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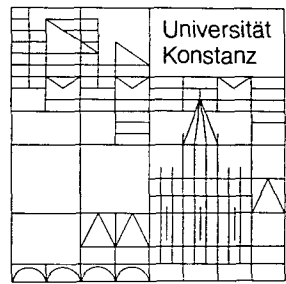
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Sonderforschungsbereich 178
„Internationalisierung der Wirtschaft“

Diskussionsbeiträge



Juristische
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**Insurance Hedging
in the Theory of the Firm**

INSURANCE HEDGING IN THE THEORY OF THE FIRM

Luc Grillet

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Insurance Hedging in the Theory of the Firm

by Luc Grillet*

ABSTRACT

This paper focuses on the costs of limited liability in the theory of the firm. Insurance may discourage the opportunistic externalization of those costs in a way that enhances optimal risk allocation for corporate stakeholders. The paper hypothesizes that insurance will enable the firm to exploit more fully the quasi-rents associated with the profitable use of its organizational capital. At a critical level of insurability, internal coordination of the insurance function by common or joint ownership might enhance the credibility of the firm's organizational capital better than market insurance would do.

1. The Risk-Aversion Short Cut

1.1. Corporate Insurance and the CAPM

Recognizing that any insurable peril can be diversified in the investor's portfolio, the seminal contributions of Main [1982, 1983] and Mayers/Smith [1982b, 1986] point out that risk

* Sonderforschungsbereich 178 "Internationalisierung der Wirtschaft", Universität Konstanz. Valuable comments of Werner F. Ebke, Günter Franke and Hartmut Picht on earlier versions of this paper are gratefully acknowledged. This paper also benefited from comments by Clifford W. Smith at the "1991 Doctoral Finance Seminar" of the Financial Management Association held on October 9 in Chicago.

aversion¹ as the traditional explanation for the corporate purchase of property and liability insurance is unsatisfactory. On the surface it would appear that, for a corporation with widely dispersed ownership, insurance of unsystematic risks will not improve the welfare of the individual security holder, because any of these specific exposures can be eliminated by holding a well-diversified portfolio without paying an insurance premium.

At actuarial odds the firm will be indifferent between insuring and not insuring. In reality, the insurance company charges huge loading fees. Apparently, this unfair-game premium would make insurance a negative NPV project for the firm.

Consider the impact of insurance within the traditional CAPM framework. Assume that we are dealing with a single time period. The risky return on firm i's market value can be written as:

$$\tilde{R}_i = \frac{\tilde{P}_1 - P_0}{P_0} , \quad (1)$$

where: P_0 = price we pay for firm i today

\tilde{P}_1 = stochastic value of firm i at the end of the period.

The Capital Asset Pricing Model (CAPM) states that

$$E(\tilde{R}_i) = R_f + [E(\tilde{R}_m) - R_f] \frac{\sigma(\tilde{R}_i, \tilde{R}_m)}{\sigma^2(\tilde{R}_m)} , \quad (2)$$

where: R_f = the risk-free rate of interest

\tilde{R}_m = the return on the market portfolio

¹ See Goldberg's [1990] interesting criticism of the risk-aversion short cut in the economic analysis of institutional structure.

$\sigma(\tilde{R}_i, \tilde{R}_m)$ = the covariance between the return on firm i
and the market return

$\sigma^2(\tilde{R}_m)$ = the variance of the market return.

Combining expressions (1) and (2) results into the following equilibrium price of firm i:

$$P_0 = \frac{E(\tilde{P}_1)}{1 + R_f + [E(\tilde{R}_m) - R_f] \frac{\sigma(\tilde{R}_i, \tilde{R}_m)}{\sigma^2(\tilde{R}_m)}} \quad (3)$$

The covariance between the return on firm i and the market return can be rewritten as

$$\sigma(\tilde{R}_i, \tilde{R}_m) = \frac{\sigma(\tilde{P}_1, \tilde{R}_m)}{P_0} \quad (4)$$

Substituting expression (4) in expression (3) yields the certainty equivalent valuation equation:

$$P_0 = \frac{E(\tilde{P}_1) - [E(\tilde{R}_m) - R_f] \frac{\sigma(\tilde{P}_1, \tilde{R}_m)}{\sigma^2(\tilde{R}_m)}}{1 + R_f} \quad (5)$$

Assuming that the firm purchases insurance I at actuarially fair odds, we may write:

$$\frac{\partial E(\tilde{P}_1)}{\partial I} = 0 \quad (6)$$

Investigating the ultimate impact of the insurance decision on the market value of the firm, we can write:

$$\frac{\partial P_0}{\partial I} = \frac{1}{1 + R_f} \left[\frac{\partial E(\tilde{P}_1)}{\partial I} - \frac{[E(\tilde{R}_m) - R_f]}{\sigma^2(\tilde{R}_m)} \frac{\partial \sigma(\tilde{P}_1, \tilde{R}_m)}{\partial I} \right] \quad (7)$$

Substituting expression (6) in equation (7) reduces the first-order conditions to

$$\frac{\partial P_c}{\partial I} = - \frac{1}{1 + R_f} \frac{[E(\tilde{R}_m) - R_f]}{\sigma^2(\tilde{R}_m)} \frac{\partial \sigma(\tilde{P}_i, \tilde{R}_m)}{\partial I} \quad (8)$$

Insurance of firm-specific perils reduces the total volatility of a firm's stock. Modern capital market theory dictates that investors will benefit from that only if they hold that stock in isolation. If they hold a well-diversified portfolio, however, the insurance purchase is not going to enhance stockholder wealth since they can achieve the elimination of unsystematic risk through diversification without paying an insurance premium². Expression (5) clearly states that buying insurance at actuarially fair odds against risks which do not correlate with the market doesn't affect the firm's valuation. Although the variance of the return on firm i will be reduced, its expected value will be the same. The premium payment would not induce a commensurate reduction in 'actual' portfolio risk, as the investor can write his own insurance policy against firm-specific perils through diversification³.

