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Abstract

Recent events involving major insurance companies and insurance brokerage firms highlight substantial incentive problems in commercial and reinsurance markets where intermediation takes place. We show that in markets with informed as well as uninformed consumers and heterogeneous risk profiles intermediation has the potential to improve social welfare. However, since intermediation reduces insurers' market power, incentives for tacit collusion are higher compared to markets without intermediation. A controversial matter in the discussion concerning insurance intermediation is the issue of compensation customs. Our analysis provides explanations for the counterintuitive observation that brokers are usually compensated by insurance companies. The rationale for the latter is the fact that a fee paid by uninformed consumers limits the insurers' ability to extract rents from informed consumers.

Keywords: insurance, brokerage, collusion, compensation, information

JEL Classification: D83; G22; J33; L1

1. Introduction

Middlemen play an important role in markets with considerable market imperfections. Essentially, as pointed out by YAVAS [1994] there are two different types of intermediaries that facilitate market transactions. Market makers, on the one hand, such as stock market specialists, act on their own account by buying a certain good from a seller at a bid price and reselling it to buyers at an ask price. On the other hand, matchmakers, like real estate brokers, simply match sellers and buyers without being an active trading party. As studied by BIGLAISER [1993], middlemen are usually experts with superior information about market conditions and product characteristics. Hence, they may enhance market efficiency by providing additional consulting services for market participants.

In insurance markets brokers act mainly as matchmakers and offer supplementary services for both policyholders and insurance companies. The social profitability of intermediation depends on the market environment in which transactions take place. In non-commercial insurance markets a broker primarily is concerned with analyzing the insured's risk profile. Typically, given the consumer's individual need for coverage, the matching product could be purchased from a variety of carriers.

In this paper we will concentrate on commercial insurance markets and reinsurance markets, where risk profiles are complex and coverage solutions tend to be more individualized. In these markets the majority of consumers might be able to assess their own needs quite accurately. However, because of capacity limits and product differentiation, the broker's function of finding a matching insurer becomes more important. The broker's comparative advantage in this context is the superior market overview. For instance, brokers can determine the necessary coverage and seek for appropriate offers among different carriers. In addition, brokers typically assume other functions such as the administration of the policy and the transfer of payments between the two parties. Subsequently, it is not very surprising

that brokers are important intermediaries particularly in the context of commercial property and liability insurance as well as in reinsurance.

However, recent events involving major insurance companies and insurance brokerage firms highlight substantial incentives for collusion in commercial and reinsurance markets with intermediation. In one, rather prominent, case collusion between an American insurance broker and several insurance companies took place.[1] A coalition of commercial insurance companies agreed to pay "contingent commissions" for brokers, and in return, the receiving brokers presented their customers high premium pseudo-offers from other coalition members. In another case, German commercial insurance companies established a cartel in order to decrease price competition and to enforce higher premiums as a reorganization measure. They particularly agreed to unify terms and conditions and exerted pressure on companies that tried to deviate from the cartel, by excluding them from certain pooling solutions.[2]

Given these examples of collusive behavior in insurance markets where intermediation plays a major role, this paper tackles the following three important questions. First of all, why is collusive behavior such a common phenomenon in insurance markets with intermediation? Secondly, what is the specific role of a broker in this context? And thirdly, to what extent does the broker's compensation affect pricing and collusive behavior of insurance companies?

In the spirit of VARIAN [1980] and SCHULTZ [2004, 2005], this paper considers a Hotelling market with differentiated products, where some consumers are unaware of their own risk profile and market prices. In a situation without intermediation uninformed consumers match randomly with one of two suppliers which leads to a significant welfare loss. In this situation, price competition is not very intensive and suppliers make strictly positive profits. When the costs for an individual risk analysis are sufficiently low,

