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MANDATORY INSURANCE: TRANSACTION COSTS ANALYSIS OF INSURANCE

Göran Skogh
Department of Management and Economics, Linköping University

Abstract

The pooling-of-risks theory of insurance has proven to be most useful and is widely applied in law and economics. Nevertheless, the theory has important limitations. This article reviews the established approach to insurance and liability. However, the focus is on law and economics aspects of property and liability insurance, which the standard risk-aversion theory fails to explain. An institutional theory of financial intermediation clarifies the services supplied by the insurance firm. Besides risk-aversion, transaction costs in trade explain a demand for insurance. Mandatory requirements and insurance as a private alternative to public justice are other reasons for an insurance demand.
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1. Transaction Costs Analysis of Insurance

The basic pooling-of-risks theory of insurance assumes: (i) expected utility-maximizing, risk-averse individuals with positive but decreasing utility of wealth; (ii) risk given by nature with known loss distribution; and (iii) no transaction costs. Under these conditions insurance is mutually beneficial for a risk-adverse individual and a risk-neutral (fully diversified) insurer. This theory was first formulated by Arrow (1965) and Pratt (1964). Recommended reading on the foundation of insurance economics is Dionne and Harrington (1992). The theory of insurance has proven to be most useful and is widely applied. In law and economics it is applied in most fields where risk is analyzed, see for example, Chapters 4200, 4600, 4700, 5600, 5700 and 7700.

Nevertheless, the theory has important limitations. First of all, it does not explain why there *is* an insurance industry. Following the assumptions of the basic model, insurance contracts can be traded as lotteries, or as an option on the financial market - that is, insurance will be available *without* an insurance industry. Moreover, besides risk aversion, there are other reasons for a trade of risks to insurers that remain unexplained by the theory.

In this article we will review briefly the established approach to insurance and liability. Our main focus, however, will be on the law and economics aspect of property and liability insurance, which the standard-risk-aversion -pooling-of-risks theory fails to explain.

A crucial difference between the standard insurance model and the transaction costs, or institutional, approach applied here and in other fields of law and economics is the treatment of information, see Chapters 0520, 0530 and 0740. The standard insurance theory assumes that the probability distribution is (subjectively) known by both insurer and insured (or by the insured at moral hazard and adverse selection). The transaction costs theory presumes bounded rationality (Chapter 0710) and analyses comparative advantages in producing and distributing information - that is, the insurance firm exists and makes a profit because it possesses an informational advantage not accessible to others, policyholders included. The advantage explains the existence of specialized insurers, contractual forms and the supply of private (and public) legal services. The institutional theory has been applied to various industries, but seldom to the insurance business.

First, we present an institutional theory of financial intermediation that clarifies the services supplied by insurance firms. Then, we study the demand for insurance. Risk aversion is first examined. The second major reason for insurance demand - transaction costs in trade - is subsequently analyzed. Mandatory insurance and insurance as a private alternative to public justice are examined in separate sections. Concluding remarks end the article.

A. Intermediation and the Supply of Insurance

2. Credit Risks

Insurance firms are specialized in areas pertaining to fire, storm, health and life. The structure of the industry appears to be virtually the same throughout the capitalistic world - that is, it appears to be independent of national customs or regulations. If this is so, how can the specialization of the industry be explained? An answer may be found in the institutional economics of financial intermediation. The theory was first applied to banks by Benson and Smith (1976) and Leland and Pyle (1977), who raised another fundamental question: why do lenders and borrowers transact via costly intermediaries such as banks, instead of trading directly with each other?

Their answer is based on a presumption that hidden and unspecified, information exists - that is, that the borrower, as well as others, may be privy to some information about the borrower's ability and willingness to pay back that is not freely available to the lender. The lender, in turn, demands this

information in order to avoid credit risk. A firm may specialize in supplying such credit risk information. Such firms may either act as consultants or as intermediaries. As intermediary, the firm borrows and re-lends. The credit risk is, thus, assumed by the firm.