Since the loss of say a factory is a loss to the economy as a whole, this risk can never be fully diversifiable. An insurable risk can never be entirely unsystematic. As depicted in equation (8), the market value of the firm depends on the covariance of its return with the market return and insurance of

² The actual riskiness of a firm's stock is its contribution to the riskiness of a well-diversified portfolio.

³ Consider an equally weighted portfolio. It is clear that, as the number of portfolio assets becomes large, the variance term vanishes. The actual portfolio risk approaches the average covariance term and, provided that costless diversification opportunities and a large market portfolio do exist, is equal to the average portfolio beta square times the variance of the market return.

systematic risk will reduce that covariance. Main [1983] correctly argues that, if a firm cedes some of its systematic risk to an insurance company, the latter may charge an insurance premium that exceeds the actuarially fair odds by a mark-up sufficient to justify holding such a systematic risk⁴. This makes insurance of systematic risks a matter of no concern to the firm's securityholder. Insurance will lower the covariance, but the potential increase in firm value will be consumed by the insurer as risk premium for holding nondiversifiable risk⁵.

1.2. Institutionalism Criticism

In spite of this argumentation, the picture looks different. Most corporations are major purchasers of property and liability insurance, hence the CAPM fails to explain their observed insurance buying and risk management⁶ behavior.

Management is often engaged in hedging activities directed towards the reduction of unsystematic risks⁷. Main [1982, 1983]

⁴ Insurance would not reduce the market's perception of the company's cost of capital or required rate of return.

⁵ Residual insurer risk is undiversifiable since the insurer's underwriting losses are correlated with losses for the economy as a whole.

⁶ Cassidy/Constand/Corbet [1990] report positive and statistically significant cumulative abnormal returns around the announcement of an expansion or start of firm-specific risk management activities, providing evidence against the validity of the CAPM.

⁷ See, for example, Smith/Stulz [1985] and Rawls/Smithson [1990]. The observed hedging of unsystematic risk suggests that the total variance of a firm's return does affect its cost of capital. Empirical evidence confirming this suggestion can be found in Levy [1980].

and Mayers/Smith [1982a, 1982b, 1983, 1986, 1987] argue that, if corporate insurance buying affects the market value of the firm, it must do so via taxes, regulatory costs, contracting costs or the impact of financial policy on the firm's investment decision. Corporate insurance may raise the value of the firm by lowering its tax liability, increasing efficiency in the allocation of risk bearing among the firm's claimholders, providing real service efficiencies in the firm's claims administration and lowering agency costs of risky debt.

Although the market value of a firm is sensitive to casualty losses⁸, the value of the firm will not necessarily rise if these exposures are insured. The condition is that the insurance strategy raises the present value of the firm. The market value of the firm is the sum of all future expected net cash flows, discounted by the investor's required rate of return. Assuming that investors can perfectly diversify unsystematic risks, modern portfolio theory dictates that insurance should not have an effect on that discount rate. Nevertheless, the insurable risk will always contain some systematic risk, so that only part of the risk will be diversifiable. Yet, if the risk in question is a small one in a large capital market, insuring the risk will

⁸ Sprecher/Pertl [1983] provide some empirical evidence on the negative impact of large losses on stock prices. Contrary to investigations of dividend announcements, changes in accounting procedures, mergers and stock-splits, empirical evidence on casualty losses should be more robust since the nature of those events is unlikely to allow for anticipation. It is quite obvious that the market value of the firm is adversely affected by casualty losses. More important is the extent of the stock price change based on the size of the loss and the nature of the firm's claims.

only change its beta at the margin⁹. This boils down to an 'approximately' constant company cost of capital. The important message of this is that insurance will predominantly increase the value of the firm by increasing the firm's expected net cash flows¹¹. Therefore, in the presence of loadings in excess of the (small) beta risk premium of the loss, the insurance policy must either reduce the firm's contracting costs or taxes or improve its investment decisions. Insurance should then be thought of as a special case of corporate financial policy.

Mayers/Smith [1982b] argue that this provides the firm with a risk-shifting incentive for the purchase of insurance. Shifting risk to the insurance company enables an efficient allocation of risk for the firm's other claimholders. This approach is similar to the view of the firm as a contractual coalition that includes both investor and non-investor stakeholders. Note the consistency with Alchian/Demsetz [1972], who view the firm as a contractual structure that commands resources by selling promises of future returns to its claimants. In addition, Cornell/Shapiro [1987] point out that stakeholders other than investors and management play an important role in financial policy and constitute a vital link between corporate strategy and corporate finance. The higher the ratio of the customers', suppliers' and employees' claims over the firm's output, the more likely the

⁹ This is intuitively clear from equation (8).