[1] See, e.g., RUQUET, M. AND D. HAYS [2004], "Spitzer Sues Marsh For Payoffs; 2 AIG Executives Plead Guilty", *National Underwriter / Property & Casualty Risk & Benefits* 108: 6 – 10.
[2] See, BUNDESKARTELLAMT [2005], "Bundeskartellamt verhängt 130 Mio. Euro Bußgeld gegen Industrieversicherer," *Press release*, March 23.

intermediation is potentially beneficial from a social planner's point of view (see for instance BAYE AND COSIMANO [1989] or COSIMANO [1996]). However, the increase of market transparency on the consumer side intensifies competition between suppliers and lowers their profits. Therefore, markets with intermediation or high transparency are susceptible to collusion (see, e.g., SCHULTZ [2005]). As a further consequence, the suppliers' cartel has reasonable incentives to include brokers into their coalition. Moreover, incentives for collusion can affect the way intermediaries are compensated. Usually two remuneration regimes compete with each other: commission and fee-for-advice systems.[3]

In order to answer the questions identified above we use a two-step approach: Firstly, as a starting point, we highlight the potential profitability of insurance intermediation in a Hotelling insurance market with uninformed consumers in either remuneration system. Secondly, we analyze incentives for collusive behavior and evaluate the specific role of insurance brokers within the three-tier relationship between policyholders, insurance brokers and insurance companies. In this respect, we give a theoretical explanation of why a commission system, which is weakly preferable from an insurer's point of view, prevails in real insurance markets.

The remainder of the paper is organized as follows. In section 2 the model framework is introduced and a situation without intermediation is analyzed. The potential advantages of intermediation without collusion are considered in section 3. Consequently, in section 4, we regard the possibility of collusion between suppliers and evaluate the specific role of brokers in markets with uninformed consumers. Finally, section 5 concludes.

[3] For an analysis of these systems in life insurance markets with more than one intermediary and its impact on advice quality see for example GRAVELLE [1994].

2. Model without intermediation

The purpose of this section is to characterize the market result without intermediation and to determine the welfare loss which is due to the presence of uninformed consumers in the insurance market. Following D'ASPREMONT ET AL. [1979], HOTELLING [1929] and SCHULTZ [2004], we consider an insurance market with risk neutral consumers[4] that have heterogeneous preferences. A consumer is located at $x \in [0,1]$, which represents her risk profile[5]. For simplicity reasons, each individual risk profile is assumed to be associated with the same marginal cost (expected loss) $c > 0$. A consumer's willingness to pay for an insurance policy is $v > 0$, and she purchases one insurance policy at most. There are two insurance companies, $j = 0,1$, which are located at the two extremes of the city. Company 0 offers a policy at $x = 0$ and company 1 at $x = 1$.

Since insurance is a rather complex product, it is assumed that only a fraction ϕ of consumers is informed about their precise risk profile or, technically, their location in the interval $[0,1]$ and the firms' "location". (Please note again, that a firm's relative position represents its product's fit, given the consumer's profile.) Informed and uninformed consumers are uniformly distributed.

Consumers face a disutility from purchasing an imperfectly matching insurance product. If insurance companies charge premiums p_0 and p_1, consumer x receives a net utility $v - p_0 - tx$ from buying a policy from insurer 0 and $v - p_1 - t(1-x)$ from buying a policy from insurer 1, where $t > 0$ measures the marginal disutility of a mismatch[6]. An informed consumer is indifferent between buying from company 0 and 1 if she is located at

[4] For simplicity reasons consumers are assumed to be risk neutral, since we are not interested in any risk allocation problems, and the standard assumption of risk aversion does not change our qualitative results.

[5] "Risk profile" here refers to the consumer's individual preferences concerning the insurance product characteristics.

