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ABSTRACT

The choice of insurance distribution system is examined from a transaction cost analysis perspective. Under independent agency, the agent's ownership of the customer list gives that agent incentives to perform some activities that would be more costly under a more vertically-integrated system. It is argued that independent agency offers advantages to insurers when products are complex, underlying uncertainty is higher, or relationship-specific investments are less important. This hypothesis is tested using 1990 accounting data from a sample of 149 insurance groups.

INTRODUCTION

The coexistence of alternative distribution systems for property-liability insurance continues to attract the attention of researchers, despite evidence that independent agency insurers have higher costs. Previous empirical studies have shown that independent agency insurers have higher expense margins than exclusive dealing insurers (Joskow, 1973; Cummins and VanDerhei, 1979; Barrese and Nelson, 1992; Regan, 1993) and thus may be considered less efficient in delivering products to consumers. Critics of these studies argue that the higher expense margin reflects the fact that independent agents offer more service to consumers. However, other studies using traditional measures of service have failed to support this position, at least in personal lines (Cummins and Weisbart, 1977; Doerpinghaus, 1991). Since the market is seemingly competitive, this leaves an open question as to how independent agency insurers have continued to survive despite the expense ratio disadvantage.

Although independent agency insurers have been losing market share, most notably in personal auto insurance, they continue to survive despite higher expense

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margins, and in fact dominate the market in commercial lines. In 1994, independent agency insurers had 52 percent of the total market and 72 percent of the commercial insurance market, but just 32 percent of the private passenger auto market. This systematic relationship between distribution system and market shares across lines suggests that independent agency insurers offer advantages for some lines that have not been captured by traditional measures of service. This is the hypothesis explored in this article.

Transaction cost analysis provides the framework for the study.¹ Transaction cost analysis is concerned with determining the optimal organizational form for a particular transaction, where organizations range from spot markets to completely vertically-integrated firms. Transaction cost analysis recognizes that, in addition to production costs, transaction costs are incurred in any exchange relationship.² Under this theory, the optimal organizational form is one that minimizes the sum of production and transaction costs. Transaction costs vary with the level of complexity and uncertainty surrounding the transaction and the presence of relationship-specific investments. The main argument of the theory is that, because contracts are necessarily incomplete, trading partners may be subject to opportunism when specific investments are made in support of the trading relationship. Vertical integration reduces the transaction costs that might arise when a firm makes investments in relationship-specific assets. Then, vertical integration can increase production efficiencies by safeguarding investments in specialized assets.

However, because vertical integration also changes the incentives of the trading partners, the cost of vertical integration must be weighed against the gains in production efficiency. The principal cost of vertical integration of the distribution system is the change in incentives of the downstream trading partner that accompanies the integration decision. That is, an agent in a more integrated firm does not have the same profit maximizing incentives that an autonomous agent has. This study argues that, when uncertainty or complexity are higher, it might be more important to preserve the profit maximizing incentives that prevail in the less integrated firm.

The choice of insurance distribution system is a choice about the degree of vertical integration of the firm. While most property-liability insurers distribute their products through either exclusive or independent agents, distribution methods range from the use of direct marketing, where no sales person is involved, to brokerage, where the sales agent represents the client's interest rather than the insurer's. Independent agents (and brokers) own the rights to the expirations of the policies they place with insurers. This means that the insurer may not solicit the client of an independent agent directly or unilaterally assign the client list to another agent. In contrast, exclusive dealing insurers, distributing through autonomous agents, employees, or direct marketing, own the rights to the customer lists. The sales representative does not have an ownership interest in the list and, if ter-

¹ Although first posited by Coase in 1937, transaction cost analysis was formalized principally by Williamson (1979, 1985), who summarizes the foundations of the theory.

² Transaction costs include costs associated with designing and enforcing contracts, information costs, costs that arise from a change in incentives, and costs of monitoring trading partners.

minated, may not move the clients to another insurer. Because of insurer ownership of the client list and attendant rights to control the residual profits, exclusive dealing insurers are more vertically integrated than independent agency insurers.³

Several articles have examined the choice of insurance distribution system from an incomplete contracting perspective. The use of exclusive dealing in insurance has been explained as a method to prevent agent free-riding on insurer advertising investments (Marvel, 1982; Grossman and Hart, 1986). Sass and Gisser (1989) demonstrate that exclusive dealing minimizes the costs of inducing the optimal level of agent sales effort, as long as exclusive dealing insurers are large enough to offer sufficient income potential to agents. Regan and Tennyson (1996) add the additional insight that agents may participate in information gathering to aid in risk assessment. The common thread across these studies is that they predict that independent agency and exclusive dealing insurers will optimally serve different markets.

The current study adds to the existing literature by examining additional dimensions of the distribution system choice within a broader theoretical framework. The tradeoffs between the transaction cost advantages of vertical integration and the incentive advantages of independent agency are examined. In particular, it is argued that, under independent agency, the ownership of the expirations list allows the agent to capture the residual gains from profitable trades and provides incentives to undertake activities that are valuable for some transactions. Under exclusive dealing, however, the returns to the agent from performing these services are lower because the agent does not participate in the residual profits and does not have access to multiple insurers. This article argues that the independent agency distribution system offers advantages when agent participation in risk assessment is more important, or when uncertainty is higher. When relationship-specific investments are more important, exclusive dealing should be used.

