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A Search Model of Marketing Systems in Property-Liability Insurance

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ABSTRACT

Earlier studies (e.g., Joskow, 1973; Cummins and VanDerhei, 1979; and Barrese and Nelson, 1992) have shown that insurers using independent agencies have higher costs than those employing the direct writing system. These studies indicate that competition in insurance markets should have eliminated the independent agency system. This article develops a search theoretical model for an insurance market where insurers and potential policyholders search for each other to form a match. We prove that there exist equilibria where the independent agency and direct writer marketing systems coexist.

Introduction

The marketing of property-liability insurance is generally done through one of two distribution systems. In the independent agency system, insurers enter into agreements with independent contractors who sell insurance simultaneously for several firms. These independent agents are intermediaries who match potential policyholders with appropriate insurers. The agents are paid a commission, usually a predetermined percentage of the premium, once a policy has been sold. Insurers that use the second type of distribution system are known as direct writers. Their insurance is sold by individuals who represent only their firm. They may employ salespeople, sell through mass media or mail, or use the services of an exclusive agent.

Empirical evidence shows a significant cost differential between these two marketing systems. Joskow (1973), Cummins and VanDerhei (1979), and Barrese and Nelson (1992) found that independent agency firms have higher costs than direct writers, and the latter two articles found no evidence that this cost differential is declining over time. Proponents of the independent agency system claim that this is due to superior services provided by independent

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agents, but Etgar (1976) and Cummins and Weisbart (1977) found no significant difference in the quality of services provided by the two marketing systems. On the other hand, Berger, Cummins, and Weiss (1995) provide evidence that profit efficiency differentials between independent and exclusive agency insurers are much less than measured cost efficiency differentials, suggesting that at least part of the cost differential between the two groups of insurers represents additional services that are compensated through higher revenues.

Barrese and Nelson (1992) explain the cost differential between the two marketing systems by claiming that the "principal" (insurer) must incur monitoring costs because of agency conflicts between itself and the "agent" (independent agent). Agents may feel a need to monitor insurers' relationships with policyholders as well, since independent agents own the policy renewal rights. Direct writers face lower agency costs because the individuals selling their policies do not represent other insurers and direct writers generally own the renewal rights for their own policies. Similarly, D'Arcy and Doherty (1990) argue that, because direct writers do not have to share with their agents the rent on private information about their policyholders, direct writing has a cost advantage over independent agency marketing. However, these two studies stop short of providing a theory for the continuing coexistence of the two marketing systems. The question, then, is how the independent agency system survives despite its cost disadvantage.

The Insurer-Agent Relationship

Virtually all existing articles answer this question by employing agency theory. Mayers and Smith (1981) expect the agent-policyholder conflict to be greater and the firm-agent conflict to be smaller with exclusive agency. Thus, they expect independent agency firms to specialize in high-service, high-price policies. Cummins and Weiss (1992) suggest that agency conflicts between insurers and policyholders may result in policyholder willingness to pay higher premiums to independent agents as a form of monitoring cost, since such agents own policy renewal rights and can, therefore, protect policyholder interests. The ownership of the client list is also the focus of Grossman and Hart (1986), who argue that the choice of marketing system will depend on which party, the insurer or the agent, has the greater potential to exploit the ownership rights over the client list. Sass and Gisser (1989) argue that, since exclusive agency does not allow the agent to sell other insurers' policies, it must compensate the agent by providing the agent with sufficient business. They conclude, therefore, that larger firms are more likely to use the exclusive agency distribution system.

Regan and Tennyson (1993) add an additional element to the optimal contractual arrangement between the firm and the agent: the role of the agent in gathering information about applicants' riskiness. They argue that independent agents are more efficient in gathering this information. Thus, they predict that use of independent agents becomes relatively more advantageous as the insurance products become more differentiated and as the risk assessment of the

applicants becomes more difficult. Marvel (1982) argues also that an insurer is more likely to use exclusive agents than independent agents as the nature of the policyholders' characteristics becomes more diffuse. Regan and Tennyson (1993) and Marvel (1982) conclude that exclusive dealers have a greater market share in personal insurance than in commercial insurance markets.

The Role of the Consumer

A common feature of these studies is that they focus exclusively on the incentive problems between the firms and the agents, without considering consumers' choices between the two marketing systems. This article incorporates the strategies of consumers; it allows consumers as well as firms to choose between an independent agent and a direct writer. In addition, where previous articles have modeled the coexistence of the two marketing systems, the results have generally indicated that direct writers and independent agency firms should specialize in different products. This article provides a theoretical explanation of why the two marketing systems might coexist in the market for a single product by developing a search theoretical model where insurers and potential policyholders search for each other to form a match. Thus, the focus shifts from incentive problems between insurers and agents to the search cost for insurers and consumers. Potential policyholders (consumers) choose between the independent agency and direct writing markets in their search for an insurer with an appropriate policy.[1]

There are two types of consumers, one type with lower search costs than the other. Similarly, insurers can choose a marketing system to find potential policyholders. Independent agents are modeled as intermediaries who charge insurers a commission for matching them with policyholders. The agent's commission is assumed to be the only cost an insurer faces when using the independent agent to obtain customers, because the firm does not incur the costs of searching on its own. The insurer may choose to search itself for potential policyholders rather than use an independent agent. In this case, the insurer is a direct writer; it incurs search/acquisition costs but does not pay a commission to an independent agent.[2] Therefore, the choice of marketing system involves choosing whether to search and incur the corresponding search/acquisition costs or to contract with an independent agent and pay the corresponding commission.[3]

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[1] In our model, appropriate insurers are those that sell the particular insurance policy that the individuals are interested in buying, and inappropriate insurers are those that sell other policies but not the one our consumers are interested in. The difference between inappropriate and appropriate insurers is their product choice. A firm's choice of product is assumed to be given but arrived at in a rational manner (e.g., they may have a competitive advantage in one product market over another). Appropriate and inappropriate insurers can sell multiple products. Our assumptions simply mean that all firms do not sell all products.

[2] Commissions to exclusive agents are captured in the insurer's search/acquisition costs.

[3] The approach taken here is similar to the approach of some studies on intermediation (e.g., Rubinstein and Wolinsky, 1987; Yavaş, 1992, 1994). However, the question of interest here is quite different from the issues analyzed in the intermediation literature.

Search Models

Numerous search models in the economics literature (e.g., Salop and Stiglitz, 1977; Reinganum, 1979; and MacMinn, 1980) and a few in the insurance literature (e.g., Mathewson, 1983; Dahlby and West, 1986; and Schlesinger and Schulenburg, 1993) obtain price dispersion. These models do not address the issue of search as an explanation for the coexistence of the two marketing systems in that they do not treat the search processes afforded to consumers under the two marketing systems as different.[4] Our model differs from these earlier articles in two respects. Consumers in our model do not search to find a better price on their policy, but rather try to find a good match (a firm with an appropriate policy). More importantly, our model introduces independent agents as intermediaries that firms and consumers can use as alternatives to searching for trading partners themselves so that the search process is distinctly different in the direct writer and independent agency markets. Therefore, both the focus and the results of earlier research are quite different from those of the current study.