¹¹ No loss is fully diversifiable, but the beta of a small risk in a large capital market is small. In that case the 'expected value' arguments are approximately correct. Yet, if the risk is a 'catastrophic' loss or if the capital market is small, risk aversion will again become more important as one of the factors affecting the corporate demand for insurance.

firm is going to benefit from insurance purchasing. The inclusion of additional stakeholders, in this case insurance companies, leads to new insights into the theory of finance.

This emphasizes the importance of transaction costs as determinants of corporate insurance buying. Packaging credibility, claims adjustment and pricing of liabilities in an insurance policy minimizes these transactions costs. Skogh [1989] concludes that this makes the transaction costs theory of insurance and the pooling-of-risks theory of insurance rather complementary than competitive. The former explains how insurance might reduce the contracting costs of risk-neutral agents, the latter explains how insurance might supply the risk-averse with a diversification tool. The transaction costs explanation doesn't rely on attitudes toward risk. It argues that insurance might be the best way to minimize the transaction costs of alternative institutional arrangements triggered or inflated by property and liability losses¹².

The insurance decision of corporations with widely dispersed ownership seems best understood in a framework of market imperfections and transaction costs, where the insurer is a financial intermediary counteracting these imperfections. Part of the front-end loadings of the insurance policy can be viewed as sunk or switching costs, making the insured's commitment to its relationship with his insurer more credible. The front-end loadings are in part costs of bonding and depend on the magnitu-

¹² The captive insurance phenomenon is incompatible with the risk-aversion rationale. See also Goldberg [1984, p.566]: "[Increasing bonding costs of the insurer suggest] an explanation for an apparent anomaly - the increased use of self-insurance in the face of increased uncertainty."

de of the insured peril. Regardless of whether the corporation is risk-loving, risk-neutral or risk-averse, the question is whether the purchase of commercial insurance leads to a more efficient decrease in accident costs than in the case where the corporation had performed the risk management activity itself¹³.

2. Limited Liability and Financial Distress

Woodward [1985] argues that the benefits of alienability of equity shares conferred by limited liability allows the exploitation of large investment opportunities by separating consumption, risk-bearing and production decisions. Limited liability eliminates the dependence of firm credit on shareholder wealth and reduces the transaction and information costs for risky investment projects with numerous stakeholders¹⁴. But if financial distress depresses firm value, then limited liability will protect shareholders and allow them not to be held personally liable for corporate debts when income or existing reserves are insufficient to cover those claims¹⁵.

¹³ Efficient transfer of risk to a commercial insurance carrier occurs when the latter has a comparative advantage in assessing the risk and monitoring the insured. Skogh [1991, p.65] stresses that risk-aversion doesn't change that result.

¹⁴ This emphasizes that it is not the stylized risk-aversion rationale, but the reduction of contracting costs that promotes limited liability.

¹⁵ This paper does not address the issue of personal liability of stockholders under the various theories of piercing the corporate veil, nor does it address the issue of personal liability of those who control the corporation and may be held personally liable for corporate debts under the con-

The benefits of limited liability have to be weighed against its costs. In times of financial distress, the interests of stockholders and other corporate claimants may be in conflict. Leonard/Zeckhauser [1985] point out that the limited liability¹⁶ of stockholders produces an asymmetry in payoffs around the point of bankruptcy. Management, acting on behalf of shareholders, may induce risk-preferring behavior, reflecting gambles involving a mean-sacrificing spread of outcomes.

Modigliani and Miller's [1958] famous "Proposition I" states that financing decisions do not matter in perfect markets. The overall market value of the firm (the value of all its securities) is independent of its capital structure (the mix of its securities), as long as the firm's investment decisions are taken as given. Any shift in capital structure can costlessly be duplicated or repackaged by investors on their own accounts. In practice, market imperfections are likely to make a difference, including taxes, deadweight costs of financial distress and other contracting costs. This paper sheds light on the impact of insurance policy on the firm's costs of limited liability assuming that there is a positive probability that the firm will become insolvent. The point to be made is that, if costs of financial distress depress the value of the firm, the addition of insurance contracts to the firm's nexus of contracts may lower those costs and, hence, increase its market value. The magnitude of the insurance benefit will be determined by the

trol theory of liability.

¹⁶ Limited liability separates the private from the social costs of the firm's activities.

composition of the firm's claimants.

Costs of financial distress are those costs that arise when promises to creditors are broken or honored with difficulty. Expected costs of financial distress cover the direct and indirect costs of bankruptcy, as well as the costs of financial distress without bankruptcy. Even though this distinction may be straightforward, it will prove to be particularly useful for evaluating financial distress as a determinant of corporate insurance buying. Cornell/Shapiro [1987] view the firm as a contractual coalition of both investor and non-investor stakeholders. These stakeholders possess both implicit and explicit claims. The firm's mix of those claims will be important for estimating its degree of financial distress. Consequently, stakeholder theory will play an important role in the insurance policy of the firm.