The next section discusses transaction cost analysis and its application to the property-liability insurance industry. Testable implications are derived. Then, I discuss the empirical estimation. The tests are carried out using 1990 accounting data for 149 insurance organizations. The results confirm that the independent agency distribution system is more likely when asset specificity is lower, insurance products are more complex, and the trading environment is subject to higher levels of uncertainty. Exclusive dealing insurers are larger, invest more in advertising, and are more specialized across lines.

THE TRANSACTION-COST FRAMEWORK

For the purpose of determining the optimal organizational form, transactions are characterized on the following dimensions: frequency of exchange, complexity of the contracting environment, exogenous uncertainty in the underlying environment, and the importance of relationship-specific investments that cannot be trans-

³ The distribution system choice is between exclusive dealing and independent agency. Therefore, throughout this article, independent agency encompasses both independent agency and brokerage, and all exclusive dealing arrangements are referred to as exclusive dealers.

ferred to other uses without a loss in value. These relationship-specific investments include investments in physical capital and brand name capital and are made with the expectation that initial costs will be recovered some time in the future.⁴ This requires that the trading relationship be maintained and raises the possibility that quasi rents will be opportunistically expropriated by one of the trading partners.⁵

The advantages of vertical integration are that the integrated firm can prevent free-riding on its investments in specialized assets (Klein, Crawford, and Alchian, 1978; Masten, 1984), has access to more information upon which to base payoffs (Crocker, 1983), and increases incentive compatibility among trading partners (Williamson, 1985; Heide and John, 1988). In addition, the vertically-integrated firm is better able to adapt to changes in the trading environment because contracts do not have to be renegotiated to conform to new conditions.

Of course, there are also costs associated with imposing restrictions on market exchange. Bureaucratic costs are likely to be higher in a more vertically-integrated firm because it is more difficult to control a larger number of functions, holding resources constant. A more important consideration for this analysis is the cost associated with the change in incentives facing trading partners. An autonomous downstream decision-maker has incentives to undertake activities that maximize expected utility (or profits). This agent has complete control in deciding how best to accomplish this goal and is rewarded through capturing the gains from effort. If this agent becomes part of a vertically-integrated firm and does not fully capture the gains from effort, incentives to exert effort will be reduced. Thus, there will be distortions to the behavior of agents under a vertically-integrated regime.

However, for some transactions, it may not be important to maintain the incentives which would prevail in the absence of vertical integration. Recognizing that vertical integration imposes costs as well as confers benefits, the firm analyzes the characteristics of the transaction and chooses the optimal level of vertical integration—that which minimizes the sum of transaction and production costs. Accordingly, alternative organizational forms will optimally govern different types of transactions.

In the property-liability industry, this implies that both exclusive dealing and independent agency insurers will coexist, but they will specialize in segments of the market for which the respective organizational form is optimal. Predictions

⁴ Site specificity, which arises when buyers and sellers must be in close proximity, and dedicated assets, where capacity is reserved for a particular buyer, are transaction-specific investments that have been analyzed by other researchers (see, for example, Joskow, 1985), but these are not relevant for the property-liability industry. Also, although investments in human assets are important for this industry, the data set used in this study does not allow any tests of the importance of these investments across insurers.

⁵ Quasi rents are defined by Klein, Crawford, and Alchian (1978) as the difference between the value of the asset in the current use and its value in the next best use. To recover the costs of the transaction-specific investments, future revenues must exceed future variable costs. It is this difference which is the appropriable quasi rent.

about which organizational form will be preferred for which types of transactions are derived by examining the dimensions of transactions indicated by the theory.

Relationship-Specific Investments

Investments in both physical assets and brand name capital are important for the property-liability insurance industry. These relationship-specific assets can lower production costs but are subject to expropriation, because, *ex post*, the trading parties are in a bilateral monopoly. Once the investments are made, one party can attempt to change the terms of the original agreement to extract a greater share of the gains. The investing party is thus subject to holdup.

Since this article is concerned with integration of the distribution system only, the relevant relationship-specific physical asset is proprietary data processing and communications hardware and software.⁶ The insurer can choose to invest in proprietary information systems which are placed in distributor locations to improve workflows. These types of information systems are designed to enhance communication between the insurer and its distributors, and they have the effect of more closely tying the agency to the insurer. They are relationship-specific in the sense that agency personnel must devote time, money, and effort to learn how to exploit the system. The dedicated information system may be used to reduce costs associated with billing, pricing, and data collection. The system may also allow sales agents direct access to the insurer's system, reducing inefficiencies due to duplication of effort and standardizing procedures across agencies/locations. These investments are more likely to be made by exclusive dealing insurers because costs can be recovered over the term of the agency relationship, and there is no possibility for free-riding when the agent is constrained to represent only one insurer.

Of course, independent agency insurers could also make these investments, but, since independent agents represent multiple insurers, this is not likely to be efficient. An independent agency insurer would be reluctant to undertake this investment for its agencies because, since agents represent more than one insurer, there is less certainty that the cost of the system would be recovered. For example, the independent agent might terminate the relationship with the insurer. Even in the absence of termination, it might take longer to recover the initial cost of the investment since each insurer gets only a portion of the agency's business. In addition, the insurer is at risk for having the benefits of the system accrue to competing insurers. Moreover, independent agents themselves may be reluctant to participate in such a system because of a desire to protect their rights to the information in the expirations list. Thus, independent agency insurers may forego the production cost advantages that arise from these types of investments.