The reason for the firm to accept to become the residual claimant is due to the fact that traded information may easily become public. On the other hand, information collected and experienced is, at least partly, private or 'transaction specific' and, hence, not marketable (see Williamson, 1979). Thus, a consulting firm selling information may not be able to appropriate enough of the value of the information to cover the costs of information acquisition. It may choose to keep the information secret and instead of selling it, search for profit through the choice of borrowers. The profit of the intermediary depends directly on the private and hidden information available only to the residual claimant. The firm, therefore, has an incentive to utilize economies of scale and scope and to invest in information that is profitable because of its hidden character. The value of specific information explains why we observe banks specialized in households, agriculture, shipping, and so on. This theory of the firm rests on the seminal work of Coase (1937), Alchian and Demsetz (1972), Fama (1990) and others (see Chapter 5610).

3. Property and Liability Insurance

The same approach has been be applied to insurance by Skogh (1991). The insurer is a risk-carrier, as is the bank. The profit depends directly on information about the risk, the terms of the contract, the claims and the portfolio of assets and liabilities. To glean most of the value from information, it is helpful (i) to accept being the residual claimant; (ii) to keep information secret; and (iii) to monitor the policyholder.

The insurance industry specializes in writing contracts on insurable risks such as potential losses due to fires, storms, traffic accidents and third-party liability. A general characteristic of insurable exposures is that a large number of specific risky events may arise, but the probability that a specific event will occur is very low. Low probabilities may provide a specialized insurance firm with a comparative advantage in writing contracts and in dealing with accidents that have occurred. The insurer obtains information on damages, the impact of safety devices, deductibles and co-insurance and the costs of various claim settlement procedures. In a competitive market, insurers offer different policies at premiums that vary with actuarially expected costs and a loading due to administrative costs. An important property of the insurance contract is that it gives the insurer latitude to adjust or withhold claims in accordance with contractual provisions. A number of empirical studies show that the minimum

efficient scale in handling the insurable risks is relatively large (see, for example, Allen, 1974; Cummins, 1977; Skogh, 1982).

Accident risks involving water, storm, traffic and fire have much in common and claims-adjustment procedures for such risks are similar. The common features in both acquisition and claim adjustments are important sources of economies of scope. For the buyer, it is often advantageous to transact a whole bundle of contingencies to the insurer through the purchase of a single property and liability policy. Hence, it is not surprising that these risks are covered by the same insurer. Banks, on the other hand, specialize in credit risks or 'business risks' that are related to the activities of the borrower. Such risks are usually not covered by property and liability insurance.

In sum, the institutional approach presents a rationale for the insurance industry: the insurance firm is there because it has specific information about the risks in question. The success of the insurance firm depends on the organizational and informational advantages accrued and, of course, on the fact that the insurer is trustworthy (see Hägg, 1994). Therefore, the insurer must have a sufficiently large and diversified portfolio of assets and liabilities to be able to cover potential claims. The size of the immediate pool, however, is not decisive as re-insurance and financial markets are available.

B. Demand of Insurance

4. Risk Aversion

There are several reasons for individuals and other economic agents to trade risks to trustworthy, specialized insurers. The most thoroughly analyzed reason for insurance demand is risk aversion. Risk-averse individuals faced with potential losses are willing, first of all, to pay for the coverage of large losses. If expected accident costs as well as administrative costs are included in the premium, the policyholder prefers a deductible (see Arrow, 1974). If the premium is equal to the expected actuarial cost of compensation, the risk-averse policyholder prefers full insurance coverage.

Note that liability is transferred to the insurer through the insurance contract. The policyholder's incentive to take care is thereby reduced, which may increase the accident risk. In other words, accident insurance may cause a moral hazard. The insurer, however, is specialized in handling the risk in question. If the insurer is: (i) informed about the preventive measures available to the potential injurer; and (ii) able to monitor the behavior of the injurer (through the premium and the conditions of the policy, as well as through the claims settlement), the moral hazard problem may be mitigated. In addition, if the moral hazard remains, there is the option of a deductible; partial insurance

increases the level of care and is preferred as a second best when the insurer cannot control the policyholder.