Coexistence Equilibria

This article asks whether an equilibrium can be sustained where both types of marketing systems exist even though the cost for independent agency firms (the commission) is higher than the cost for direct writers (the search cost). The answer is yes. There exist equilibria where the independent agency and direct writer marketing systems coexist. Moreover, in contrast to earlier theoretical studies, the existence of these equilibria does not require the presence of incentive problems between the insurer and the agent. The only requirement is that there be enough consumers with high search costs. In these equilibria, the insurers and consumers with higher search costs avoid searching and use the services of the independent agent instead. Consumers with lower search cost use the direct writer system. The choice of low cost firms between the two marketing systems depends on the magnitude of the search costs and the number of low and high cost consumers and firms. Insurers pay agents a commission that is higher than the search costs of direct writers, but they are able to pass on some of the commission cost to consumers who are willing to pay a higher premium in order to avoid the cost of searching for a direct writer. We also show that direct writing insurers may be larger than independent agency insurers.

The article is organized as follows. We present the model in the next section. The optimal behavior of consumers is examined, and insurers' optimal

[4] These models do explain the coexistence of insurers with high and low costs and, in this sense, indirectly explain why higher-cost independent agency firms would not be driven out of the market. But the fact that these articles model a unique search process for both marketing systems indicates that the question of coexisting marketing systems was not specifically considered.

choices between the two marketing systems and the resulting equilibria of the game are analyzed.

A Search Model of Marketing System Choice

This search model focuses on how a set of insurers and a set of potential policyholders find each other in a search for appropriate trading partners. These two sets are considered a market segment. The insurers modeled here are assumed to be a subset of a larger set of insurers as are the policyholders. It is assumed that the subset of potential policyholders (insurers) desire a policy (the business) from the subset of insurers (policyholders), and that the other members of the larger sets are not desired as trading partners. For example, the larger set of potential policyholders may include those looking for an insurance product that the subset of insurers does not provide, or it may include extremely high-risk individuals. The larger set of potential insurers may include those that do not offer the type of policy desired. It is assumed that the policyholders in the subset considered here have identical loss probabilities, and the subset of insurers offers the desired policy and identical (acceptable) "quality."[5] This is not the case for policyholders and insurers outside the subsets of "appropriate" trading partners. But potential trading partners cannot distinguish members of these subsets from other members of the larger sets without some costly information gathering.

Types of Consumers

The following definitions and analysis refer to the members of the subsets of appropriate trading partners unless otherwise specified. It is assumed that there are C individuals (consumers) each with initial wealth W and each facing a potential loss of fixed severity L with fixed probability θ, $0 < \theta < 1$. All consumers are interested in purchasing a full coverage insurance policy.

Consumers have two choices. They can go to an independent insurance agent and allow the agent to match them with an appropriate insurer (for simplicity, the number of independent agents is normalized to one).[6] If an independent agent is used, then there are no search costs. The independent agent searches to find the right match for the individual. The cost of locating the independent agent is assumed to be negligible. Alternatively, consumers can search themselves for an appropriate insurer (among those that do not use independent agents) by telephoning insurers directly or visiting the offices of an exclusive agent, inquiring about the particular type of policy they are inter-

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[5] Quality here refers to financial condition, claims adjustment practices, etc.

[6] Alternatively, we could assume that there are multiple agents; insurers and consumers are assigned randomly to agents and each agent randomly assigns its customers to the insurers it represents. Ex ante, this would yield results identical to the current model where the number of independent agents is normalized to one.

It is assumed that the commission charged by the independent agent is that which would be determined in a competitive market for agents' services with constant marginal costs.

ested in, and studying policy provisions. This second option entails search costs.

The model involves two types of consumers: C_L individuals with low search costs and C_H individuals with high search costs ($C_H = C - C_L$). Consumers are homogeneous in all respects other than those giving rise to the search cost differential, and they desire identical policies. The search cost differential is due to differences in the opportunity cost of their time, their ability to interpret the information gathered, etc.[7] Search costs are incurred with each contact with a potential insurer. Consumers with low search costs have per-contact search costs of γ_L, and consumers with high search costs have per-contact search costs of γ_H, where $\gamma_H > \gamma_L$. These per-contact search variables are measured in terms of utility. Each individual has a utility function $u(Y)$, where Y represents final wealth, $u'(\cdot) > 0$, and $u''(\cdot) < 0$. A consumer's total expected search costs equal the per-contact cost multiplied by the expected number of insurers that must be contacted before a match is found. So a consumer's expected utility is $u(Y)$ minus expected search costs. Let C_D represent the number of consumers choosing to search among direct writers, and let C_I represent the number of consumers choosing to go to an independent agent ($C_I = C\text{-}C_D$).

Types of Insurers

There are F risk-neutral appropriate insurers, who are identical except for their acquisition costs using the direct writer marketing system. F_L low-cost insurers have acquisition costs per policy of ε_L, and F_H insurers have acquisition costs per policy of $\varepsilon_H > \varepsilon_L$ ($F_H = F\text{-}F_L$). Joskow's (1973) empirical work provides support for constant marginal costs, and such an assumption is used in models of insurance markets (e.g., Pauly, Kunreuther, and Kleindorfer, 1986). Acquisition costs can be interpreted as the administrative costs of preparing and servicing the contract.[8]

In order to focus on the impact of the acquisition cost differentials, we assume that no quality differences exist among the policies of appropriate insurers. As mentioned, a group of inappropriate insurers can sell policies to a different group of consumers not considered here. The marketing decisions of the inappropriate insurers are not modeled, but it is assumed that at least

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[7] Consumers with identical incomes may have different opportunity costs of time depending on their utility of leisure and their alternative uses of time. It is common in the search literature to exogenously assign different search costs to the consumers/firms without differentiating them with respect to income or location (e.g., Reinganum, 1979, assumes an exogenous distribution of marginal costs for firms; Salop and Stiglitz, 1977, and Wilde and Schwartz, 1979, assume exogenously different search costs for the consumers). In Wilde and Schwartz, for instance, consumers have different search costs because some of them love shopping and others avoid it.

[8] Dahlby and West (1986) note that administrative costs may differ across insurers due to "differences in technology, prices paid to inputs or the innate efficiency of managers." It should be noted that, if $\varepsilon_H = \varepsilon_L$ (so all insurers have the same acquisition costs under the direct writer system), coexistence of the two marketing systems still can be obtained. Allowing for a cost differential among firms enables us to relate an insurer's marketing system choice to its acquisition costs.

some of them choose to be direct writers. The existence of inappropriate direct writing insurers provides the motivation for consumers to search.

Each appropriate insurer must choose the direct writing or independent agency marketing system. Insurers cannot use both systems. Let F_D represent the number of appropriate insurers that become direct writers, and let F_I represent the number of appropriate insurers that choose independent agents. Similarly, there are N inappropriate insurers, N_D of which are direct writers and N_I of which are independent agency firms ($N_I = N - N_D$). The price of an insurance policy from a direct writer is P_D, and the price of a policy from an independent agent is P_I.