[6] If the consumer is neither located in $x = 0$ nor in $x = 1$, she is not able to buy a perfectly matching product. This leads to a difference between her most preferred product characteristics and those offered. The resulting disutility of mismatch is measured by the distance between the consumer's location *x* and the chosen product, multiplied by *t*.

$$x = x(p_0, p_1) \equiv \frac{p_1 - p_0 + t}{2t}. \tag{1}$$

Uninformed consumers only form expectations x^e regarding their actual own risk profile *x*. Their respective net utility of buying insurance coverage is $v - p_0 - tx^e$ if coverage is purchased from company 0 and $v - p_1 - t(1 - x^e)$ if consumers buy from insurer 1. Since we concentrate on symmetric Nash equilibria in pure strategies[7] where both insurance companies set the same price and serve both groups of consumers, uninformed consumers with rational expectations $x^e = 1/2$ are ex ante indifferent between both firms. Consequently, they randomly choose their insurance carrier. Subsequently, we assume that each insurance company attracts half of the uninformed consumers.

In order to simplify our analysis, the willingness to pay for consumers *v*, is assumed to be

$$v \geq c + \left(\frac{2+\phi}{2\phi}\right)t \quad ^{8}. \tag{2}$$

Insurer 0's demand is given by

$$D_0(p_0, p_1) = \phi \frac{p_1 - p_0 + t}{2t} + (1-\phi)\frac{1}{2}. \tag{3}$$

and firm 1's respective demand is given by $D_1(p_0, p_1) = 1 - D_0(p_1, p_0)$. Given (3) the profit of company 0 is

$$\pi_0 = (p_0 - c)\left(\phi \frac{p_1 - p_0 + t}{2t} + (1-\phi)\frac{1}{2}\right). \tag{4}$$

Equilibrium prices are given by

$$\frac{\partial \pi_0}{\partial p_0} = \frac{\phi(p_1 - 2p_0 - c) + t}{2t} \stackrel{!}{=} 0. \tag{5}$$

[7] For further analyses concerning mixed strategy equilibria and the existence of a pure strategy equilibrium see, e.g., SCHULTZ [2005] and VARIAN [1980].

[8] The opposite case $v < c + [(2+\phi)/2\phi]t$ is not considered, since without intermediation it would lead to separated monopolistic markets, in which both firms can set their prices independently.

Using the symmetry of the problem, one obtains the price level of

$$-\phi(p+c)+t=0 \Leftrightarrow p^{*}=c+\frac{t}{\phi} \tag{6}$$

and a resulting equilibrium profit of

$$\pi_{j}^{*}=\frac{t}{2\phi}. \tag{7}$$

The expected ex ante net utility of uninformed consumer u_{u}^{e} is given by

$$u_{u}^{*}=v-c-t\left(\frac{2+\phi}{2\phi}\right), \tag{8}$$

whereas informed consumers the respective ex ante net utility of

$$u_{i}^{*}=v-c-t\left(\frac{4+\phi}{4\phi}\right). \tag{9}$$

Comparing (8) and (9) highlights the welfare loss due to the random matching of insurance companies and uninformed consumers. Since the latter have no information about their own location, they choose their respective insurance company randomly. Thus, from a social planner's point of view, half of the uninformed consumers match with the wrong insurance company. This mismatching causes a welfare loss of

$$(1-\phi)\left(\frac{1}{2}t-\frac{1}{4}t\right)=(1-\phi)\frac{1}{4}t. \tag{10}$$

The overall welfare in the economy, given by the weighted sum of ex ante net utility $\left(u_{i}^{*}+u_{u}^{*}\right)$ and insurers' profits $\sum\pi_{j}^{*}$ is

$$\Phi^{*}=(1-\phi)\left(v-c-t\left(\frac{2+\phi}{2\phi}\right)\right)+\phi\left(v-c-t\left(\frac{4+\phi}{4\phi}\right)\right)+\frac{t}{\phi}. \tag{11}$$

After some manipulations of (11) one obtains

$$\Phi^{*}=v-c-t\left(\frac{2-\phi}{4}\right). \tag{12}$$

The derived overall welfare without intermediation is the reference for the social profitability of intermediation in markets with uninformed consumers.