Direct costs of bankruptcy are the costs of using the legal mechanism which allows creditors to take over when the decline in the value of assets triggers a default. Trustee fees, legal fees and other third-party costs of liquidation or reorganization are claims that consume a portion of the remaining value of the firm's assets if it defaults. Indirect costs of bankruptcy reflect the difficulties¹⁷ of the firm during the bankruptcy procedure. These costs may be substantial and depend to a large extent on the nature of its assets and claims. Even short of bankruptcy, financial distress can impose substantial indirect costs on the firm, costs which arise from contracting disrup-

¹⁷ Shareholders suffer opportunity losses when corporate resources are diverted to the debt restructuring process from more productive uses.

tions¹⁸.

Increased leverage has an immediate effect on the firm's expected costs of financial distress. As a firm borrows more, the probability of default, the value of the courts' and the lawyers' claims, and the incidence of indirect costs increase. With increasing costs of financial distress, the market value of the firm will fall. The traditional writing on financial distress suggests that the optimal capital structure of the firm is reached when the marginal value of its tax shield due to additional borrowing is offset by the marginal value of its expected direct and indirect costs of financial distress¹⁹.

To see how the traditional writing on financial distress would value the impact of insurance hedging on firm value, consider the following Arrow [1964]-Debreu [1959] case. Let S be the set of a finite number of all states of nature i and B_L^U is the insolvency set of the levered uninsured firm with $S \supset B_L^U$. Assume that the Fisher separation principle holds, i.e. whatever the financing policy of the firm, the investment policy of the firm remains constant²⁰. Conditions for that property to hold are that capital markets are perfectly competitive and complete,

¹⁸ Warner [1977a] suggests that the direct costs of bankruptcy are pretty small in relation to the market value of the firm, but the indirect costs of financial distress appear to be significant (see Warner [1977b]). Altman's [1984] empirical results, though, show that both types of costs are nontrivial: prior to bankruptcy, the average ratio of direct bankruptcy costs over market value equals 6.0% and the estimate for indirect bankruptcy costs approaches 17%.

¹⁹ See Altman [1984].

²⁰ This means that the market value of $V(i)$, i.e. the present value of the after tax value of the firm if all-equity financed, is the same for all states i .

which means that maximizing firms will also maximize shareholder wealth since managerial actions will not affect the security prices of other firms and the state-space spanned by the linearly independent market securities²¹.

Suppose that the costs of insolvency in state i equal $c(i)$, with $c(i) > 0$. The value of the levered uninsured firm equals now

$$V_L^U = \sum_S P(i) V(i) + \sum_{S-B_L^U} P(i) \tau D - \sum_{B_L^U} P(i) c(i) , \quad (9)$$

where $P(i)$ denotes the present value of a monetary unit in state i , τ is the tax rate for which the additional tax paid by lenders on an extra dollar of interest equals the expected corporate tax shield on an extra dollar of interest, D is the face value of the firm's perpetual debt and $V(i)$ is the after-tax value of the unlevered firm in state i . The first term corresponds to the present value of the firm in the absence of leverage and insolvency, the second term equals the present value of the tax shield of debt financing and the last term is the present value of insolvency costs. Note that the compromise theory of the corrected version of MM's Proposition I and Miller's additional consideration of personal taxes would hold if insolvency were costless ($c=0$) or if the set of insolvency states of the levered uninsured firm were empty²². However, with costly financial distress, insurance hedging can now be analyzed.

Let B_L^I and B_L^U denote the insolvency sets of the insured and uninsured levered firms, with $B_L^I \subset B_L^U$. Assume there are no loading costs. The value of the insured levered firm equals

²¹ See, for example, Copeland/Weston [1988].

²² See Modigliani/Miller [1963] and Miller [1977].

$$V_L^I = \sum_S P(i) V(i) + \sum_{S-B_L^I} P(i) \tau D - \sum_{B_L^I} P(i) C(i) , \quad (10)$$

As a result, the increase in firm value, because of insurance, can be written as:

$$V_L^I - V_L^U = \sum_{S_L^U - B_L^I} P(i) \tau D + \sum_{B_L^U - S_L^I} P(i) C(i) . \quad (11)$$

It can easily be seen that the increase in market value of the insured firm is equal to the present value of the additional tax shield differential²³ plus the present value of the reduction in expected transaction costs of financial distress. This is the case since insurance reduces the insolvency set of the levered firm.

It should be pointed out that expression (11) is not generally correct for at least two reasons. First, MM never said that, given investment policy, the value of one firm before and after leverage remains unaffected; they talked about two firms of the same risk class. In a perfect but incomplete market, repackaging by the firm will generally upset the equilibrium. Shifting a risk to an insurance company cannot generally be undone by the investor in an incomplete market, so that state prices will change. Second, when insurance reduces the dead-weight losses of financial distress to the economy as a whole, state prices will change even in complete markets because the

²³ The more progressive the tax code, the greater the additional tax shield differential will be. Alternatively, Smith [1986] stresses this point by comparing the claim of the tax authorities with a call option on the pre-tax income of the firm (tax schedule of the firm is convex). Insurance will reduce the variability of that income and hence the value of the tax man's call option on the firm's pre-tax income will be lower.

output in the economy will be affected. The Miller-Modigliani assumption of a fixed investment policy, which implies that aggregate output is not affected by the firm's financing decision, is untenable with deadweight losses. State prices may change, but, for a small risk in a large capital market, this effect might be of second order.