Prices are at the zero profit level for both direct writers and independent agency firms and are taken as given by both insurers and consumers. This is in line with the fact that most states regulate insurance rates. It is shown below that, if the model is extended to involve search for price as well as appropriateness, then a zero-profit price can be endogenously derived as an equilibrium outcome for some parameterizations of the current model.[9] The objective of insurers is to maximize the number of policyholders they obtain.[10]

Subgame Perfect Nash Equilibrium

The equilibrium concept used here is subgame perfect Nash equilibrium. An equilibrium is subgame perfect if the strategies of the players are best replies to one another in *each* subgame in the game, that is, if it is an equilibrium for each subgame of the game (Selten, 1975). The extensive form game is as follows. First, the insurers simultaneously choose a marketing system. Then consumers observe the marketing system choice of all insurers and the distribution of appropriate and inappropriate insurers across the two marketing systems. Specifically, consumers learn which insurers are direct writers and the proportion of appropriate versus inappropriate direct writers, but they do not learn which particular insurers are appropriate; they also learn how many appropriate and inappropriate insurers use independent agents.[11] The consumers then simultaneously decide whether to search among direct writers or go to an independent agent to find an appropriate policy.

A marketing system yields zero probability of a match for a consumer unless at least one appropriate insurer chooses to use that marketing system and vice versa. A consumer who goes to an independent agent will be placed with an appropriate insurer as long as at least one such insurer markets through the independent agency system. Otherwise, the agent will not match the consumer

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[9] The coexistence of the two marketing systems can be obtained in these cases as well, so the assumption of an exogenously determined zero-profit price is not necessary for our results.

[10] The assumptions of price-taking firms and constant marginal costs imply a constant profit margin so that sales maximization and profit maximization are equivalent. Since the price is set at the zero-profit level by regulators, we assume that the objective of the marketing function is to maximize the number of policies sold.

[11] This is a standard property of search models; consumers know the distribution of prices and/or qualities offered by firms but not the price and/or quality of individual firms.

with any insurer. If more than one appropriate insurer chooses the independent agency marketing system, then the consumer will be matched randomly with one of them. Therefore, if F_I appropriate insurers market through the independent agent, then each insurer has a $1/F_I$ chance of obtaining the business of a given policyholder of the agent. An insurer using an independent agent must pay a commission equal to kP_I, where $0 < k < 1$ and k is considered exogenous to the model. Thus, if an insurer uses an independent agent, its expected profit will be

$$V^I = \frac{C_I}{F_I}\left[(1-\theta)P_I+\theta(P_I-L)-kP_I\right]. \tag{1}$$

This expected profit equation holds for insurers with either high or low acquisition costs, because it is independent of the only variable that differs for the two firms, the acquisition costs under the direct writing system, ε_i, i = L,H.

The price of an insurance policy from an independent agent (P_I) is the price at which expected profit, expression (1), is equal to zero:

$$\frac{C_I}{F_I}\left[(1-\theta)P_I+\theta(P_I-L)-kP_I\right] = 0 \quad \Rightarrow \quad P_I = \frac{\theta L}{(1-k)} = \theta L+\frac{k\theta L}{(1-k)}. \tag{2}$$

Equation (2) states that the price of insurance in the independent agency market is equal to the expected loss, θL, plus the commission paid to the independent agent, $kP_I = k\theta L/(1-k)$.

Let P^i_D represent the zero-profit price for a direct writer with acquisition costs ε_i, i = L,H. Because marginal acquisition costs are constant, the zero-profit price can be obtained by setting expected profits per policy equal to zero.[12] An insurer of type i can expect per-policy profits as a direct writer of

$$\left[(1-\theta)P^i_D+\theta(P^i_D-L)-\varepsilon_i\right]. \tag{3}$$

Setting equation (3) equal to zero yields

$$\left[(1-\theta)P^i_D+\theta(P^i_D-L)-\varepsilon_i\right] = 0 \quad \Rightarrow \quad P^i_D = \theta L+\varepsilon_i. \tag{4}$$

It is assumed that the expected marketing cost of an independent agency firm, the expected commission $kP_I = k\theta L/(1-k)$, is greater than the per-policy acquisition costs of a low-cost direct writer, ε_L, but less than the per-policy acquisition costs of a high-cost direct writer, ε_H. Therefore, from equations (2) and (4), we obtain $P^L_D < P_I < P^H_D$. Furthermore, it is assumed that the acquisition costs of a high-cost direct writer are higher than the risk premium of the

[12] As indicated above, constant marginal costs are supported by the empirical work of Joskow (1973) and also have been utilized by some search models (e.g., Reinganum, 1979) and models of insurance markets (e.g., Pauly, Kunreuther, and Kleindorfer, 1986). This assumption allows us to obtain P^i_D, i = L,H before considering the question of how many policyholders each type of insurer will obtain. Insurers may face scale economies or diseconomies with respect to acquisition costs, and acquisition costs per policy may be decreasing or increasing. However, allowing the acquisition costs per policy to vary with the number of policies will complicate equation (3) significantly and will prevent a closed-form solution for P_D and comparison with P_I.

potential policyholders.[13] This implies that the zero profit price for high-cost direct writers is high enough that consumers prefer to face the potential loss without insurance than to buy insurance from these firms. Therefore, low-cost insurers are the only potential direct writers, but either high-cost or low-cost insurers can become independent agency firms.[14] Since $P^L_D < P_I$, the policies will be offered at lower premiums under direct writing. This implication of the model follows the empirical evidence provided in Frech and Samprone (1980). Furthermore, the property of the model by which direct writers will have acquisition costs lower than the commissions paid by independent agency firms captures the relative inefficiency of the independent agency system alluded to in earlier research.

If a consumer chooses to search for an appropriate insurer among direct writers, he or she will continue to search until a match is found. Because consumers do not know which particular firms offer an appropriate policy, they search randomly among the direct writers, eliminating those that are inappropriate. Consequently, if F_D appropriate firms become direct writers, each has a $1/F_D$ probability of obtaining the business of a given consumer searching among direct writers. Therefore, an insurer can expect to obtain C_D/F_D consumers as a direct writer and C_I/F_I consumers as an independent agency firm.

Two-Stage Analysis

Backward induction must be used to determine the subgame perfect Nash equilibria in this market. For that reason, we begin with the second stage and analyze the optimal behavior of the consumers conditional on the insurers' choice of marketing system. We then study the first stage and examine the insurers' choice of optimal marketing system.

Consumers' Optimal Behavior

If there are appropriate insurers using both the independent agency and direct writing marketing systems, then consumers must compare their expected

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[13] The expected utility an individual obtains if he or she does not purchase insurance defines his or her risk premium, π, as follows: $(1-\theta)u(W) + \theta u(W-L) = u(W-\theta L-\pi)$. The term π represents the amount above the expected loss that the individual is willing to pay to eliminate the risk of the loss, so $\theta L+\pi$ represents the individual's valuation of an insurance policy providing full coverage. The assumption that $\varepsilon_H > \pi$ implies that $P^H_D = \theta L+\varepsilon_H > \theta L+\pi$, that is, the price of a policy from a high-cost direct writer is greater than the individual's valuation of such a policy. This assumption is not necessary to obtain coexistence of direct writers and independent agency insurers. The assumption allows us to ignore the issue of search over differing prices and focus on the matching of policyholders with appropriate insurers. Elimination of this assumption would simply complicate the analysis and result in additional equilibria that would not add any insight into the issue addressed here.