3. Intermediation without collusion

In this section a completely non-strategic insurance broker or middleman is incorporated into the analysis. We focus on the welfare increasing effect of an honest intermediary who exclusively improves the matching process between uninformed consumers and insurance companies.

In the considered situation a middleman can only be valuable, if he has – compared to uninformed consumers and insurance companies – access to superior information. To keep things as simple as possible, the middleman is assumed to be endowed with an information technology that incurs variable cost $k > 0$ and reveals the position x of a consumer perfectly.

Our analysis will be divided into two parts which differ with respect to the payment structure between insurance company, broker and consumer. In the first case, the broker is compensated directly by the insureds (fee-for-advice system). Particularly, neither communication nor monetary transfers between the broker and the insurance company are taking place. In this remuneration system, an insurance company cannot distinguish informed and initially uninformed consumers, who were informed by a broker.

In the second case, insurance companies pay the broker (commission system). As the broker is compensated for every individual initially uninformed consumer, insurance companies are able to distinguish the different types of consumers.

Fee-for-advice system

Let us now turn to the analysis of the fee-for-advice remuneration system. The sequence of the game is as follows: At stage 1 insurance companies simultaneously announce their prices p. Then, at stage 2, the middleman makes a price offer m for an individual risk analysis.[9] At stage 3, uninformed consumers decide whether to request a risk analysis or not. Finally, at stage 4, all consumers decide whether and where to purchase an insurance policy.[10]

Solving the game by backward induction, we start analyzing stage 4. Given the equilibrium price offers p^f, uninformed consumers who decided not to have a risk analysis performed by the middleman still choose their insurer at random. Furthermore, informed consumers buy their insurance policy at the "nearest" insurance company. Uninformed consumers prefer to become informed about their own risk profile, if

$$v - p^f - m - \frac{1}{4}t \geq v - p^f - \frac{1}{2}t \quad \Leftrightarrow \quad m \leq \frac{1}{4}t. \tag{13}$$

If $k \leq (1/4)t$, the middleman makes non-negative profits of $\kappa^f = (1-\phi)(m-k)$.[11] In this situation all uninformed consumers purchase the risk analysis and become informed about their own risk profile. In a situation where the performance of a risk analysis is not profitable and $k > (1/4)t$ holds, all uniformed consumers prefer to remain uniformed about their risk profile. Therefore, no intermediation takes place and the equilibrium results derived in section 2 are unchanged.

The profitability condition $k \leq (1/4)t$ has direct implications for the relevance of intermediation in different types of insurance markets. As the product space in our model is normalized to one, we cannot directly model different types of markets. Our model, however,

[9] We do not consider any specific kind of explicit negotiations with any arbitrary allocation of bargaining power, because this would just imply a reallocation of rents between the middleman and insurance companies.

[10] Since in equilibrium all uninformed consumers either ask for the broker's services or remain uninformed, other sequences have no impact on the qualitative results. The game could be reorganized without any loss of generality so that the broker offers the price for his service at stage 1, just before the insurers announce their premiums.

[11] For the sake of simplicity, we assume that uninformed consumers accept the offer, if they are indifferent between accepting and rejecting.

still enables us to draw conclusions based upon specific characteristics of commercial versus individual insurance markets. Obviously, given the product space, different types of insurance markets can in our framework be characterized by the parameters k and t.

Real insurance markets' structure suggests that intermediation tends to be more relevant in commercial and reinsurance than in non-commercial markets. This observation can also be explained in our framework. One could argue that the range of potential risk profiles in commercial markets is relatively larger than in non-commercial markets, implying that the disutility of mismatch, measured by *t*, ceteris paribus is greater in commercial markets. Although the costs of risk analyses *k* in commercial insurance markets are as well presumably greater than in non-commercial markets, intermediation becomes more profitable, if the relative increase in the disutility of mismatch exceeds the increase in the risk analyses costs.