⁶ The distinction must be made between proprietary and industry-specific systems. Industry-specific systems are those that use one standard to serve multiple firms. The ACORD (Agency-Company Organization for Research and Development) system is an industry-specific system designed to allow single entry multiple company interface for independent agents. This system is easily redeployable across insurers, whereas a proprietary system tailored to a specific insurer is not easily redeployable.

Investments in advertising and brand name capital are also specific to the trading relationship. When an insurer invests in name brand rather than generic product advertising, it attracts customers to its distributors. When insurer brand-specific investments are designed to generate customers, there is the possibility that an independent agent could free-ride on these investments by promoting a nonadvertising insurer over an advertising one. Exclusive dealing allows the insurer to capture the efficiencies associated with this type of advertising.

In addition, brand name advertising protects the downstream agent from possible opportunism by the insurer. An insurer with large investments in brand-specific capital will be less likely to take actions to degrade the quality of the product *ex post* because the brand-specific investments will be reduced in value. Of course, this assumes that the insurer values its reputation and that opportunism can be detected at relatively low cost. When these investments are more effectively carried out at the insurer level, or when insurer investments are more important in generating customers, then exclusive dealing should be used. Thus, like Marvel (1982), the theory predicts that exclusive dealing insurers should invest more in advertising.

Complexity

A critical task for an insurer is to devise an efficient method to evaluate the risk type of potential insureds. The insurer could perform this task directly by designing a tool to identify accurate, objective, and verifiable risk indicators. However, as risks become more complex, the number of risk indicators required to make an accurate risk assessment necessarily increases. Moreover, the cost of designing a standardized risk assessment tool increases with complexity. The risk of misclassification using a standardized tool then also increases with complexity.

Alternatively, the firm could rely on an agent to provide additional information about the applicant's risk type. The agent is the first contact the insurer has with the potential policyholder and may be able to obtain valuable information that the insurer might find costly to verify.⁷ This information may then be used by the underwriter in the risk acceptance and classification decision. Underwriting applications often ask the agent for a subjective evaluation of the quality of the risk. In property insurance for example, the agent might be asked to evaluate the applicant's reputation and standing in the community, the cleanliness of the premises, or the condition of the surrounding property.

If it is efficient to rely on an agent to provide this information, the independent agency system offers insurers advantages as compared to exclusive dealing. The advantages of independent agency arise from two sources. First, since the independent agent represents more than one insurer, risk classification effort expended by the agent on a potential insured who is unacceptable under one insurer's contracts is not wasted. The independent agent can place this customer with an-

⁷ This does not imply that agents make the underwriting decision. However, agents are often granted underwriting discretion, and, in fact, the agent's role in underwriting is widely recognized within the industry (for example, see Rejda, 1995, and Gaunt, Williams, and Randall, 1990).

other insurer, who will then compensate the agent for information gathering effort. Because of the exclusive agent's lack of outside placement opportunities, exclusive agents will not benefit from exercising discretion in risk assessment if it increases the possibility that the applicant will be rejected. Thus, under exclusive dealing, the agent would have to be compensated by the insurer for exerting classification effort for applicants who are rejected.

Second, since risk classification in the current period affects the profitability of the contract in the future, the independent agent's ownership of the customer list allows the agent to capture some of the future gains associated with making a correct placement decision. Since information about the risk types in the portfolio is revealed over time, there is a value to the insurer in maintaining a long-term relationship with profitable policyholders.⁸ Under the independent agency distribution system, the agent can bargain for a share of the profits from correct classification by threatening to move profitable business to another insurer. Exclusive agents do not have access to this strategy and thus have a lower incentive to exert effort in information gathering.⁹ Thus, when it is important for agents to participate in risk classification, independent agency is preferred to exclusive dealing. Further, agent participation in risk classification is likely to be more valuable as complexity increases. Therefore, for complex products, the independent agency distribution system will be preferred.

Uncertainty

Transaction cost analysis also examines the influence of uncertainty in the underlying environment on the vertical integration decision.¹⁰ In the property-liability insurance industry, environmental uncertainty may arise from unexpected changes in regulation, legislation, judicial decisions, interest rates, or changes in demand. Changes in the underlying environment can have important implications for the profitability of the insurance contract. This is because insurers generally must use adjusted historical data to calculate premiums and loss reserves for contracts written in the current period, where losses will not be realized until some time in the future. Thus, any unexpected change in the underlying environment will introduce errors in loss reserves and may affect the value of the investment portfolio that supports underwriting operations. Further, as the time to loss payout increases,

⁸ D'Arcy and Doherty (1990) argue that the property right to policyholder experience gives exclusive dealers a cost advantage over independent agents.

⁹ Regan and Tennyson (1996) more completely specify the advantages to independent agency when risk assessment is important and find that independent agency insurers reward agents for risk assessment efforts through the payment of contingent commissions. Using data on state market shares, the study finds that independent agency is associated with more complex markets.