Summarizing, the probability of financial distress is a positive function of the variance in the distribution of pre-tax cash-flows and, hence, firm value is a decreasing function of the expected transaction costs of financial distress. Insurance hedging will decrease those costs by providing the firm with a hedge portfolio that pays positive amounts (insurance indemnifications) when the firm would face financial distress without hedging. The probability of incurring those costs of financial distress will be lowered by shifting the financial burden associated with specific perils to the insurer. Mayers/Smith [1982b] note that insurance has a beneficial effect on financial distress as long as this gain from insurance exceeds the insurance contract's loading fees. Logically, the benefit from insurance hedging is a decreasing function of those loading costs.

3. Insurance and Corporate Stakeholders

Limited liability enables the efficient separation and specialization of function, but may also induce excessive risk taking and impose uncompensated risks on the firm's stakehol-

ders²⁴. In the absence of appropriate incentive mechanisms, the costs of limited liability are externalized and stockholders shift the risk of default to their claimants. The problem of externalized risk is reduced by the firm's incentives to insure. The corporate insurance decision is an application of the Coase (1960) Theorem with transaction costs. By adding insurance contracts to the firm's nexus of contracts in a way that internalizes the negative externality of financial distress and other uncompensated transaction inefficiencies, a widely-held corporation might improve the welfare of all its stakeholders. The insurer becomes one of the firm's contract creditors and reduces the externality under limited liability.

3.1. Voluntary Creditors

Voluntary creditors are those stakeholders who have an explicit or implicit contractual relationship with the firm. The firm as a nexus of contracts generates a variety of monitoring and free riding problems which may be triggered or widened by property and liability losses. The costs of limited liability will be lowered by the firm's incentives to insure. If no contract creditor has sufficient information about the firm's risky activities, then the market will elicit an appropriate price reaction by charging an explicit and prohibitively high risk premium and the increased uncertainty will adversely affect the firm's reputational capital. Insurance will enable the firm to

²⁴ For an excellent discussion see Easterbrook/Fischel [1985].

economize on those transaction costs²⁵.

It should be stressed that standard one-period paradigm can yield misleading results on the nature of monitoring and free riding problems in financial markets. The costs of limited liability can be greatly exaggerated in a one-period framework. In a dynamic, multiperiod context, the firm's incentives to insure will be structured by the ex ante contracted provisions of rational creditors and by reputation mechanisms²⁶.

3.1.1. Explicit Claimants

The firm's stockholders and bondholders have a comparative advantage in risk-bearing over managers, employees, customers or suppliers. As equity and debt claims are tradable and divisible, insurable risks can be largely diversified. The ability to diversify human capital claims is limited. Managers and employees have the majority of their wealth represented by the present value of expected future salaries. As such, their portfolios are largely undiversified and, as a result, they will demand insulation from or compensation for bearing additional risks, reflection from or compensation for bearing additional risks, reflection

²⁵ See Easterbrook/Fischel [1985, p.106]: "The insurer, in turn, may use its superior monitoring ability to induce the firm to internalize the costs of its risky activities."

²⁶ Easterbrook/Fischel [1985, p.106] argue that, if limited liability decreases the probability of contract fulfillment, creditors can readjust those risks by modifying the contract. The existence of first-party insurance alleviates the distributional concerns against limited liability. It should be stressed that this presumes that the insurer has a comparative advantage in assessing risks and monitoring the insured. Many risks do not exhibit favorable insurability conditions and shifting these to external insurance carriers will not necessarily be Pareto-efficient.

ting the relative uncertainty of their income stream. Allocating that risk to the equityholders and bondholders²⁷, who are relatively diversified risk bearers, increases the market value of the firm. However, the amount of risk that can be allocated to the equityholders and debtholders is limited by the capital stock of the firm. Mayers/Smith [1982b] argue that this provides the firm with a risk-shifting incentive for the purchase of insurance. Shifting risk to the insurance company enables an efficient allocation of risk for the firm's other claimholders. Kraakman [1984, p.865-866] stresses that, in the event of personal liability of managers, the benefit of fewer offenses and managerial risk shifting to a specialized monitoring intermediary should lead to a reduction in reservation prices exceeding the deterrence price paid to the insurer.

Insurance contracts can lower agency costs by reducing the likelihood of discretionary behavior when conflicts of interest arise among the contracting parties of a firm²⁸. Jensen/Meckling [1976] and Fama [1980] view the firm as a nexus of contracts, where each claimant is vying to get a piece of the economic value of the firm. When conflicts of interest within the firm affect observed corporate behavior, agency costs will be created. Shareholders and managers as well as shareholders and bondholders have divergent interests.

²⁷ Secured debtors that monitor their collateralized assets and bond trustees might signal reliable information about the firm's financial exposures to outside shareholders. This could reduce freeriding problems and lower the firm's cost of capital. For a comprehensive analysis see Levmore [1982].

²⁸ See Smith/Warner [1979], Mayers/Smith [1982b], Mayers/Smith [1987] and MacMinn [1987].