In the law and economics model of liability rules it is usually assumed that the liable party is risk-neutral. In case of risk aversion it is assumed that the risk can be insured. At insurance, the efficiency of the liability rule depends on the insurer's ability to mitigate moral hazard. Two extremes are analyzed: first, the case where the insurer is perfectly informed; and, second, the case where the insurer is unable to control the moral hazard. For an introduction to the economics of tort liability and insurance, see Shavell (1987), Becker and Ehrlich (1972) and Hansson and Skogh (1987). Moral hazard in various branches is examined in Landes (1982), Bruce (1984), Danzon (1984), Chamberlin (1985), Frech (1988), Deere (1989), Rottenberg (1990), Cummins and Weiss (1991), Danzon (1990), Devlin (1990), Viscusi (1993), Sloan, Reilly and Schenzler (1995).

Adverse selection is another difficulty thoroughly analyzed in the insurance literature. This problem may arise when the policyholder has some hidden information that is not in the possession of the insurer. Assume, for illustrative purposes, that there are two types of policyholders according to the insurer's point of view: 'good' risks and 'bad' risks. The insurer cannot distinguish between them and the policyholders do not reveal their nature - both maintain that they are good risks. In that case the market may break down. The logic is as follows: initially, the insurer charges the same premium for the two. The premium is based on the average actuarially expected costs. Insurance will then be a good affair for the bad risk and a relatively poor affair for the good risk. Consequently, many bad risks and few good risks will purchase insurance and the insurer will incur a loss on average. It will, then, be necessary to increase the premium the next round, thus discouraging good risks, attracting bad risks and precipitating a new loss. The cycle will repeat itself. In the end there may be no market left (see Rothschild and Stiglitz, 1976; Gravelle, 1991).

Consequently, the insurance industry must solve the adverse selection problem in order to survive (see, for example, Borenstein, 1989). Apparently, they have been successful in many fields of insurance. Again, the reason may be that the insurer is relatively well-informed because of specialization. Details such as risk of fire in wooden houses versus stone houses, risk reduction through the use of sprinklers, death rates in traffic accidents involving various types of cars, and so on, are known by insurers. Of course, some information will always be concealed by the policyholders, but that does not seem to be decisive in well-established branches of insurance.

Many risks are not insurable. One reason for this is that the risk may be new and inexperienced by the insurance industry and the premiums not calculable. In such cases, risk-sharing in mutual pools may serve as an alternative (compare Skogh, 1997). Moral hazard and adverse selection may also cause uninsurability. Furthermore, the potential loss may be very large or uncertain.

Uninsurability may prevail at large environmental and catastrophic risks. For the study of the uninsurability problem and catastrophic risks (see Kunreuther, 1987, 1996 and Katzman, 1988).

Another important problem related to liability and insurance is that courts may increase compensation when the liable party is insured. This 'deep pocket' phenomenon, together with high defense costs in courts, caused a serious 'insurance crisis' in the late 1980s, especially in the US (see Priest, 1985, 1988, 1996; O'Driscoll, 1987; Trebilcock, 1987; Wade, 1987; Lacey, 1988; Winter, 1991; Viscusi, 1991; Strasser and Rodosevich, 1993 and Lamb, 1995; see also Chapters 5140 and 2300).

5. Transaction Costs

Insurance at Risk Neutrality

Risk aversion certainly explains a significant part, but not all of insurance demand. In the literature on risk management it is often argued that large profit-maximizing firms should self-insure losses in order to avoid the loading costs of insurance. Smith and Warner (1979), Mayers and Smith (1981, 1982, 1987) and Main (1982, 1983) note that individuals in frictionless capital markets would adjust their portfolios so that there would be no demand for a resource-consuming insurance industry. They also state that with well-functioning capital markets, insurers would have no obvious comparative advantage over corporate firms in diversifying risks. However, property and liability of relatively low value are often insured. Individuals also tend to 'over-insure'. Given the loading charges, one would expect less insurance and larger deductibles than observed (see Friedman, 1974; Pashigian, Schkade and Menefee, 1966 and Stuart, 1983). Mandatory insurance is another phenomenon not explained by risk-averse policyholders. This is difficult to understand as pure risk-pooling is also the purchase of insurance policies to cover the replacement of buildings when replacement costs exceed expected flows of future returns (see Doherty, 1985, p. 277).