¹⁰ The standard prediction of transactions cost analysis is that vertical integration is preferred when environmental uncertainty is higher, because integrated firms can more easily adapt to unexpected changes. However, this result has not been confirmed empirically (see, for example, Anderson, 1988; John and Weitz, 1988; Monteverde and Teece, 1982; Walker and Weber, 1984; and Joskow, 1985).

changes in the underlying environment become more problematic, and the underwriting profitability of the contract becomes more uncertain.¹¹

In addition to loss prediction errors that affect underwriting profitability, insurers experience uncertainty associated with the ability to meet future obligations. Although a firm's underwriting strategy obviously has an impact on its solvency risk, it is not the only factor. The firm's investment results, asset allocation decisions, and the availability and cost of capital may have a greater impact on overall firm level risk.

When an insurer's exposure to environmental uncertainty is higher, the independent agency distribution system should be preferred to exclusive dealing. This is not an argument that agents bear risk better than insurers. Rather, the advantages to an insurer of using independent agency or exclusive dealing are examined in the context of higher underlying uncertainty. Any agent must be compensated for bearing risk, but the payment to an independent agent will be lower than that required by an exclusive agent. The advantages to independent agency arise from two sources. First, because independent agents can represent multiple insurers, they can diversify their portfolios both across insurers in a particular line and across insurance lines. This allows independent agents to accept higher levels of risk. In addition, independent agents have the ability to participate in some of the residual profits that arise out of making a correct placement decision, but which are also affected by exogenous uncertainty. When exogenous shocks reduce the profitability of a book of business, agency profit contingent compensation is reduced. These two factors allow insurers who use the independent agency system to engage in riskier activities because they can transfer a portion of the risk to the distribution system.

In contrast, exclusive dealing agents have a large portion of their wealth and income tied to the products and profitability of a single insurer. This relative lack of diversification requires the payment of a larger risk premium to induce an exclusive dealing agent to participate in more risky markets. Similarly, exclusive dealing insurers are likely to have lower firm level risk because, lacking alternative placement opportunities, the distribution system has a greater incentive to monitor insurers (Cather, 1993). This is because exclusive dealing agents suffer a greater loss than independent agents if policyholders switch insurers. In addition, if the insurer becomes insolvent or withdraws from a market, the exclusive agent is at greater risk than the more diversified independent agent.

EMPIRICAL ANALYSIS

The transaction cost determinants of the choice of distribution system for the property-liability insurance industry are the presence of relationship-specific assets, complexity, and uncertainty. The theory predicts a positive relationship between

¹¹ A striking example of the effect of this type of uncertainty can be seen in environmental impairment liability claims which arise under old general liability policies. Several insurers, including Aetna, Cigna, Continental, and The Home, have restructured or been acquired because of heavy liabilities for these unanticipated claims.

vertical integration of the distribution system and relationship-specific assets and a negative relationship between vertical integration and complexity and vertical integration and uncertainty.

Data and Measurement of the Variables

These predictions are tested by examining accounting information for a sample of property-liability insurance company groups. Two hundred groups were chosen from reports provided by the A. M. Best Company. Aggregate balance sheet and income statement data were collected for the period 1980 through 1990.¹² Risk retention groups and reinsurance groups were eliminated, as were groups that wrote only financial guaranty products. Although some groups do use a combination of marketing systems, no group wrote more than 30 percent of its total business outside its distribution system classification. Therefore, groups are classified as either independent agency or exclusive dealers. The final cross-sectional sample comprises 149 groups operating in 1990, with 112 independent agency insurers and 37 exclusive dealers. Seventy-seven groups are classified as stockholder owned.

The group rather than the firm is used as the unit of analysis for several reasons. Many groups internally pool premiums and allocate losses among member firms within the group. Many also conduct reinsurance transactions internally. These practices make it difficult to accurately measure the performance or underwriting activities of any one firm within a group. Therefore, using firms within groups as the unit of analysis will provide biased results.¹³

Table 1 presents summary statistics for the firms in the sample. The sample contains a broad representation of firms, with firm size as measured by assets ranging from \$13 million to \$44 billion and output as measured by direct premiums written ranging from \$4 million to \$24 billion. Within the independent agency sample, firm size ranges from \$13 million to \$23 billion, while output ranges from \$4 million to \$8 billion.

The key hypotheses to be tested are:

Hypothesis 1. Relationship-specific investments should be more important for exclusive dealing insurers. That is, (a) exclusive dealers should invest relatively more in advertising, and (b) exclusive dealers should invest relatively more in information systems equipment.

Hypothesis 2. Independent agency is preferred for more complex products.

¹² Other studies of vertical integration have relied on survey data to determine the characteristics of the transaction (e.g., Anderson and Schmittlein, 1984, and Monteverde and Teece, 1982). However, since vertical integration is implicitly assumed to be for the benefit of the upstream firm, it may be more appropriate to examine upstream firm level data.

Because several of the risk variables used in the analysis are subject to large year-to-year fluctuations that might bias the estimates, they are measured as the means over the time period 1980 through 1990.

¹³ Although a significant portion of the market is served by non-group insurers, most do not meet the minimum size requirements for publication in A. M. Best's *Aggregates and Averages*.

Hypothesis 3. Independent agency is preferred when environmental uncertainty is higher.