When the risk analysis performed by the middleman is profitable, eventually each consumer makes an informed decision. Using $\phi = 1$ and $0 \le m \le 1/4t$ [12], the analysis of section 2 leads directly to the equilibrium premium

$$p^f = c + t \tag{14}$$

and a resulting equilibrium profit of

$$\pi_j^f = \frac{t}{2}. \tag{15}$$

In a situation in which consumers pay the brokerage fees directly, the ex ante expected net utility of informed and uninformed consumers is given by

$$u_i^f = v - c - \frac{5}{4}t \tag{16}$$

and

[12] Again, a variation of *m* can be interpreted as a change in the allocation of bargaining power between the parties involved.

$$u_u^f = v - c - \frac{5}{4}t - m \tag{17}$$

The resulting overall welfare Φ^f in this situation equals the weighted sum of the ex ante net utility of consumers $\left(u_i^f + u_u^f\right)$ and both the profits of the middleman κ^f and the insurance companies $\sum \pi_j^f$.

$$\Phi^f = \phi\left(v - c - \frac{5}{4}t\right) + (1-\phi)\left(v - c - \frac{5}{4}t - m\right) + t + (1-\phi)(m-k). \tag{18}$$

Rearranging (18) leads to

$$\Phi^f = v - c - \frac{1}{4}t - (1-\phi)k\,. \tag{19}$$

Given that intermediation is profitable, and $k \leq (1/4)t$ holds, the lower bound for (19) is given by

$$\underline{\Phi}^f \geq v - c - \frac{2-\phi}{4}t = \Phi^*. \tag{20}$$

In this case, intermediation leads to an increase in welfare if and only if $k < (1/4)t$. Thus, if intermediation is individually rational for uninformed consumers, it will also be profitable from a social planner's point of view. However, a comparison of (7) and (15) indicates that market intermediation by a middleman reduces the insurers' profits.

Commission system

Turning towards the commission system, we will now address whether or not the latter result concerning the social profitability of intermediation remains the same. The analysis again is divided into two parts. First we assume that insurers cannot distinguish between the different groups of consumers and therefore offer their products at a uniform price. The second step will introduce the possibility of price discrimination, which gives insurance companies the opportunity to offer different prices for informed and uninformed consumers.

For the analysis of the first case, we can directly use the results of section 2 and additionally implement a broker's service fee m, which has to be paid by the insurers. This leads to

$$\pi_0 = \left(p_0 - c - (1-\phi)m\right)\frac{p_1 - p_0 + t}{2t}. \tag{21}$$

Equilibrium prices are now characterized by

$$\frac{\partial \pi_0}{\partial p_0} = \frac{p_1 - 2p_0 + c + (1-\phi)m + t}{2t} \overset{!}{=} 0. \tag{22}$$

Using the symmetry of the problem, one obtains the price level of

$$-\left(p - c - (1-\phi)m\right) + t = 0 \Leftrightarrow p^c = c + (1-\phi)m + t. \tag{23}$$

and a resulting equilibrium profit of

$$\pi_j^c = \frac{t}{2}. \tag{24}$$

The result equals the one for the situation in which the insureds pay for the broker's service. The only difference is a redistribution of income from informed to uninformed consumers since the latter only pay a fraction $(1-\phi)m$ of the risk analysis fee.

Now consider the case of price discrimination. The price for informed consumers p_i^d can be derived directly from the analysis in section 2 as

$$p_i^d = c + t. \tag{25}$$

Uninformed consumers additionally pay for the broker's services. The insurance companies maximize the premium offers subject to the restriction that the consumers' net utility is not lower than in the case in which the broker is directly paid by the consumer. This condition is due to the fact that the broker would still be able to offer its services directly to the insureds who could subsequently purchase insurance at the price for informed consumers. The latter constraint directly leads to

$$p_u^d = c + t + m. \tag{26}$$

Using the prices p_i^d, p_u^d and assuming that the insurer pays the amount m to the broker, the profit for an individual insurer is given by

$$\pi_j^d = \frac{t}{2}.^{13} \tag{27}$$

Considering the analysis in this section, the presence of insurance brokers strengthens incentives of insurance companies to override competition in order to raise their profits[14]. In the next section we will analyze these incentives and the impact of tacit collusion between insurance companies upon welfare and middlemen compensation.