Insurance may control the manager/shareholder conflict. Mayers/Smith [1982b] point out that the source of these conflicts lies in the difference in time horizons and in the way in which management is compensated. By postponing expenditures for positive net present value projects, such as hazard-reducing investments, management tries to increase its own overall compensation. With foregone positive net present value projects, shareholder wealth will be expropriated. Shareholders will anticipate those actions and calculate the corresponding costs into the compensation package of the managers. Management has an incentive to avoid these costs and to promise that it will not engage in such activities. The insurance contract is an effective mechanism to enforce the adoption of those hazard-reducing projects. As the insurance company has a comparative advantage in monitoring the maintenance of such projects, the firm will benefit from the purchase of insurance. The monitoring of contractual obligations that are imposed on management is shifted to a credible, specialized intermediary²⁹. Insurance hedging on the part of managers has a beneficial impact on shareholder welfare if incentive compensation contracts between managers and stockholders can anticipate the extent of managerial insurance hedging. However, Campbell/Kracaw [1987] prove that, if the expected loss for the insurable risk is dependent on managerial

²⁹ Corporate law promotes the indemnification of directors and officers against litigation expenses (Easterbrook/Fischel [1991, p.98-99]). The mid-1980s crisis in the D&O insurance market, however, raises doubts about the insurer's superior risk-bearing ability. Romano [1990] found the legal uncertainty concerning extensive policy interpretation against insurers together with unfavorable economic conditions (reduced reinsurance capacity and declining interest rates) to be major causes of the market dislocations.

effort, there is an embedded moral hazard problem. This might induce management to under- or overinsure with respect to the optimal insurance coverage required by shareholders.

Insurance may solve the conflict of interest between bondholders and stockholders³⁰. The conflict between these two types of claimants results from the different nature of their claims. Debtholders hold fixed claims whereas equityholders are residual claimants. Managers, acting as the shareholders' agents, will maximize stockholder wealth. Managerial actions can induce underinvestment or asset substitution. Underinvestment occurs when management passes up positive net present value projects for which the benefits would primarily accrue to bondholders. Asset substitution is the (ex post³¹) substitution of high risk for low risk projects. The value of the fixed claims of bondholders declines, because the ex ante contracted risk/return conditions are violated by the new investment policy. Bondholders will anticipate this discretionary behavior and its corresponding bonding costs and, as a result, the debt will be priced lower or more precisely, a higher promised payment will be required for the amount borrowed.

Insurance can reduce these costs by bonding the firm's real investment decisions. Shareholder wealth can only be increased if the firm can convince potential debtholders that it will

³⁰ The insurance purchase may also aggravate the bondholder/stockholder conflict. This is particularly true in the case where managerial slack affects the materialization of the insured loss or the restrictive imposition of unflexible insurance programmes triggers incentives in an undesired direction by increasing fixed costs unnecessarily.

³¹ After the bond sale.

actually hedge after the sale of the debt. Ex post, however, it might be that insurance hedging is not in the best interest of shareholders. It might redistribute wealth from stockholders to bondholders in a way that makes the former worse off. The solution is to impose a governance structure³² that triggers the incentives for shareholders to undertake the right action.

One way to make the intended hedging policy credible is by imposing bond covenants. A restricting covenant to protect bondholders can stipulate the required purchase of insurance coverage. Smith/Warner [1979] point out that a covenant requiring the purchase of insurance protection will make the debt issue safer and cheaper. The secured debt may force the firm to alter its investment policy and insurance hedging will reduce the probability that those restrictive covenants become binding. A further point is that the bond provision can force stockholders (or managers acting as their agents) to engage in the optimal³³ amount of loss control projects.

Reputation may act as an 'implicit' contract that curtails moral hazard without writing an 'explicit' contract. John/Nachman [1985] show that this is consistent with the observation that the higher rated bonds of reputable firms carry less restrictive provisions in the bond covenants on dividend payouts or minimum investment than those of lower rated debt. Applied to an 'implicitly' required purchase of insurance, the bond market

³² For a survey of governance structures that protect bondholders from wealth expropriation, see McDaniel [1986].

³³ The 'optimal' amount of loss control projects is defined as the amount for which the marginal cost of loss control investment equals the marginal value of real investment and loss ratio improvements.

would act as a price-rating arbitrator. An unfulfilled insurance requirement would induce the bond market to revise its expectations and would elicit an appropriate price reaction. Though, if asymmetric information about the going concern value allows shareholders to squeeze arbitrage profits, part of bondholder wealth may still be expropriated. Haugen/ Senbet [1988] argue that the best solution is to internalize the cost of verification. The inclusion of simple (in this case) insurance covenants prohibits free riding. If the required amount of insurance coverage is not purchased, the covenants become binding and stockholders will bear the associated costs.

Insurance covenants should not be too restrictive. Applying the implications of Ravid's [1987] model, the covenant provisions should be designed as 'safety first' provisions. The explicit constraints should take into account the stochastic nature of the market characteristics and cost structures of the firm, especially if closely related to the insured exposure. With changed market conditions and cost structures, too restrictive insurance covenants might create incentives in an undesired direction by increasing fixed costs unnecessarily, in the worst case precipitating insolvency. If the stochastic nature of the firm's business seriously affects the relevance of the imposed insurance program, the covenants should allow for flexibility by including the appropriate contingencies.

The firm's optimal choice between these two contractual alternatives finally reflects a trade-off between the inefficiencies of rigid bond insurance covenants and the agency costs of hiring a delegated monitor.