Logistic regression is used to test the theory, where the dependent variable is equal to one if the firm is an independent agency firm and zero otherwise. Important relationship-specific investments indicated by the theory include advertising and information systems. Following Marvel (1982), advertising is measured as the ratio of advertising expenses to net premiums written, and information systems investments are measured as the ratio of computer and data processing expenses to net premiums written.¹⁴ The data presented in Table 1 indicate that exclusive dealing insurers invest proportionally more in advertising, and the difference is statistically significant. To control for possible simultaneous choice of these relationship-specific investments and distribution system, the regression is also undertaken with advertising and information systems treated as endogenous variables.¹⁵

Table 1
Sample Statistics and Comparison of Means

Variable	Independent Agency (n = 112)		Exclusive Dealer (n = 37)		Z-test
	Mean	Standard Deviation	Mean	Standard Deviation	
Assets	2,200,092,125	4,338,098,881	3,892,270,331	8,577,774,423	-1.152
Direct Premiums Written	864,784,759	1,530,927,090	2,033,823,205	4,678,013,634	-1.493
Net Premiums Written	798,833,672	1,422,080,859	20,009,200,272	4,692,287,501	-1.5457
Advertising Ratio	13.77139	16.38797	32.49181	33.02377	-3.316*
Equipment Ratio	100.6841	67.30501	118.74476	72.13279	-1.324
Complexity Ratio	4,139	2,199	1,673	2,071	6.1825*
Coefficient of Variation of the Economic Premium Ratio	0.20429	0.29705	0.12674	0.07748	2.5156*
Kenney Ratio	19,975	7,616	19,582	6,656	0.30007
Leverage Ratio	14,954	4,803	16,190	5,764	-1.176

Note: Ratio variables are multiplied by 10,000 for tractability.

* Significant at the 5 percent level.

There are several ways to measure complexity, each of which addresses a different dimension. A company can choose to emphasize complex product lines within its underwriting portfolio. A panel of informants ranked six lines of insur-

¹⁴ Unfortunately, the equipment variable does not distinguish between proprietary and general purpose expenditures, and so is not the ideal proxy for relationship-specific physical investments.

¹⁵ Maddala (1983) presents a two-stage estimation procedure for logistic regression with an endogenous variable.

ance according to the degree of underwriting complexity.¹⁶ The lines of business are private passenger auto physical damage and liability, homeowners, commercial multiple peril, general liability, and workers' compensation. The commercial lines are unanimously ranked more complex than the personal lines. Based on the informant rankings, the complexity variable is measured as the proportion of the firm's business in workers' compensation, commercial multiple peril, and general liability.

Table 2 illustrates the breakdown of aggregate market shares by line for independent agency and exclusive dealer insurers for 1993. Independent agency insurers have larger market shares in the more complex commercial lines, and this relationship holds across all commercial lines with the exception of medical malpractice. In addition, the means test in Table 1 indicates that the complexity variable is significantly higher for independent agency insurers for the sample used in this analysis. Thus, across the industry and within this sample, independent agency is associated with a greater degree of complexity.

A more direct way to measure underwriting complexity is to calculate expenditures on inspections and audits of loss exposures. In addition to the agent's report, the insurer might require a physical inspection of the premises or a report by a safety engineer as to the adequacy of the insured's loss control programs. These reports are not a substitute for agent effort in risk classification but are rather a complement to the agent's effort. This additional information is expensive to obtain and is likely to be required only for complex loss exposures. If independent agency insurers operate in more complex lines of business, then they should spend relatively more on underwriting inspections and audits as measured by the proportion of the firm's expenses allocated to surveys and audits.

An insurer's exposure to environmental uncertainty can be assessed by examining the risk in its underwriting portfolio or by examining overall firm-level risk. A good measure of underwriting risk is the coefficient of variation of the economic premium ratio (Cummins and Weiss, 1991). Greater variation in the economic premium ratio across insurers indicates differences in the types of risks underwritten. This measure improves upon the loss ratio by adjusting losses incurred for the loss payout tail and the discount rate. Premiums are measured as the net of underwriting expenses to control for the effect of an insurer with higher expenses. The theory predicts a positive relationship between independent agency and underwriting risk. Again referring to Table 1, the means test indicates a statistically significant difference across distribution systems for underwriting risk, with a Z-statistic of 2.516.

Overall firm level risk can be measured by the net premiums-to-surplus ratio, also called the Kenney ratio. This ratio is used by the National Association of Insurance Commissioners as an indicator of financial stability, where a higher value indicates that the insurer may have an insufficient cushion to absorb unexpected

¹⁶ An informant survey is one where a small number of experts are relied on to provide information about the question under study. The expertise of the informants is what separates an informant survey from a more general opinion survey. The survey used in this study is available from the author. Seidler (1974) discusses the use of informants in organization studies.

losses. An alternative measure of a firm's risk, and one commonly applied to non-financial firms, is the assets-to-liabilities ratio, which is a measure of leverage. If independent agency insurers have greater exposure to environmental uncertainty, then the value of this ratio should be negatively related to independent agency.

Table 2
Independent Agency Insurer Market Shares
(1994 Net Premiums Written)

Line of Insurance	Market Share (%)
Private Passenger Auto Damage	29.4
Private Passenger Auto Liability	31.6
Homeowners	36.6
All Personal Lines	31.9
Commercial Multiple Peril	78.8
Inland Marine	66.8
Workers' Compensation	78.6
Medical Malpractice	48.9
General Liability	84.2
Commercial Auto Physical Damage	73.4
Commercial Auto Liability	73.4
Boiler and Machinery	77.2
Fire	61.8
Fidelity and Surety	85.3
Burglary and Theft	83.2
All Commercial Lines	71.3
All Lines	51.8

Source: A. M. Best (1995).