Insurance purchases by widely-held corporate (risk-neutral) firms may be motivated by: low-cost claims administration services provided by insurers, assistance by insurers in assessing the value of safety and maintenance projects, improvements in the incentives to undertake investments in safety and maintenance projects and a reduction in the firm's expected tax liability (see Mayers and Smith, 1987). The services offered by insurers can be explained in part by the information advantages of the insurer. The explanation is incomplete, however. Why does this industry act as risk-taker and not as consultant? A partial answer may be found above: transaction-specific information makes it profitable to the insurer to carry the risk. The insurer has

a comparative advantage in carrying the risk, given that the insurer is able to monitor the policyholder and is solvent enough to carry potential losses.

Guarantees

Note that the property and liability insurance market is a market where liability is traded to an insurer. One situation where such a trade may appear profitable is when traders do not trust each other and require some form of security. Here, insurance functions as a guarantee.

Assume again, for illustrative purposes, that two traders, A and B, are to contract on a risky project. They expect the project to become mutually beneficial, but are concerned about liabilities at a potential loss. Both parties are risk-neutral. A, being the 'least-cost avoider', is willing to accept the liability, but the assets that can be collected from A are limited. Hence, there is a limit of liability and a problem of moral hazard. The cost to collect may also be high. Moreover, A and B are strangers who do not expect to trade with each other again. Therefore, A would have limited incentive to take care and to compensate B *ex post.* The parties may, therefore, end up with a project of low value, or with no contract at all.

A way out of the dilemma may be for A to offer a pledge or collateral or, if such security is not available, a guarantee. Collateral may not only increase the collectable amount but also the probability that a given amount can be collected. A guarantee transfers risk to an external risk-carrier, the guarantor. The guarantee is valuable to the extent it ensures payment. It functions as a collateral, given that the guarantor is credible and has sufficient funds to cover the loss. Moreover, to accept the risk at a relatively low price, the guarantor must be in possession of some comparative advantage as risk-carrier. One advantage may be that the guarantor is able to collect more from A than B can, perhaps because the guarantor has had a longer-lasting relationship with A than B has had. The guarantor may also be able to control the behavior of A because of some specific information about A. The guarantor may be a bank, a relative, or a business partner who knows A rather well.

In sum, a guarantee increases the value of the initial trade if the guarantor has: (i) assets enough to cover potential claims; and (ii) a comparative advantage in monitoring the liable party. Note that the argument for a guarantee is similar to the argument for vicarious liability in tort law (see Sykes, 1984; Shavell, 1986; Chapter 3400); that is, a 'judgment-proof' problem arises when a party that has become legally liable is unable to fully pay the claim. Someone else - for instance, an employer - may then be held vicariously liable. This situation may be efficiency-increasing because the employer is able to observe the employee continuously and has the power to reward or dismiss the employee. Parents are often liable for damages caused by their children for the same reason. Similarly, professional associations and branch organizations

with the power to control membership may be willing to guarantee the services of their members.

An insurance contract in which A or B pays a premium and the insurer compensates losses at certain specified contingencies is equivalent to a guarantee. In a 'perfect' world in which the insurer knows the marginal impact of the control, the insurer can steer A's behavior toward optimal care by stipulating conditions in the policy and by varying premiums.

As noted above, the insurer specializes in specific risks such as fire, heath, and so on and covers normally only such risks. Insurance is, therefore, a complement to other guarantees. Assume, for instance, that a shipper is willing to accept liability for property damages during transportation, but that the buyer of the service, a manufacturer, questions the credibility of the shipper and requires some form of security. For the sake of simplicity, suppose there are two options: a bank that issues a guarantee and a transport insurance. Which would be preferred? The (solvent) insurer with long experience of transport damages has a comparative advantage in the coverage of transport risks. Similarly, the bank with substantial reserves and experience in the evaluation of credit risks possess a comparative advantage in insuring risks of bankruptcy. Consequently, the manufacturer may require both a guarantee from the bank in case of bankruptcy of the shipper and transportation insurance.

The literature on the insurer as guarantor and monitor is most limited (see Smith and Warner, 1979; Kunzman, 1985; Katzman, 1987; Holderness, 1990; Endres and Schwarze, 1991; Skogh, 1991).