3.1.2. Implicit Claimants

Stakeholder theory suggests that non-investor stakeholders play an important role in financial policy. Non-investor stakeholders possess both explicit and implicit claims. Explicit claims are claims such as wage contracts and product warranties, implicit claims³⁴ are claims such as a promise of continuing service to clients, timely delivery or continuing a relation with a supplier. Implicit claimants can be viewed as outside owners of organization-specific assets. Following Cornell/Shapiro [1987], the market value of all future implicit claims the firm expects to sell equals its organizational capital and the expected costs of honoring both current and future implicit claims equal its organizational liabilities. The difference between the firm's organizational capital and its organizational liabilities is called net organizational capital. Note that this approach is consistent with the concept of corporate reputation. Building and maintaining a high value of reputational capital can be seen as an ongoing capital budgeting decision. Net organizational capital, the net proceeds of the investments in reputation, accrues to the shareholders.

Cornell and Shapiro [1987] argue that to the extent that the value of the firm depends on its ability to sell implicit claims, financial distress is likely to be particularly costly, even in the absence of bankruptcy. The explanation is that in times of financial distress the prices of implicit claims will

³⁴ Implicit claims are obligations that are too complicated and state contingent to reduce to writing at a reasonable cost. Their legal enforceability is very limited.

drop, since the stakeholders involved expect reduced payouts on their implicit claims. They may even refuse to buy claims at all. Customers, suppliers and other business partners are no longer prepared to do business on the same terms. Explicit contracts might have to be written at highly inflated cost to convince stakeholders to stay in business with the firm. Shocks, such as product recalls, litigations and environmental difficulties will seriously jeopardize the value of the firm, more than the direct cash drain would indicate. The value of the firm's implicit claims will fall and the price of new explicit contracts will rise.

Stakeholder theory provides an interesting avenue for explaining the relevance of insurance hedging of financial distress. For a firm that owns a lot of implicit claims the indirect costs of financial distress are likely to be huge. This should induce the firm to choose an insurance policy that signals its intent to make payments (insurance indemnifications) on its implicit claims. The possibility of large casualty losses placing a drain on the firm's already reduced liquidity may bring about a substantial incentive for such a firm to insure. Insurance could restore the optimal allocation of resources which, in the presence of perfect marketability, would have been achieved through market forces. Since the possible externalization of the costs of limited liability varies with the ratio of the firm's implicit over explicit claims, the firm's value enhancement due to insurance should grow correspondingly.

Jarrell/Peltzman [1985] provide some empirical evidence on the impact of auto and drug recalls on the shareholder wealth of

the selling firms. They find that the drop in stockholder wealth is 12 times the size of the direct³⁵ costs of the recall. As drug companies and car manufacturers sell a lot of implicit claims, this is not a surprising result. The recalls substantially reduced the value of the firms' implicit claims and adversely affected the firm's goodwill.

By examining the market's reaction to the Chrysler Corporation's 1980 buy-back program, a thirty-day lemon insurance policy, Smithson/Thomas [1988] find that consumers do value protection against the possibility of buying a lemon car. The extent to which the benefit of decreased costs of financial distress exceeded the cost of the lemon insurance program appeared to be positively correlated with the size of the car.

Highly levered firms and/or firms with volatile income streams are likely to benefit from insurance hedging of financial distress. Insurance will act as a device of corporate financial policy directed at lowering the costs of covering the potential future cash outflows arising from implicit claims. The insurance hedge is going to be more valuable if the firm provides a lot of warranties or service agreements, produces credence goods, requires tailored service from suppliers, trains workers for firm-specific jobs or uses special labor services. The value of these firms depends heavily on growth opportunities, goodwill and intangible assets. Serious financial distress may quickly erode those organizational assets. For firms possessing a lot of net organizational capital, the announcement of a defective product or other shocks will quickly damage the perceived value of

³⁵ The costs of destroying or repairing defective products.

implicit claims across the entire firm and hence precipitate financial distress.

Insurance might hedge some of this spillover risk. The spillover exposure is likely to be severe, if the firm produces a lot of related products, sells these to the same customer basis, uses common supply and labor inputs. Firms anticipating that it will be valuable to align their interests with their implicit claimants should realize that large casualty losses might precipitate financial distress ex post. Recognizing the uncertainty of implicit stakeholders about their future payouts, ex ante insurance of these casualty losses should maximize the firm's ex post value of net organizational capital. For a firm issuing a lot of implicit claims, shocks, such as product recalls, litigations and environmental difficulties may severely inflate its indirect costs of financial distress. Hence, this paper hypothesizes that firms with high levels of net organizational capital should engage substantially more in insurance hedging, thereby signalling their commitment to make payments on implicit claims³⁶. Moreover, this paper suggests that insuring

³⁶ For firms owning a lot of implicit claims, borrowing less and sticking more to internal finance is likely to be part of the recommended strategy. Cornell/Shapiro [1987] claim that stakeholder theory explains why firms with higher amounts of net organizational capital carry lower levels of debt. In cases of financial distress, it is much harder to cash in on net organizational capital because such assets have market value only as part of a going concern. Using the degree of product line relatedness as a proxy for net organizational capital, Barton/Hill/Sundarem [1989] found some significant evidence for these stakeholder theory predictions of capital structure. This is consistent with Titman [1984], who suggests that an appropriate debt/equity choice should bond the firm's optimal liquidation policy. Presumably, there will be a tradeoff between the benefits of insurance hedging and the amount of equity financing.