[14] This is similar to the result of Regan and Tennyson (1993) that independent agency becomes more advantageous as the insurance policies become more differentiated and search costs for firms and consumers become greater. They support this result by showing that direct writing is more common in commercial lines of insurance (which are more complex) than personal lines of insurance.

utility under the two systems. A consumer who goes to an independent agent receives utility $u(W-P_I)$ with certainty. If the consumer searches among direct writers, expected utility will be $u(W-P_D)$ minus expected search costs. A consumer's total expected search costs equal the per-contact cost multiplied by the expected number of insurers that must be contacted before a match is found. This expectation depends upon the ratio of appropriate to inappropriate direct writing insurers. More explicitly, the expected search costs for a consumer of type i, i = L,H are

$$\gamma_i\left[\frac{F_D}{F_D+N_D}+\sum_{n=2}^{N_D+1}\prod_{m=2}^{n}\left(1-\frac{F_D}{F_D+N_D-m+2}\right)n\left(\frac{F_D}{F_D+N_D-n+1}\right)\right]=\gamma_i\Omega(F_D).^{15} \quad (5)$$

Therefore, the difference in consumer expected utility between the two types of insurance marketing systems is

$$u(W-P_D)-\gamma_i\Omega(F_D)-u(W-P_I). \quad (6)$$

If expression (6) is positive (or equal to zero), the consumer prefers to search for an appropriate direct writer. If expression (6) is negative, the consumer prefers to pay a higher price and allow an independent agent to match him or her with an appropriate insurer.

Condition (6) can be rewritten in a form that will be convenient for the equilibrium analysis below. First, let

$$G(F_D)=\frac{u(W-P_D)-u(W-P_I)}{\Omega(F_D)}. \quad (7)$$

Note that $G(F_D)$ is defined on the interval $[1,F_L]$ and is a strictly increasing function of F_D, the number of appropriate insurers that become direct writers. This follows from the fact that, as F_D increases, the expected number of firms that must be contacted to find an appropriate policy, $\Omega(F_D)$, decreases. Now, expression (6) is positive (or equal to zero), and the consumer prefers to search among direct writers when $G(F_D) \geq \gamma_i$, and expression (6) is negative and the consumer prefers to go to the independent agent when $G(F_D) < \gamma_i$. If there are no direct writers, then consumers who would have preferred a direct writer choose an independent agent rather than go without insurance. If there are no independent agency insurers, then consumers who would have preferred an independent agency firm choose a direct writer rather than go without insurance. It is assumed that, if a consumer is indifferent between searching and using an independent agent, the consumer chooses to search.

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[15] Note that, with probability $F_D/(F_D+N_D)$, the consumer locates an appropriate insurer in his or her first attempt and incurs a search cost of γ_i; with probability $1-(F_D/(F_D+N_D))(F_D/(F_D+N_D-1))$, he or she locates an inappropriate insurer in his or her first attempt (and eliminates that insurer from the sample) and locates an appropriate one in the second attempt, hence incurring a search cost of $2\gamma_i$, and so on.

Insurers' Optimal Strategies

We now analyze the insurer's optimal strategies and the resulting equilibria. As indicated above, a consumer's choice between the two marketing systems crucially depends on the values of $G(F_D)$ and γ_i. For the equilibrium analysis in this section, the two extreme values of the $G(F_D)$ function, $G(1)$ and $G(F_L)$, will be particularly useful. Since $G(F_D)$ is an increasing function and since $\gamma_H > \gamma_L$, there are six possible relationships between $G(1)$, $G(F_L)$, and the search costs:[16]

1. $\gamma_L < \gamma_H < G(1) < G(F_L)$.
2. $G(1) < G(F_L) < \gamma_L < \gamma_H$.
3. $\gamma_L < G(1) < G(F_L) < \gamma_H$.
4. $\gamma_L < G(1) < \gamma_H < G(F_L)$.
5. $G(1) < \gamma_L < G(F_L) < \gamma_H$.
6. $G(1) < \gamma_L < \gamma_H < G(F_L)$.

This section analyzes the equilibria corresponding to each of the six parameter conditions.

Recall that this is a two-stage game where each insurer makes a marketing system choice in the first stage, taking the choices of the other insurers as given, and each consumer chooses which system to use in the second stage, taking the choices of the insurers and the other consumers as given. The second-stage optimal behavior of the consumers is discussed above. In the first stage, the insurer's objective is to maximize its expected number of policyholders. It is assumed that if an insurer can obtain no policyholders, it drops out of the market and that if an insurer is indifferent between the independent agency and direct writing systems, it chooses direct writing.[17] It also is assumed that $C_L > (C_H+C_L)/F$, which implies that, if consumers with low search costs prefer to search, there are enough of these consumers to induce a single insurer to become a direct writer if all insurers market through independent agents.[18]

Some additional notation will be helpful for the equilibrium analysis below. If $G(1) \leq \gamma_L$, then define $\hat{F}_D$ as the smallest integer for which $G(\hat{F}_D) \geq \gamma_L$. Also, if $G(F_L) \geq \gamma_H$, then define $\tilde{F}_D$ as the smallest integer for which $G(\tilde{F}_D) \geq \gamma_H$. $\hat{F}_D$ is the minimum number of insurers that must become direct writers in

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[16] We ignore the equality signs under which consumers are indifferent between direct writing and independent agency when F_D is either one or F_L.

[17] Because empirical findings show that independent agency firms are less efficient, previous studies have questioned why competition has not eliminated the independent agency system. This and the following assumption give the direct writer system the benefit of the doubt. Given that our purpose here is to explain the existence of the independent agency system, these assumptions will strengthen our results.

[18] C_L is the number of consumers a single firm will get by deviating and becoming a direct writer if the consumers with low search costs prefer to search, and $(C_H+C_L)/F$ is the expected number of consumers the insurer will obtain if it remains with all the others as an independent agency firm.

order to induce consumers with low search costs to search, and $\tilde{F}_D$ is the minimum number of insurers that must become direct writers in order to induce consumers with high search costs to search.

Next, we analyze the equilibria under each of the six possible cases. The first two parameter conditions each lead to a unique equilibrium that does not include coexistence of the two marketing systems, because consumer search costs are either sufficiently low or sufficiently high that all consumers prefer one marketing system over the other.

1. $\gamma_L < \gamma_H < G(1) < G(F_L)$. This condition implies that the search costs of consumers with low and high search costs are sufficiently low that they would all prefer to search themselves, rather than pay the additional premium to an independent agent, even if there is only one appropriate insurer among direct writers. Under this condition, there is a unique subgame perfect Nash equilibrium where all consumers use direct writers, all F_L insurers with low acquisition costs become direct writers, and all F_H insurers with high acquisition costs drop out of the market. If at least one low-cost insurer becomes a direct writer, all consumers will choose that direct writer. Given consumers' optimal behavior in the second stage, any equilibrium where there are no direct writers will not be sustainable because each low-cost insurer will have an incentive to deviate in the first stage by becoming a direct writer and capturing the whole market. Furthermore, no independent agency insurer will have consumers, so all insurers with low acquisition costs become direct writers and all insurers with high acquisition costs drop out of the market.

2. $G(1) < G(F_L) < \gamma_L < \gamma_H$. This condition implies that consumer search costs are sufficiently high that they would prefer to let an independent agent find an appropriate insurer for them even if all the F_L insurers with low acquisition costs become direct writers. In this case, there is a unique subgame perfect Nash equilibrium where all F insurers become independent agency firms and all consumers use an independent agent. If at least one insurer chooses to use independent agents, then all consumers go to an independent agent. Any direct writer will have an incentive to deviate and become an independent agency insurer. If all insurers use independent agents, then there is no incentive for any to deviate.