Contracting

Another important reason for transferring liability to an insurer is that it reduces contracting costs (see Skogh, 1989b); that is, contracting parties realize that a complete contingent claim contract regulating all possible outcomes is unfeasible because of the costs of identifying all events, negotiating, pricing, documenting that contracted liabilities have occurred and enforcing the contract. Contingencies that are too costly to regulate contractually may, therefore, be insured.

Assume that the above manufacturer and shipper enter into a contract for the transport of the manufacturer's machinery. Their contract specifies the price and date of delivery, as well as some other basic details. However, the contract does not cover contingencies such as fire, storm and explosion risks, because the traders possess too little knowledge of these risks to be able to price liability and precautions and because the liable party may not be financially able to fulfill the agreement if a serious accident occurs. Instead, they add a clause stating that the cargo must be insured during transportation. Accordingly, a whole package of contingencies is transferred to an insurer.

An insurance policy contains a list of restrictions and limitations that specify the liabilities of the insurer and the involved parties. For instance, a

shipping policy may state explicitly that the insurer is liable except when the shipped goods are improperly packed, which would make the packing firm liable, or when the shipper is negligent, which would make the shipper liable. Hence, the services of the insurance industry include writing, pricing and enforcing liabilities as defined in the insurance policy.

Suppose a risk management expert specializing in low-probability events were to offer advice to the parties about how to draw up a contract and assistance with safety projects and claim adjustments. Because of the low probability of each specific event, the credibility of information is low. Consequently, information about the value of the risk-manager's advice is unreliable. This implies that there is a principal-agent problem whereby risk managers may shirk their duty. Of course, the principal-agent problem might be reduced by transferring the risk to the risk manager, who would then also receive an *ex ante* payment covering expected claims and administrative costs. Such a contract that renders the risk manager the residual claimant is in essence an insurance contract.

Qualitative evidence supports the view that transaction costs are a central motive for insurance. Contractual clauses frequently require guarantees and/or insurance. Shipping contracts and standard loan contracts normally include a clause requiring that property and liability are insured. The same is true of rental and lease contracts. Covenants, which require that the issuing corporation purchase insurance, are commonly attached to bonds. Insurance clauses have a long tradition in the construction industry (see Bunni, 1986). Franchisers often require explicitly that franchisees are insured. These requirements appear to be independent of whether the insured party is risk-averse or not - insurance is universally required to reduce costs related to contracts, trust and control.

C. Mandatory Insurance - Insurance and Public Justice

6. Mandatory Insurance

Insurance is often a mandatory requirement for permission to run a business, transport goods, drive a car, employ personnel, and so on. The reason for the obligation to insure may differ depending on whether the involved parties are contractors or not. In the case of the contractor, the obligation to insure may be part of a standard contract or a result of collective bargaining. Examples are 'free on board' or 'costs, insurance and freight' clauses in transportation contracts. Such contractual agreements or trade customs may, of course, be codified by law.

Insurance may also be required as a guarantee on behalf of potential victims. The victim, the victim's first-party insurance, or the public may need

to cover losses if the injurer does not pay. Moreover, if the injurer's liability is limited, inefficient (too little) care results. Mandatory insurance, therefore, contributes to efficiency to the extent that the insurer compensates the victim and monitors the behavior of the injurer. That explains why traffic, health and environmental insurance, for instance, are often mandatory requirements.

An insurance may not only simplify contracts between two trading parties. The insurance may also simplify contracts or relations with other parties. Assume, for illustrative purposes, that the owner of an apartment complex, A, borrows from a bank, B, with the property as collateral. To guarantee the value of the collateral, the bank requires property insurance. This policy will serve to simplify the landlord's contracts with tenants C, D, E, and so on. Without the policy, it would be costly to agree on liability at fire, water damage and so on; and if the parties neither contract on the risks nor insure, the potential for conflicts *ex post* of accidents is augmented. Such conflicts may be burdensome, not only to the landlord and tenants, but also to the public authorities. A mandatory property and liability insurance requirement for apartment complex owners may, therefore, eliminate a number of complicated bargainings.