large casualty losses will enable the firm to exploit more fully the quasi-rents associated with the profitable use of its specific assets. Shifting 'insurable' risks to a specialized intermediary enhances the credibility of the firm's organizational capital as a performance bond. Analogous with the seminal contribution of Klein/Crawford/Alchian [1978]: at a critical level of 'insurability', the insurer's comparative risk-bearing advantage will disappear, and the firm will have an incentive to vertically integrate into the corporate insurance function. Decreasing predictability of the insured's risks will raise the insurer's information costs. This will raise the real cost of market insurance relative to self-insurance and increase incentives for the internal coordination of corporate insurance by common or joint ownership (captives, mutuals and risk retention groups)³⁷.

3.2. Tort Creditors

Stakeholder theory should focus on the entire group of corporate claimants. Cornell and Shapiro [1987] point out that the firm's nexus of contracts includes all explicit and implicit first-party claims. The firm, however, has to tap the private interests of its activities to serve the public interest. The menu of corporate claimants also includes its tort or involuntary

³⁷ Alchian/Woodward [1987, p.111] note that restraining contracts and departures from repeated spot market transactions arise where information is costly. Very much like an ordinary firm, the insurance company is a nexus of contracts where teamwork should cut information costs at lower cost than a market-governance structure would do.

ry creditors. Limited liability and the existence of third-party (noncontract) creditors enlarges the firm's set of opportunistic cost externalization possibilities. Since limited liability separates the private from the social costs of its risky activities, the firm might undertake projects for which marginal social costs exceed marginal social benefits. Hansmann/Kraakman [1991, p.5-6] claim that a higher degree of financial leverage will exacerbate the externality, since the priority rule in bankruptcy includes secured but not tort creditors.

These costs of limited liability will be reduced by the firm's incentives to insure. The explanation is that especially the firm's explicit and implicit claimants other than investors will anticipate the adverse impact of tort liability losses on the value of their investment stakes in firm-specific assets. Insurance will enable shareholders to economize on the premiums paid to these claimants as compensation for bearing an increased probability of financial distress and hence of personal wealth expropriation in the event of mass tort litigation³⁸. Insurance will lower the opportunity cost of funds for high payouts on these claims.

The incentives to insure are, however, much weaker when the firm expects tort claims to be filed after many years of profitable and excessive risk taking. The incentives for entering risky projects for which the NPV of social costs and benefits is negative will be particularly strong, the longer it takes until

³⁸ Easterbrook/Fischel [1985, p.108] argue that liability insurance against tort claims will encourage managers and employees to make firm-specific investments of human capital.

tort costs materialize. A delayed risk of tort litigation enables the firm to spin-off its risky activities without paying for future accident claims³⁹. Schwartz [1985] argues that abolishing limited liability and imposing complete successor liability on the corporation that continues the risky activities will solve the cost externalization problem. In the event of expected liability for predecessors' torts, the successor will pay a lower price for the assets or won't buy at all. This should induce the firm to engage in the optimal amount of insurance hedging, since it cannot get rid of its tort liabilities by sale⁴⁰.

Both Cooter [1985] and Schwartz [1985] argue that liability should not be extended to remote risks, i.e. risks whose full extent a cost-justified research program would not have revealed and whose materialization could not have been prevented by an accurate warning. The courts should investigate negligence on the basis of the reasonably available information at the time the firm started its risky activity. It is precisely the wrong practise of assessing negligence with ex post information together with extensive policy interpretation against insurers that reduced the firm's incentives to insure, stimulated liability evasion strategies and induced insurers to withdraw from unpredictable market segments. Capping liability on the basis of

³⁹ The subsidiarization of risky activities in the face of liability for large-scale, long-term hazards is empirically documented in Ringleb/Wiggins [1990].

⁴⁰ See Schwartz [1985, p.716]: "It is better for the risk to be borne by successors who can protect themselves by contract than by tort victims who cannot."

ex ante information⁴¹, however, will benefit both the demand for and the supply of liability insurance.

Conclusion

The insurance decision of a corporation with widely-held ownership cannot be reconciled with the CAPM framework, but should be related to transaction costs. The costs of limited liability in the theory of the firm may be greatly exaggerated using the standard one-period paradigm. The cost externalization problem will be greatly reduced by the firm's incentives to insure. Incentives to insure will be triggered by the ex ante contracted provisions of rational stakeholders and by reputation mechanisms.

Insurance will enable the firm to more fully exploit the quasi-rents associated with the profitable use of its organizational capital. At a critical level of insurability, however, the insurer's comparative risk-bearing advantage will disappear, and the firm will have an incentive to internally coordinate the insurance function by common or joint ownership. With decreasing predictability of risks and rising monitoring costs, the insurer faces an increased probability of being deprived of his own quasi-rents associated with the profitable use of his specific information-producing resources. This will induce the insurer to charge skyrocketing premiums and impose restrictive contractual

⁴¹ The level of risk control achieved through insurance and risk prevention would be more optimal if tort standards were enforced using ex ante measures of harm.

provisions, or in the worst case, to withdraw from the market.

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