The first two conditions represent the two extreme cases where the search costs of all consumers are either sufficiently low or sufficiently high that the corresponding equilibrium involves either only direct writing or only independent agency. The next four conditions contain intermediate cases where direct writing and independent agency can coexist.

3. $\gamma_L < G(1) < G(F_L) < \gamma_H$. This condition implies that, if at least one insurer becomes a direct writer and one becomes an independent agency firm, the consumers with low search costs would prefer to search for a direct writer, and the consumers with high search costs would prefer the independent agent.

Proposition 1: When $\gamma_L < G(1) < G(F_L) < \gamma_H$, there is a unique subgame perfect Nash equilibrium where all consumers with high search costs go to the independent agent, all consumers with low search costs search among direct

writers, and all insurers with high acquisition costs become independent agency firms. If the proportion of consumers with low search costs is greater than or equal to the proportion of insurers with low acquisition costs—that is, if $\frac{C_L}{C} \geq \frac{F_L}{F}$—then all low-cost insurers become direct writers. But, if the proportion of consumers with low search costs is less than the proportion of insurers with low acquisition costs—that is, if $\frac{C_L}{C} < \frac{F_L}{F}$—then the number of direct writers is $F_D^* \varepsilon [1, F_L]$, where F_D^* is the smallest integer for which $\frac{C_L}{F_D^*+1} < \frac{C_H}{F-F_D^*}$, and the remaining $F_L - F_D^*$ insurers with low acquisition costs become independent agency firms. For proof of this proposition, see the Appendix.

In this case, when F_L low-cost insurers become direct writers, then $\frac{C_L}{F_L} \geq \frac{C_H}{F-F_L}$. That is, a direct writing insurer, on average, has at least as many customers as an independent agency insurer, because the proportion of consumers attracted to the direct writer system is greater than the proportion of insurers with acquisition costs low enough to survive as direct writers. This result is consistent with the empirical findings of Sass and Gisser (1989) and Berger, Cummins, and Weiss (1995) that direct writing firms tend to be larger than independent agency firms.

4. $\gamma_L < G(1) < \gamma_H < G(F_L)$. This condition implies that, if at least one insurer of each type exists, consumers with low search costs prefer to search, but consumers with high search costs may or may not prefer to search depending upon how many appropriate insurers become direct writers; the more such firms there are, the easier it is to find a match.

Proposition 2: Two subgame perfect Nash equilibria exist when $\gamma_L < G(1) < \gamma_H < G(F_L)$. The first, equilibrium 2.1, is characterized by all consumers searching among direct writers, all F_L low-cost insurers becoming direct writers, and all F_H high-cost insurers dropping out of the market. Under the second equilibrium, 2.2, the number of insurers and consumers using each marketing system depends upon the proportion of consumers that have low search costs, C_L/C. If $\frac{C_L}{C} \geq \frac{\tilde{F}_D}{F+1}$, then the equilibrium number of direct writers is $F_D^* = F_L$, all consumers search, and the high-cost insurers drop out of the market, so no insurers or consumers use the independent agency system. If $\frac{C_L}{C} < \frac{\tilde{F}_D - 1}{F+1}$, then all consumers with high search costs and all high-cost insurers use the independent agency system. F_D^* insurers with low acquisition costs become direct writers, where F_D^* is the smallest integer in the interval $[1, \tilde{F}_D - 1)$ for

which $\frac{C_L}{F_D+1} < \frac{C_H}{F-F_D}$, and F_L-F_D^* insurers with low acquisition costs use the independent agency system.[19] For proof of this proposition, see the Appendix.

Note that, for $\gamma_L < G(1) < \gamma_H < G(F_L)$, if direct writers and independent agency insurers do coexist, some of the independent agency insurers must be firms with low acquisition costs. If enough low-cost insurers become direct writers, then direct writers are attractive to all consumers. On the other hand, if enough low-cost insurers decide to use the independent agent system, then consumers with high search costs will be attracted to that market. When low-cost insurers consider using independent agents, the proportion of consumers that they can attract under each marketing system is a deciding factor. If C_L/C is sufficiently low relative to C_H/C, then independent agency may provide a better opportunity for obtaining potential policyholders. The more low-cost insurers using independent agency, the fewer customers available per firm, so there is a limit to the number of insurers that will be attracted to that market. Therefore, it is possible that, in equilibrium, these low-cost insurers are divided among the two marketing systems.

5. $G(1) < \gamma_L < G(F_L) < \gamma_H$. This condition implies that, if at least one firm of each type exists, consumers with high search costs prefer an independent agent, and consumers with low search costs may or may not prefer to search depending upon how many appropriate insurers become direct writers.

Proposition 3: Two potential subgame perfect Nash equilibria exist when $G(1) < \gamma_L < G(F_L) < \gamma_H$. The first, equilibrium 3.1, is where all consumers go to an independent agent, and all F insurers use the independent agency system. The number of insurers and consumers using each marketing system under the second potential equilibrium, 3.2, depends upon the proportion of consumers that have low search costs, C_L/C. If $\frac{C_L}{C} < \frac{\hat{F}_D}{F+1}$, then the equilibrium number of direct writers is $F_D^* = F_L$, and all consumers and firms use the independent agency system. If $\frac{C_L}{C} \geq \frac{\hat{F}_D+1}{F+1}$, all consumers with low search costs search; F_D^* low-cost insurers become direct writers, where F_D^* is the smallest integer in the interval $(\hat{F}_D, F_L]$ for which $\frac{C_L}{F_D+1} < \frac{C_H}{F-F_D}$, and F_L-F_D^* low-cost insurers

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[19] If $\frac{\tilde{F}_D-1}{F+1} \leq \frac{C_L}{C} < \frac{\tilde{F}_D}{F+1}$, then the equilibrium number of direct writers is either $F_D^* = \tilde{F}_D$-1 or $F_D^* = F_L$.

use the independent agency system.[20] For proof of this proposition, see the Appendix.

6. $G(1) < \gamma_L < \gamma_H < G(F_L)$. In this condition, the number of appropriate direct writers determines whether consumers with low and/or high search costs search.

Proposition 4: Three subgame perfect Nash equilibria exist in this case, one where all insurers and all consumers use the independent agency system; a second where all low-cost insurers become direct writers, all consumers search, and all high-cost insurers drop out of the market; and a third where the number of insurers using the direct writing system depends upon the ratio of consumers with low search costs, C_L/C. The third equilibrium may be characterized by the coexistence of the two marketing systems, as is the case for $\gamma_L < G(1) < \gamma_H < G(F_L)$ and $G(1) < \gamma_L < G(F_L) < \gamma_H$. The number of direct writers under an equilibrium with coexistence must be in the interval $[\hat{F}_D, \tilde{F}_D\text{-}1]$, and the equilibrium conditions are those discussed for equilibria 2.2 and 3.2 with the exception of this additional restriction on the interval.