The contracting cost motive for insurance also provides an explanation for the observed purchases of (mandatory) insurance that cover the replacement of factories when replacement costs exceed the expected flows of future returns (see Doherty, 1985). In a world with no contracting and enforcement costs, the owner(s) would sign complete contingent claim contracts with bondholders, workers, customers and suppliers. Because of moving costs and firm-specific capital, these contracts would include payments to workers (damages) in the event of factory closure. Confronted with a replacement decision, the firm would then have to compare the expected return from replacement with the damages paid if no replacement were made. If damages were sufficiently high, replacement would be optimal even if the investment cost exceeded the expected flow of future returns. In reality, of course, comprehensive contracts are costly. An alternative contracting technique that can lead to the same outcome as under a comprehensive contract is for the firm to purchase replacement insurance. The insurance policy reduces contracting costs and enforcement problems that would arise through potential conflicts between shareholders who have no incentive to reinvest in a new factory and other claimholders.

Public insurance is also mandatory. One argument for public insurance is the adverse selection problem mentioned above - that is, if bad as well as good risks are forced to pay a premium (tax), all can be insured, which may be preferable as compared to a situation where no one is insured. A second reason for the state to insure the population through mandatory premiums (taxes) is the need of a large pool. Thirdly, the state may cover highly uncertain events that the insurance industry does not insure (see Skogh, 1998; Chapter 6100).

7. Insurance and Public Justice

Risks in trade must not necessarily be regulated by contract or by insurance. They may in some cases be simply ignored. On the other hand, if such an unregulated risk does occur, the liability must be settled *ex post*, for example, by a public court or by arbitration. Hence, *ex post* litigation is an alternative to insurance. Dispute settlement is costly, however and sometimes not feasible. Property or liability insurance may thus be preferred to public justice.

Insurance may also be an substitute for, or complement to, repeated dealings - that is, if there are no long-term relationships that foster loyalty and provide solutions to conflict, the parties may demand insurance.

Aviation insurance may serve as an interesting, albeit scientifically unexplored, example. The aviation industry began its international operations after the First World War. At that time there were few trade customs or conventions regulating the liability of carriers and passengers in the air. Crashes and emergency landings were frequent. Today, an advanced system of safety regulations and liability prevails. Reliance on public litigation, however, still appears inferior to private solutions, especially in the case of accidents where the victims are from many different nations. Settlements are normally made out of court. The solution of the liability matter has been to insure all parties including aircraft, pilots, customers, cargo and airports. A remaining problem is that third parties who are on the ground are not covered by insurance. Nilsson (1982) suggests, therefore, that this group should also be covered by insurance. Most liability is hereby transferred to the insurance industry. *Ex post* of an accident, the insurers interpret the policies and settle the sharing of accident costs among the insurers. A reason why these private liability systems work may be that the insurers are involved in repeated dealings.

Another example of the development of liability by traders and their insurers is the liability of accountants in Sweden (see Skogh, 1989a). The professional liability is covered by mandatory insurance. The insurance policies, negotiated by the accountants' associations (that act as agents for their members) and the insurers, specify the liability of the profession. The liability is mainly interpreted at claims settlements by boards established by the industry, where the insurers and the agents bargain on the liability standards of the profession. Some disputes are settled in public courts, but the courts usually defer to 'good practice', which - to a large extent - is developed in the bargaining interplay between the insurers and the associations of accountants.

8. Concluding Remarks

The risk-aversion-pooling-of-risks theory is applied to most areas of law and economics. Yet, large segments of the insurance business are related to property law and liability law in a way that cannot be explained by risk aversion and pooling. Besides risk aversion, insurance is demanded because of problems of enforcement and the costs of contracting. These sources of demand are complementary rather than competitive; insurance both eliminates risk by pooling and reduces transaction costs. The combined risk-aversion and transaction costs demand explain why a major part of all insurable liability is covered by insurance. Because most publicly settled liability is transacted to insurers, it is of importance to analyze the functioning of the insurance industry to understand the effects of liability laws. The availability of insurance and the monitoring of the industry is especially important at new and/or very large losses, such as nuclear accidents, chemical accidents, products liability, hazardous waste, and so on. Only a fraction of the damage may be covered by the assets of the liable party, guarantors and insurers. Therefore, liability may be strongly limited and inefficient in practice, although it is strict and unlimited formally (Chapter 2300). Thus, it is important that research be conducted on the insurance industry, its contracts and performance.

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