4. Intermediation and collusion

In the previous section the middleman's only function was to provide information for uninformed consumers. After information is revealed by the broker, consumers are able to find the best matching product by themselves. In order to introduce the possibility of collusion, we now extend the previous game structure by introducing a stage 0 where insurance companies bargain over explicit contracts. Insurers then present the middleman with a certain offer for his service. The minimum profits required by members of the coalition are the payoffs in the case without collusion. Particularly, the following participation constraints

$$\pi_j^{tc} \geq \frac{t}{2}. \tag{28}$$

and

$$\kappa^{tc} \geq 0 \tag{29}$$

[13] However, insurance companies may be able to increase their profits by only paying a fraction of m to the broker. Since the broker's cost of risk analysis is $k < m$, the insurer's maximum possible profit is $\tilde{\pi}_j^d = \frac{t}{2} + (1-\phi)(m-k)$, which includes a redistribution of income from the broker to the insurance companies but has no effect on social welfare. Nevertheless, for the remainder of the analysis we will not consider such a situation.

[14] If insurance companies can decide upon their optimal product characteristics, product differentiation will, due to the increasing transparency on the consumer side, decrease compared to the situation without intermediation. However, profit-maximizing locations are still outside [0,1] (see SCHULTZ [2004] for further details).

must hold.

Condition (28) considers the fact that an insurance company's individual profit under collusion must weakly exceed the profits π_j^f or π_j^c without collusion. The non-negativity constraint (29) is due to the ability of the colluding insurers to exclude the broker from the market. If the broker offers a fee-for-advice service simultaneously, the sum of fee, insurance premium and costs of mismatch of an uninformed consumer would exceed his initial willingness to pay.

From a cartel's point of view two questions need to be answered: First, would the coalition benefit from a situation where every uninformed consumer acquires information and thus becomes an informed consumer? Secondly, is rationing beneficial, i.e. could it be preferable for the coalition to design the product in such a way that it would not be purchased by every consumer?

Initial situation without rationing

The straightforward approach for the coalition is to maximize their overall profit given the limited willingness to pay v. The decision problem regarding the risk analysis is unchanged compared to section 3. Therefore, irrespective of the payment arrangements for a broker's service, the performance of risk analysis activities is profitable from the coalition's point of view whenever $k \leq \frac{1}{4}t$ holds. The optimal arrangement must ensure that uninformed consumers purchase the risk analysis service. Moreover, after the risk analysis it must be individually rational for all types of consumers to purchase insurance coverage.

The second constraint is only fulfilled if and only if consumers located at $x = \frac{1}{2}$ that face the maximum disutility of $\frac{1}{2}t$ would choose to purchase insurance coverage. The consumers' participation constraint has a direct impact on the optimal design of payment arrangements.

Again, the fee-for-advice and the commissions system need to be analyzed separately. At first glance, both payment structures seem to be payoff equivalent from the coalition's point of view. However, this is not the case, as the following considerations clarify.

Commission system

In a commission system without rationing every uninformed consumer will purchase the product after receiving information regarding her risk profile from the broker, so long as the premium does not exceed

$$p_c^{tc} = v - \frac{1}{2}t \,.^{15} \tag{30}$$

This implies that insurance companies charge all consumers the maximum possible premium (30) and only remunerate the broker for services provided to the uninformed consumers. This leads to additional costs of $(1-\phi)k$. Thus, the overall profit for the coalition is

$$\Pi^{tc} = v - c - \frac{1}{2}t - (1-\phi)k \,. \tag{31}$$

Fee-for-advice system

Now, again, assume the situation where the broker is paid directly by uninformed consumers. Consequently, insurance companies are unable to distinguish between informed consumers and previously uninformed consumers. Hence, insurance can only be offered at a uniform premium p_f^{tc}. The implementation of a fee $m \geq k$ paid by uninformed consumers would lower the maximum feasible insurance premium for previously uninformed consumers. Therefore, insurance companies would have to reduce their premium offers for all consumers by m in order to guarantee participation by all types of consumers. The maximum feasible premium in a fee-for-advice system therefore is