Several variables are included in the model to control for other hypotheses about the choice of distribution system. Previous research has offered evidence that stockholder owned firms are more prevalent in riskier lines of business (Lamm-Tennant and Starks, 1993) and that stock firms are more likely to use the independent agency system (Kim, Mayers, and Smith, 1992). To control for the effect of ownership structure on the firm's choice of distribution system, a dummy variable included in the analysis is assigned a value of one if the firm is a stock company.

Regan and Tennyson (1996) present evidence that exclusive dealing insurers are more specialized by line of business than independent agency insurers, while Marvel (1982) argues that exclusive dealing insurers should be more concentrated in personal lines. Therefore, a variable to control for the relationship between distribution system and within-firm concentration is used. The measure is derived by summing the squared proportion of the firm's business in each line. This is similar

to the calculation of the Herfindahl index, which measures concentration within an industry. A very specialized firm will have a higher concentration index than a firm offering many product lines.

The A. M. Best Company publishes ratings of insurers' relative financial condition. Ratings are based on an analysis of a series of financial ratios measuring leverage, profitability, and liquidity. A qualitative judgment of a firm's performance and managerial expertise is also made. Thus, the Best's ratings may be used as a measure of a firm's reputation. If independent agency insurers are more risky than exclusive dealers, then Best's ratings might be systematically related to distribution system. To control for this, a dummy variable is assigned a value of one if the firm is rated A or A+.

Several researchers have found evidence that distribution system choice is related to firm size (for example, Sass and Gisser, 1989; Anderson, 1988). Exclusive dealing insurers are likely to be larger because of the fixed costs associated with developing and managing the distribution system. The data presented in Table 1 illustrate that exclusive dealing insurers are larger on average than independent agency firms, both in terms of assets and premiums written, but these differences are not significant at the 5 percent level. The logarithm of the assets of the firm is included in the regression to control for the effect of firm size on distribution system choice.

Reinsurance variables are also included because there may be systematic differences in the use of reinsurance across distribution systems. The firm's retention ratio is measured as the level of net to direct premiums written and indicates the proportion of business the firm writes that it keeps for its own portfolio. Other researchers have measured the firm's use of reinsurance as the ratio of reinsurance ceded to the sum of reinsurance assumed and direct premiums written (Mayers and Smith, 1989; Barrese and Nelson, 1992).

Table 3 summarizes the predictions of the model and defines the variables used in the analysis.

Results

The principal hypothesis tested here is that transaction cost variables are important determinants in the choice of insurance distribution system. The results of the logistic regressions are presented in Tables 4, 5, 6, and 7. To measure the impact of the transaction cost variables, two separate regression equations are estimated. In the first equation, the distribution system choice is modeled as a function of the control variables only, while the second equation includes alternate forms for the transaction cost variables.

Table 4 presents the results of the analysis using the controls variable only. Two models are estimated using alternative formulations for the reinsurance variable. For model 1, where reinsurance is measured as the retention ratio, all of the variables with the exception of the reinsurance variable are significant indicators of the choice of distribution system. The explanatory variables in the model are jointly significant with a Chi-square statistic of 41.488 ($p = 0.0001$), and the model correctly matches 80.91 percent of the firms in the sample. Exclusive dealing firms

Table 3
Variable Definitions

Variable	Definition	Expected Sign
<i>Transaction Cost Analysis Variables</i>		
Relationship-Specific Investments		
Advertising	Ratio of advertising expenditures to net premiums written	-
Equipment	Ratio of expenditures on computers and information processing equipment to net premiums written	-
Complexity		
Complexity	Proportion of the firm's business in complex lines as identified by the informant survey	+
Survey	Ratio of survey and audit expenditures to net premiums written	+
Uncertainty		
Coefficient of Variation of the Economic Premium Ratio	Standard deviation of the variable divided by the mean	+
Leverage	Mean of the assets-to-liabilities ratio	-
Kenney	Mean of the premiums-to-surplus ratio	+
<i>Control Variables</i>		
Concentration	Sum of the squared proportions of the firm's business in each line	-
Firm Size	Logarithm of the firm's level of assets (Assets)	-
Quality	A dummy variable equal to one if the firm is rated A or A+ by the A. M. Best Company	?
Stock	A dummy variable equal to one if the firm is a stock company	+
Reinsurance1	The ratio of net to direct premiums written	?
Reinsurance2	The ratio of reinsurance ceded to the sum of reinsurance assumed and direct premiums written	?

Note: Dependent variable equals one if the insurer uses the independent agency distribution system.

are reliably larger in terms of assets than independent agency insurers and are also more concentrated by line. This latter result confirms the findings in Regan and Tennyson (1996). Independent agency insurers are also significantly more likely to be stockholder-owned firms, supporting Kim, Mayers, and Smith (1992). Model 2, with reinsurance measured as aggregate reinsurance activity, provides similar results. Again, all of the variables are significant with the exception of the

reinsurance variable, but this specification improves slightly over the previous one, with a Chi-square statistic of 43.589 and a correct match rate of 81.5 percent.