Discussion of Results

The intuition behind these results is simple. Consumers use the least costly method of search for an appropriate insurer. If the consumers' search costs (including consumers with high search costs) are low enough, then they will all be searching; hence, only the direct writing system will survive. Conversely, if consumers' search costs (including consumers with low search costs) are high enough, they will all delegate the search process to an independent agent; hence, only independent agency insurers will survive. In intermediate cases, the ratio of consumers with high and low search costs as well as their search costs will determine the equilibrium number of direct writing and independent agency insurers, subject to the equilibrium condition that no insurer would want to switch from its current marketing system to the other system. Although the insurers pay the agent a commission that is higher than the search costs of direct writers, they are able to pass on some of the commission cost to consumers who are willing to pay a higher premium in order to avoid the cost of searching for a direct writer. As indicated at the beginning of this article, the driving factor behind these equilibria is the consumers' search behavior.

Even in a very simple environment where there are no incentive problems between insurers and agents, where there are no quality differences between the policies offered by direct writers and independent agents, and even where the insurance premiums are at the zero-profit level and are common knowledge, we can still explain the coexistence of direct writing and independent

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[20] If $\frac{\hat{F}_D}{F+1} \leq \frac{C_L}{C} < \frac{\hat{F}_D+1}{F+1}$, then the equilibrium number of direct writers is either $F_D^* = \hat{F}_D$ or $F_D^* = 0$.

agency systems as an equilibrium phenomenon. The only requirement for this result is that some consumers must incur high search costs to locate an appropriate insurer.

It is easy to show that, if we extend the model to involve search for price as well, then the unique equilibrium price in the independent agency market would be the zero-profit price. The only requirement for such an equilibrium is that independent agents inform consumers of all the insurers with appropriate policies and their prices (it is assumed that agents do not have the power to steer customers to higher-priced firms in order to increase their commission). The intuition for this result is simple. Since each independent agent represents all the independent agency insurers in the market, the lowest priced firm would capture the whole market, resulting in all firms charging the same price in equilibrium. If all insurers charge the zero-profit price, then no firm would deviate and raise its price, because it would lose all its customers. If, on the other hand, all insurers charge a price above the zero-profit price, then each firm would have an incentive to lower its price and capture the whole market.

While the consumers in the independent agency market would have their agents perform the price search for them, the consumers in the direct writing market would search for a low price on their own.[21] We cannot unbundle search for price from search for a proper match. Consequently, it is not necessarily true in our model that the zero-profit price will be the unique equilibrium price in all the cases considered here. There are, however, two cases in our model where the zero-profit price can be endogenously derived as an equilibrium outcome. These are the cases studied in propositions 1 and 2, $\gamma_L < G(1) < G(F_L) < \gamma_H$ and $\gamma_L < G(1) < \gamma_H < G(F_L)$, both of which involve an equilibrium where all consumers with low search costs search among direct writers and all consumers with high search costs go to the independent agent. Let $\gamma_L = 0$ (low-cost consumers' search costs are zero). The consumers in the direct writing system will search until they find the lowest priced appropriate insurer. As a result, in equilibrium each insurer will charge the zero-profit price. Note that, since $\gamma_L = 0$ satisfies the parameter conditions in the two cases and since the current results are already based on the assumption that prices are regulated at the zero-profit level, we retain the current division of consumers and insurers between the two marketing systems. So the assumption of an exogenously determined zero-profit price is not necessary to obtain an equilibrium with coexistence of the two marketing systems.

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[21] One way of obtaining a zero-profit price equilibrium in the direct writing system is to assume that when a consumer searches, he or she obtains two or more price quotes (Burdett and Judd, 1983; Salop and Stiglitz, 1977). Such an assumption, however, is not realistic for our model, because, in order to obtain a price, the consumer and the insurer also need to establish that they are appropriate for each other.

The absence of price search in our model strengthens our results. Because consumers can obtain price quotes for many insurers by going to an independent agent, the presence of price search makes the independent agency system more attractive for consumers. What we have shown is that, even in the absence of such an advantage, the independent agency and direct writing systems can coexist.

The relationships between the number of consumers with low and high search costs, actual consumer search costs, and the number of insurers with low and high acquisition costs determine the type of equilibrium predicted by our model. Coexistence of the two marketing systems is likely when consumer search costs per contact differ enough between consumers with high and low search costs that they prefer different approaches to finding an appropriate insurer. Firms' behavior affects consumer preferences since the number of direct writers affects expected search costs.

Although the importance of search costs in insurance markets has been shown empirically in Mathewson (1983) and Dahlby and West (1986), a direct test of our theory for the coexistence of the two marketing systems is difficult to design because it requires a data set that would enable us to control these parameters of our model (i.e., search costs and the number of high-cost and low-cost insurers and consumers). Pauly, Kunreuther, and Kleindorfer (1986) use rough proxy variables for costs of information and search in their market share equations—in particular, the percentage of the population with a college education, the percentage that recently moved, and the percentage of the workforce in white-collar jobs. A more precise data set might be obtained through either carefully designed surveys or laboratory experiments. We regard the latter approach as more efficient and are currently considering tests for our results using experimental techniques.

Conclusion

Empirical studies by Joskow (1973), Cummins and VanDerhei (1979), and Barrese and Nelson (1992) indicating that independent agency insurers have higher costs than direct writers lead to the question of why competition in insurance markets has not eliminated the independent agency system. Most earlier studies answered this question by analyzing the incentive problems between the firms and the agents. This article uses a search theoretic approach to provide an alternative explanation. By incorporating search strategies of consumers as well as insurers, we show that the search cost differentials among consumers and acquisition cost differentials among insurers can lead to equilibria where direct writing and independent agency coexist in the same market. In these equilibria, the firms and consumers with higher search costs choose to avoid searching and use the services of an independent agent. Consumers with lower search costs use the direct writer system. The division of

insurers with low acquisition costs between the two marketing systems depends on search costs and the number of low- and high-cost consumers and insurers.

It is assumed in the model that each insurer charges the zero-profit price. As a result, consumers do not search for a lower priced policy, but rather to locate an appropriate insurer. This is in line with the fact that many states regulate insurance rates. However, some states have competitive rating laws. Since search is costly, it is not necessarily true that each insurer will set the same price in that environment. Although we have shown that there exist certain parameterizations of our model under which a unique zero-profit price can be obtained endogenously in the direct writing system, this result cannot be generalized for all parameters. The equilibrium distribution of firms across the two marketing systems likely will be different in unregulated markets. An interesting extension of the model would be to endogenize the price choice of the firms. Such an extension would enable us to compare the prevalence of independent agency in the regulated and unregulated markets.

Appendix

Proof of Proposition 1

All consumers with high search costs prefer to use an independent agent, and all consumers with low search costs prefer to search among direct writers as long as one insurer of each type exists. All insurers with high acquisition costs choose the independent agency marketing system since they can obtain some consumers (recall that insurers with high acquisition costs cannot survive as direct writers). The question that remains is what the low-cost insurers will do. The expected number of policyholders that insurers with low costs will obtain as direct writers, C_L/F_D, must be compared to the expected number of policyholders they will obtain if they become independent agency firms, $\frac{C_H}{F-F_D}$, to see if insurers in either marketing system have an incentive to deviate. The equilibrium number of direct writers must satisfy simultaneously the inequalities

$$\frac{C_L}{F_D+1} < \frac{C_H}{F-F_D} \text{ and } \frac{C_L}{F_D} \geq \frac{C_H}{F-F_D+1}. \tag{E1}$$

The first inequality in equilibrium condition 1 ensures that independent agency insurers have no incentive to deviate because they will obtain fewer policyholders if they do so, and the second inequality ensures that direct writers have no incentive to deviate. Note that there is exactly one integer value of $F_D \in [1,F_L]$ that satisfies both of these conditions.[22] This integer may be characterized as *either*

$$\text{The smallest integer value of } F_D \in [1,F_L] \text{ for which } \frac{C_L}{F_D+1} < \frac{C_H}{F-F_D} \tag{E2}$$

or

$$\text{The largest integer value of } F_D \in [1,F_L] \text{ for which } \frac{C_L}{F_D} \geq \frac{C_H}{F-F_D+1}.^{23} \tag{E3}$$

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[22] The conditions in equilibrium condition (E1) are algebraically equivalent to $\frac{C_L F}{C} - \frac{C_H}{C} < F_D^* \leq \frac{C_L F}{C} + \frac{C_L}{C}$. Since $C_L + C_H = C$, the difference between the far right-hand side and the far left-hand side terms in this latter condition is exactly one. Therefore, a single integer satisfies this condition.

