma D)]\Delta\}}{1 + r}$
Self-insurance	0	$\dfrac{\pi[\tau'(C - \Sigma D) - C' + \tau'C'\Delta]}{1 + r}$

where I is the indemnity under the insurance policy; the book value of the asset is cost, C, minus accumulated depreciation, ΣD; C' is the replacement cost of the asset; Δ is the factor that represents the present value of depreciation charges from \$1.00 of assets under whatever depreciation method is em-

ployed.[20] With actuarially fair insurance, $P = \pi I/(1+r)$, and constant tax rates, $\tau = \tau'$, the tax advantage of insurance over self-insurance is $\Phi = \{\pi\tau(1 - \Delta)[I - (C - \Sigma D)]\}/(1 + r)$. Thus the tax advantage of insurance is larger (1) the larger the difference between the indemnity and book value, (2) the slower the depreciation schedule, (3) the higher the interest rate, (4) the higher the probability of the loss. If the effective tax rate conditional on an uninsured loss is lower, $\tau' < \tau$, then the tax advantage of insurance is $\Phi = \{\pi[\tau(1 - \Delta)I - (C - \Sigma D)(\tau' - \tau\Delta) + C'\Delta(\tau - \tau')]\}/(1 + r)$. Thus the greater the difference in effective tax rates, the greater the tax advantage of insurance.

The insured has the option to recognize the gain from an indemnity, pay taxes on the gain, and make no adjustment in the depreciable basis of the property. We can compare the difference in the present values of the expected cash flows for deferral of the gain with the recognition of the gain. The expected cash flows can be represented as

Period	0	1
Deferral option	$-P(1 - \tau)$	$\dfrac{\pi\{(I - C') + \tau[C' - I + (C - \Sigma D)]\Delta\}}{1 + r}$
Recognition option	$-P(1 - \tau)$	$\dfrac{\pi[(I - C') + \tau C'\Delta - \tau\Sigma D - \tau_g(I - C)]}{1 + r}$

where τ_g is the capital-gains rate. The difference in cash flows between the recognition option and the deferral option in period 1, after the casualty, is

$$\Theta = \tau\Delta[I - (C - \Sigma D)] - \tau\Sigma D - \tau_g(I - C)$$

$$= (\tau\Delta - \tau_g)(I - C) - \tau(1 - \Delta)\Sigma D.$$

Thus, the option of recognizing the gain is more valuable (1) the greater the difference between ordinary tax rates and the capital-gains tax rates, (2) the lower interest rates, (3) the faster the rate of depreciation, (4) the greater the difference between the indemnity and original cost, and (5) the smaller accumulated depreciation.

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20. See Wakeman (1980) for an analysis of the present value of the tax shield from alternative depreciation methods.

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