Table 4
Results of the Logistic Regression Using Control Variables Only
(Dependent Variable = One If Independent Agency)

Variable	Model 1	Model 2
Assets	-0.6179* (0.1676)	-0.6805* (0.1780)
Stock	3.186* (0.6430)	3.294* (0.6485)
Concentration	-0.000491* (0.000154)	-0.000496* (0.000156)
Quality	1.10* (0.5097)	0.96* (0.5201)
Reinsurance1	0.2415 (0.4616)	
Reinsurance2		0.5823 (0.4835)
Chi-square	41.488	43.589
Match Rate ^a	80.9	81.5

^a The match rate is the percentage of all possible pairs of observations having different values of the index, where the model predicts a higher probability for the higher value of the index.

* Significant at the 5 percent level.

Table 5 presents results of regressions including the transaction cost variables. The models estimated here use the coefficient of variation of the economic premium ratio as the measure of underwriting risk. Four models are estimated using alternative measures for the firm's level of risk and reinsurance activity. Models 1 and 2 use leverage as the measure of firm level risk, while models 3 and 4 use the Kenney ratio. These models uniformly improve upon those which rely on the control variables alone, with the match rate ranging from 89.7 for model 1, to 91.1 for model 4. The Chi-square statistics for the joint significance of the variables also indicate an improvement when the transaction cost variables are included, with the Chi-square statistics ranging from 70.481 for model 1 to 76.652 for model 4.

Table 5
Results of the Logistic Regression Using Transaction Cost
and Control Variables: Coefficient of Variation of the
Economic Premium Ratio as the Measure of Underwriting Risk
(Dependent Variable = One If Independent Agency)

Variable	Model 1	Model 2	Model 3	Model 4
Advertising	-0.0279* (0.0108)	-0.0321* (0.0115)	-0.0282* (0.0111)	-0.0321* (0.0118)
Equipment	0.00123 (0.00450)	0.00241 (0.00454)	-0.00090 (0.00426)	0.00014 (0.00431)
Survey	0.0329* (0.0119)	0.0356* (0.0121)	0.0307* (0.0112)	0.0319* (0.0112)
Coefficient of Variation of the Economic Premium Ratio	8.514* (4.302)	6.780** (4.185)	10.527* (4.242)	9.540* (4.12)
Leverage	-0.000137* (0.00006)	-0.000158* (0.00006)		
Kenney			0.00012* (0.000049)	0.00013* (0.000051)
Assets	-0.5831* (0.2414)	-0.6929* (0.2482)	-0.5451* (0.2358)	-0.6750* (0.2490)
Stock	3.4099* (0.81)	3.5995* (0.83)	3.7845* (0.86)	4.0046* (0.88)
Concentration	-0.000749* (0.000201)	-0.000722* (0.000202)	-0.000817* (0.000208)	-0.000788* (0.000211)
Quality	1.7682* (0.666)	1.6101* (0.683)	2.2702* (0.760)	2.1332* (0.781)
Reinsurance1	1.1558 (0.955)		-0.7822 (0.871)	
Reinsurance2		1.033** (0.571)		1.012 (0.655)
Chi-Square	70.481	74.586	72.736	76.652
Match Rate ^a	89.7	90.3	90.1	91.1

^a The match rate is the percentage of all possible pairs of observations having different values of the index, where the model predicts a higher probability for the higher value of the index.

* Significant at the 5 percent level.

** Significant at the 10 percent level.

Table 6 presents the results using complexity rather than the coefficient of variation of the economic premium ratio.¹⁷ Four models are estimated here as well. These models have a slightly higher success rate (up to 94.6 percent, Chi-square = 94.56) than those that use the coefficient of variation of the economic premium ratio as the measure of underwriting risk. Notably, in all eight models that include the transaction cost variables, the uncertainty variables are significant and of the expected sign. Independent agency is strongly associated with greater complexity and uncertainty in the underwriting portfolio and a higher degree of firm-specific risk as measured by both the Kenney ratio and the leverage variable. These results are consistent even after controlling for the effect of differences in quality as measured by A. M. Best. This finding provides strong support for the idea that the independent agency distribution system provides advantages when a firm is more exposed to environmental uncertainty.

The results for the asset specificity variables are mixed. The physical asset specificity measure is not significant for any of the models. This may be because, regardless of distribution system, investments in computers and information systems at the home office level are necessary for dealing with the huge amount of information that large insurers process. In addition, the information systems investments made at the agency level are not included in the accounting information used in this study.

The advertising variable is negative and significant for all models. Thus, like Grossman and Hart and Marvel, this finding supports the idea that advertising is more likely under exclusive dealing, because the exclusive dealing restriction protects the insurer's investment in brand name capital.

Table 7 presents the results when advertising and equipment are treated as endogenous variables.¹⁸ Model 1 presents the results when advertising is treated as an endogenous variable, and model 2 presents the results when equipment is treated as endogenous. All of the transaction cost variables are of the same sign and significance as when these variables are treated as independent.¹⁹

Finally, in all of the equations estimated, stock firms are significantly more likely to use the independent agency system rather than the exclusive dealer system, thus providing strong support for the Kim, Mayers, and Smith hypothesis. However, even controlling for the effect of ownership form, independent agency firms have higher levels of risk in the underwriting portfolio, and also higher firm level risk than exclusive dealers.