[15] Price discrimination is not considered in the case of collusion. It is not beneficial for the insurers, as decreasing the premium for some consumers would just lead to lower profits.

$$p_f^{tc} = v - \frac{1}{2}t - m \tag{32}$$

which leads to the coalitions overall profit

$$\Pi_f^{tc} = v - c - \frac{1}{2}t - (1-\phi)k - \phi m\,. \tag{33}$$

A comparison of (31) and (32) reveals that the resulting loss for the coalition corresponds to $\phi \cdot m$ (as the fee is only collected from initially uninformed consumers). Therefore, a payment regime where brokers are compensated by insurance companies is strictly preferable for the coalition.

Rationing

At this point, the possibility of rationing needs to be added to our analysis. The question is, whether or not it is more profitable for the insurers to increase prices in order to extract additional rents from some consumers, while others do no longer purchase insurance, as their willingness to pay is exceeded.

It must be taken into account that a premium greater than the expression in (30) will exclude all uninformed consumers from buying the product. The resulting profit is therefore

$$\Pi_i^r = 2x\phi(v - c - xt), \quad x \in \left[0, \frac{1}{2}\right], \tag{34}$$

where *2x* represents the fraction of informed consumers purchasing the product at a premium

$$p_i^r = v - xt, \quad x \in \left[0, \frac{1}{2}\right]. \tag{35}$$

If, and only if, $\frac{\partial \Pi_i^r}{\partial x} < 0$ holds, rationing is profitable for the coalition. The marginal profit under rationing is given by

$$\frac{\partial \Pi_i^r}{\partial x} = 2\phi(v - c - 2xt)\,, \quad x \in \left[0, \frac{1}{2}\right]. \tag{36}$$

Thus, a necessary condition for rationing to be profitable is

$$v < c + t\,. \tag{37}$$

Comparing (37) and (2) implies that rationing is never profitable. Thus, insurers' coalition does not have any incentives to ration consumers by increasing their prices beyond p_i^r in order to raise overall profits. In particular the initial profit under collusion (31) can not be exceeded by rationing consumers.

5. Conclusions

In the light of recent events in commercial insurance markets, this paper considers collusion incentives and compensation structure for insurance brokers. In markets with uninformed consumers and heterogeneous risk profiles, intermediation has the potential to improve social welfare. However, since intermediation reduces insurers' market power, incentives for tacit collusion are higher compared to markets without intermediation.

A controversial matter in the discussion concerning insurance intermediation is the issue of compensation customs. Our analysis provides an explanation for the counterintuitive observation that brokers are usually compensated by insurance companies. As long as intermediation is profitable, it is irrelevant from a social welfare point of view whether brokers are paid by uninformed consumers or by insurance companies. From the insurers' point of view, though, a system in which brokers are solely compensated by insurance companies is strictly preferable when the demand side consists of informed and uninformed consumers. The rationale for this is the fact that a fee paid by uninformed consumers limits the insurers' opportunity to extract rents from both types of potential insureds.

A limitation of our analysis is the fact that we do not examine the broker's incentive problem. In our model the broker acts completely non-strategic. Particularly, every uninformed consumer is matched with the nearest supplier. However, in reality brokers may have incentives to mismatch uninformed consumers. For example, when commissions for different products vary and disutility of mismatching is non-verifiable, brokers are able to

collect contingent commissions from suppliers for directing additional consumers to them. Contrasting our results, such a situation with strategic experts market intermediation may not necessarily lead to an increase of social welfare.[16]

[16] See, e.g., DARBY AND KARNI [1973]; EMONS [1997]; WOLINSKY [1993].

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