[23] These alternative equilibrium conditions, (E1), (E2), and (E3), will be relevant in all cases where the coexistence of the direct writer and independent agency system is considered in the following analysis, with the qualification that the interval over which this integer must fall will vary as explained below.

Now, by our assumption that $C_L > \frac{C_H+C_L}{F}$, if all insurers use the independent agency marketing system, each insurer with low acquisition costs will have an incentive to deviate and become a direct writer. So there will be at least one direct writer. Suppose $\frac{C_L}{C} \geq \frac{F_L}{F}$. Since $C = C_L+C_H$ and $F = F_L+F_H$, this is equivalent to $\frac{C_L}{F_L} \geq \frac{C_H}{F-F_L}$, which implies that $\frac{C_L}{F_L} \geq \frac{C_H}{F-F_L+1}$; that is, F_L is the largest integer in the interval $[1,F_L]$ for which $\frac{C_L}{F_D} \geq \frac{C_H}{F-F_D+1}$ (equilibrium condition [E3]). In this case, all F_L insurers with low costs become direct writers. On the other hand, $\frac{C_L}{C} < \frac{F_L}{F}$ is equivalent to $\frac{C_L}{F_L} < \frac{C_H}{F-F_L}$, which implies that $\frac{C_L}{F_L+1} < \frac{C_H}{F-F_L}$. Since $C_L > \frac{C_L+C_H}{F}$ implies $C_L > \frac{C_H}{F}$, there exists some $F_D^* \varepsilon [1,F_L]$ which is the smallest integer value of F_D for which $\frac{C_L}{F_D+1} < \frac{C_H}{F-F_D}$ (equilibrium condition [E2]). In this case F_D^* insurers with low costs become direct writers, and the remaining $F-F_D^*$ insurers use the independent agency system.■

Proof of Proposition 2

The condition $\gamma_L < G(1) < \gamma_H < G(F_L)$ implies that all consumers with low search costs prefer to search as long as one insurer becomes a direct writer. Consumers with high search costs prefer to search if the number of direct writers is greater than or equal to $\tilde{F}_D$; if $F_D < \tilde{F}_D$, then consumers with high search costs prefer the independent agent.

Equilibrium 2.1. Given consumers' optimal behavior, if F_L insurers with low costs become direct writers, no individual insurer will have an incentive to deviate, because there will be no customers for independent agency firms since $F_L-1 \geq \tilde{F}_D$ (given that $F_L > \tilde{F}_D$ and both F_L and $\tilde{F}_D$ are integers).

Equilibrium 2.2. If $\frac{C_L}{C} \geq \frac{\tilde{F}_D}{F+1}$, then $\frac{C_L}{\tilde{F}_D} \geq \frac{C_H}{F-\tilde{F}_D+1}$. This latter condition implies that the greatest integer value of F_D for which $\frac{C_L}{F_D} \geq \frac{C_H}{F-F_D+1}$ is at least as great as $\tilde{F}_D$. So the equilibrium condition (E3) for the number of direct writers is not satisfied for any value of F_D less than $\tilde{F}_D$. But the only equilibrium number of direct writers greater than or equal to $\tilde{F}_D$ is F_L since once at

least $\tilde{F}_D$ insurers become direct writers, independent agency insurers obtain no consumers. Therefore, when $\gamma_L < G(1) < \gamma_H < G(F_L)$, the equilibrium condition for the number of direct writers, (E3) (or [E2]), has the additional restriction that the number must fall in the interval $[1,\tilde{F}_D-1)$. If $\frac{C_L}{C} \geq \frac{\tilde{F}_D}{F+1}$, then the additional restriction is not satisfied and F_L is the only equilibrium number of direct writers. When $F_D^* = F_L$ insurers become direct writers, all consumers search so no consumers remain for independent agency insurers, and insurers with high costs drop out of the market.

If $\frac{C_L}{C} < \frac{\tilde{F}_D-1}{F+1}$, then $\frac{C_L}{\tilde{F}_D-1} < \frac{C_H}{F-\tilde{F}_D+2}$. This implies that the equilibrium condition (E3) holds for some integer F_D^* strictly less than $\tilde{F}_D-1$. So the equilibrium number of direct writers F_D^* is in the interval $[1,\tilde{F}_D-1)$, consumers with low search costs search, consumers with high search costs go to the independent agent, and the remaining $F-F_D^*$ insurers use the independent agency system.[24] ■

Proof of Proposition 3

All consumers with high search costs prefer to go to the independent agent as long as at least one insurer chooses the independent agency marketing system. Therefore, all insurers with high acquisition costs use the independent agency system. Consumers with low search costs prefer to search if the number of direct writers is greater than or equal to $\hat{F}_D$; if $F_D < \hat{F}_D$, then consumers with low search costs go to the independent agent.

Equilibrium 3.1. If all insurers use the independent agency system, then consumers with both low and high search costs go to the independent agent. Furthermore, an insurer with low acquisition costs has no incentive to deviate and become a direct writer since it would obtain no consumers because $G(1) < \gamma_L < \gamma_H$.

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[24] If $\frac{\tilde{F}_D-1}{F+1} \leq \frac{C_L}{C} < \frac{\tilde{F}_D}{F+1}$, then the unique integer value of F_D which satisfies the equilibrium conditions in (E1) hold at $F_D = \tilde{F}_D-1$. Recall that $\tilde{F}_D$ is the minimum number of insurers that must become direct writers in order to induce consumers with high search costs to search. Therefore, if $F_D = \tilde{F}_D-1$ insurers are direct writers, then a deviating independent agency insurer would bring the consumers with high search costs into the search market. So the first condition in equilibrium condition (E1) is no longer relevant since an independent agency insurer that deviates and becomes a direct writer would expect to obtain $(C_L+C_H)/\tilde{F}_D$ consumers rather than $C_L/\tilde{F}_D$. The equilibrium conditions for $F_D^*=\tilde{F}_D-1$ are then $\frac{C_L}{\tilde{F}_D-1} > \frac{C_H}{F-\tilde{F}_D+2}$ and $\frac{C_L+C_H}{\tilde{F}_D} < \frac{C_H}{F-\tilde{F}_D+1}$. If these conditions are not satisfied, then $F_D^* = F_L$.