¹⁷ These variables are not jointly included in the regression because they potentially measure the same effect. A strong correlation is likely to exist between risk in the underwriting portfolio and concentration in complex lines of business.

¹⁸ The model fails when advertising and equipment are treated as simultaneously endogenous because of the lack of instruments available in the data set; the system is underidentified (Theil, 1972). Therefore, results are presented treating advertising and equipment as separately endogenous.

¹⁹ Although only one specification of each model is shown, the results are robust to other specifications.

Table 6
Results of the Logistic Regression Using Transaction Cost and Control
Variables: Complexity as the Measure of Underwriting Risk
(Dependent Variable = One If Independent Agency)

Variable	Model 1	Model 2	Model 3	Model 4
Advertising	-0.0302* (0.0131)	-0.0329* (0.0138)	-0.0346* (0.0140)	-0.0384* (0.0150)
Equipment	0.00434 (0.00495)	0.00442 (0.00497)	0.00240 (0.00457)	0.00307 (0.00466)
Survey	0.0427* (0.0125)	0.0426* (0.0128)	0.0460* (0.0137)	0.0476* (0.0141)
Complexity	0.00065* (0.000165)	0.00061* (0.000163)	0.00064* (0.000155)	0.00062* (0.000151)
Leverage	-0.000175* (0.000061)	-0.000175* (0.000061)		
Kenney			0.00015* (0.000057)	0.00017* (0.000059)
Assets	-0.8217* (0.2708)	-0.8675* (0.2683)	-0.7380* (0.2592)	-0.8493* (0.2704)
Stock	3.500* (0.8895)	3.581* (0.9079)	4.191* (1.0291)	4.434* (1.0796)
Concentration	-0.000566* (0.000197)	-0.000542* (0.000198)	-0.000672* (0.000205)	-0.000663* (0.000206)
Quality	1.757* (0.7217)	1.559* (0.7305)	2.113* (0.7755)	2.017* (0.7967)
Reinsurance1	2.039* (0.1021)		1.568** (0.9144)	
Reinsurance2		1.0726* (0.3971)		1.0922* (0.4081)
Chi-Square	90.15	92.78	90.88	94.56
Match Rate ^a	94.1	94.6	94.1	94.6

^a The match rate is the percentage of all possible pairs of observations having different values of the index, where the model predicts a higher probability for the higher value of the index.

* Significant at the 5 percent level.

** Significant at the 10 percent level.

Table 7
Endogenous Relationship-Specific Investments
(Logistic Regression: Dependent Variable = One If Independent Agency)

Variable	Model 1	Model 2
Advertising	-0.1607* (0.0403)	
Equipment		0.000924 (0.00663)
Survey	0.0386* (0.0139)	0.0387* (0.0118)
Complexity	0.0006* (0.00019)	0.0006* (0.00016)
Leverage	-0.000161* (0.000078)	-0.000172* (0.000058)
Assets	-0.646* (0.3278)	-0.906* (0.2654)
Stock	2.516* (1.0124)	3.436* (0.8194)
Concentration	-0.000628* (0.000233)	-0.000474* (0.000192)
Quality	0.6175 (0.9028)	1.6271* (0.7071)
Reinsurance2	1.081* (0.5115)	1.021* (0.3791)
Chi-Square	101.56	86.04
Match Rate ^a	96	93

^a The match rate is the percentage of all possible pairs of observations having different values of the index, where the model predicts a higher probability for the higher value of the index.

* Significant at the 5 percent level.

CONCLUSION

The coexistence of alternative distribution systems for property-liability insurance poses an interesting economic question. This study uses the transaction cost analysis framework to argue that alternative distribution systems arise to efficiently carry out different transactions. In particular, the study argues that the independent agency system will be preferred by insurers marketing complex products or operating in lines or markets where uncertainty is higher. Exclusive dealing insurers are able to invest in relationship-specific assets that lower production costs and give them an advantage in relatively standardized lines and markets. The empirical results confirm the importance of transaction cost variables in the distribution system choice and are robust across different specifications of the regression model.

These findings have important implications for both insurers and regulators. Recent attention to distribution system cost cutting may be misplaced if the documented higher costs of independent agency are a result of independent agency insurers operating in different market segments than exclusive dealing insurers. Berger, Cummins, and Weiss (1995) find evidence that independent agency insurers have higher costs but are not significantly less profitable than exclusive dealers. Therefore, a focus on cost cutting without regard to product quality differences may result in an erosion of market share in lines and markets where the independent agency system is currently successful. However, if independent agents are to compete successfully with exclusive dealers in more standardized markets, then the focus on cost cutting is probably appropriate.

Unfortunately, the data do not allow any test of within-lines differences across distribution systems. If independent agency is a superior distribution method for complex products, then it should also have advantages for more complex market segments within product lines. This implies that independent agency would have long-term success across all lines but would specialize in less standardized, or more risky, business within lines. However, the level of aggregation of the data do not permit this analysis here.

Also, the data used in this study do not discriminate between independent agency and brokerage insurers or between various degrees of vertical integration. Brokers are generally larger than independent agencies and offer a wider array of services to more sophisticated clients. Since the broker is the legal agent of the client and not the insurer, insurers who operate through brokers are even less vertically integrated. Thus, it might be that they have advantages over independent agency insurers in complex lines, but this cannot be tested with the current data set.

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