Equilibrium 3.2. If $\frac{C_L}{C} < \frac{\hat{F}_D}{F+1}$, then $\frac{C_L}{\hat{F}_D} < \frac{C_H}{F-\hat{F}_D+1}$. This latter condition implies that the greatest integer for which $\frac{C_L}{F_D} \geq \frac{C_H}{F-F_D+1}$ is less than $\hat{F}_D$. So equilibrium condition (E3) for the number of direct writers is not satisfied for any value of F_D greater than or equal to $\hat{F}_D$. But the only equilibrium number of direct writers less than $\hat{F}_D$ is zero, since direct writers obtain no consumers when less than $\hat{F}_D$ appropriate insurers become direct writers. Therefore, under relationship V, the equilibrium condition for the number of direct writers, (E3) (or [E2]), has the additional restriction that the number must fall in the interval $(\hat{F}_D, F_L]$. If $\frac{C_L}{C} < \frac{\hat{F}_D}{F+1}$, then the additional restriction is not satisfied, and zero is the only equilibrium number of direct writers. All insurers and all consumers use the independent agency system.

If $\frac{C_L}{C} \geq \frac{\hat{F}_D+1}{F+1}$, then $\frac{C_L}{\hat{F}_D+1} \geq \frac{C_H}{F-\hat{F}_D}$. This implies that the equilibrium condition (E2) holds for some integer F_D^* strictly greater than $\hat{F}_D$. So the equilibrium number of direct writers F_D^* is in the interval $(\hat{F}_D, F_L]$, the consumers with low search costs search, and the remaining $F-F_D^*$ insurers use the independent agency system.[25] ■

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[25] If $\frac{\hat{F}_D}{F+1} \leq \frac{C_L}{C} < \frac{\hat{F}_D+1}{F+1}$, then the equilibrium conditions in (E1) hold at $F_D = \hat{F}_D$. In this case, the second condition in (E1) is no longer relevant since a direct writer that deviates and becomes an independent agency insurer would expect to obtain $\frac{C_L+C_H}{F-\hat{F}_D+1}$ consumers rather than $\frac{C_L}{F-\hat{F}_D+1}$. Therefore, the equilibrium number of direct writers would be $F_D^* = \hat{F}_D$ if $\frac{C_L}{\hat{F}_D+1} < \frac{C_H}{F-\hat{F}_D}$ and $\frac{C_L}{\hat{F}_D} \geq \frac{C_H+C_L}{F-\hat{F}_D+1}$, and $F_D^* = 0$, otherwise.

References

Barrese, James and Jack M. Nelson, 1992, Independent and Exclusive Agency Insurers: A Reexamination of the Cost Differential, *Journal of Risk and Insurance,* 59: 375-397.

Berger, Allen N, J. David Cummins, and Mary A. Weiss, 1995, The Coexistence of Multiple Distribution Systems for Financial Services: The Case of Property-Liability Insurance, Finance and Economics Discussion Paper 95-22, Board of Governors of the Federal Reserve System, Washington, D.C.

Burdett, Kenneth and Kenneth L. Judd, 1983, Equilibrium Price Dispersion, *Econometrica,* 51: 955-969.

Cummins, J. David and Jack VanDerhei, 1979, A Note on the Relative Efficiency of Property-Liability Distribution Systems, *Bell Journal of Economics and Management Science,* 10: 709-719.

Cummins, J. David and S. N. Weisbart, 1977, *The Impact of Consumer Services on Independent Insurance Agency Performance* (Glenmont, N.Y.: IMA Education and Research Foundation).

Cummins, J. David and Mary A. Weiss, 1992, The Structure, Conduct, and Regulation of the Property-Liability Insurance Industry, in: A. W. Kopcke and R. E. Randall, eds., *The Financial Condition and Regulation of Insurance Companies* (Boston: Federal Reserve Bank of Boston).

Dahlby, Bev and Douglas S. West, 1986, Price Dispersion in an Automobile Insurance Market, *Journal of Political Economy,* 94: 418-438.

D'Arcy, Stephen P. and Neil A. Doherty, 1990, Adverse Selection, Private Information, and Lowballing in Insurance Markets, *Journal of Business,* 63: 145-164.

Etgar, Michael, 1976, Service Performance of Insurance Distributors, *Journal of Risk and Insurance,* 43: 487-499.

Frech, H. E. III and Joseph C. Samprone, Jr., 1980, The Welfare Loss of Excess Nonprice Competition: The Case of Property-Liability Insurance Regulation, *Journal of Law and Economics,* 23: 429-440.

Grossman, Sanford J. and Oliver D. Hart, 1986, The Costs and Benefits of Ownership: A Theory of Vertical and Lateral Integration, *Journal of Political Economy,* 94: 691-719.

Joskow, Paul L., 1973, Cartels, Competition, and Regulation in the Property-Liability Insurance Industry, *Bell Journal of Economics and Management Science,* 4: 375-427.

Kim, Wong J., David Mayers, and Clifford W. Smith, Jr, 1992, On the Choice of Insurance Distribution Systems, Working Paper, William E. Simon School, University of Rochester, Rochester, New York.

MacMinn, Richard D., 1980, Search and Market Equilibrium, *Journal of Political Economy,* 88: 308-327.

Marvel, Howard P., 1982, Exclusive Dealing, *Journal of Law and Economics,* 25: 1-25.

Mathewson, G. F., 1983, Information Search, and Price Variability of Individual Life Insurance Contracts, *Journal of Industrial Economics,* 32: 131-148.

Mayers, David and Clifford W. Smith, Jr., 1981, Contractual Provisions, Organizational Structure, and Conflict Control in Insurance Markets, *Journal of Business,* 54: 407-434.

Pauly, Mark, Howard Kunreuther, and Paul Kleindorfer, 1986, Regulation and Quality Competition in the US Insurance Industry, in: Jörg Finsinger and Mark Pauly, eds., *The Economics of Insurance Regulation* (New York: St. Martin's Press).

Regan, Laureen and Sharon Tennyson, 1993, Agent Discretion and the Choice of Insurance Marketing System, Mimeo, University of Pennsylvania, Philadelphia.

Reinganum, Jennifer F., 1979, A Simple Model of Equilibrium Price Dispersion, *Journal of Political Economy,* 87: 851-858.

Rubinstein, Ariel and Asher Wolinsky, 1987, Middlemen, *Quarterly Journal of Economics,* 102: 581-593.

Salop, Steven and Joseph Stiglitz, 1977, Bargains and Ripoffs: A Model of Monopolistically Competitive Price Dispersion, *Review of Economic Studies,* 44: 493-510.

Sass, Tim R. and Michael Gisser, 1989, Agency Cost, Firm Size, and Exclusive Dealing, *Journal of Law and Economics*, 32: 381-400.

Schlesinger, Harris and J.-Matthias Graf von der Schulenburg, 1993, Consumer Information and Decisions to Switch Insurers, *Journal of Risk and Insurance,* 60: 591-615.

Selten, Reinhart, 1975, Reexamination of the Perfectness Concept for Equilibrium Points in Extensive Games, *International Journal of Game Theory,* 4: 25-55.

Wilde, Louis L. and Alan Schwartz, 1979, Equilibrium Comparison Shopping, *Review of Economic Studies,* 46: 543-554.

Yavaş, Abdullah, 1992, Marketmakers versus Matchmakers, *Journal of Financial Intermediation,* 2: 33-58.

Yavaş, Abdullah, 1994, Middlemen in Bilateral Search Markets, *Journal of Labor Economics,* 12: 406-429.