

Focht, Uwe; Richter, Andreas; Schiller, Jörg

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**Uwe Focht, Andreas Richter  
und Jörg Schiller**

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# Intermediation and Matching in Insurance Markets\*

Uwe Focht<sup>†</sup>, Andreas Richter<sup>‡</sup> and Jörg Schiller<sup>§</sup>

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## Abstract

This paper addresses the role of independent insurance intermediaries in markets where matching is important. A controversial matter in the discussion concerning insurance intermediation is the issue of compensation customs and how the latter affect prices, rents and advice quality in insurance markets. This work compares a fee-based with a commission-based system. We show that in a situation with a non-strategic intermediary both remuneration systems are payoff-equivalent. In a second step, allowing for strategic behavior, we discuss the impact of remuneration on the quality of advice. The analysis shows that the possibility of mismatching can provide the intermediary with substantial market power which however does not translate into mismatching as long as consumers have rational expectations. We offer a rationale for the use of contingent commissions. In addition, this paper addresses whether or not the recent ban of any commission payments as introduced in countries such as Denmark and Finland is an appropriate market intervention.

**JEL Classification:** G22, G24, L51

## 1 Introduction

Middlemen play an important role in markets with significant 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

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<sup>†</sup>Swiss Re, Munich, Germany, uwe@focht.de

<sup>‡</sup>Professor, Chair in Risk & Insurance, Ludwig-Maximilians University Munich, Institute for Risk and Insurance Management, Schackstr. 4/III, 80539 Munich, Germany, phone +49 89 2180 3755, fax +49 89 2180 993755, richter@imu.de

<sup>§</sup>Professor, Chair in Insurance and Social Systems, University of Hohenheim, Fruwirthstr. 48, 70599 Stuttgart, Germany, phone +49-711-459-22869, fax +49-711-459-23953, j.schiller@uni-hohenheim.de.

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 consulting services for market participants.

In insurance markets independent agents and brokers act mainly as matchmakers and offer supplementary services for both policyholders and insurance companies. The work of Regan (1997) as well as Regan and Tennyson (1996) suggests that independent agents are better at both assessing risk and servicing consumers in more uncertain markets and in complex product lines than for example exclusive agents. However, the primary market function of intermediation depends on the market environment in which transactions take place. One distinction with respect to the intermediary's role obviously needs to be made between life and property-liability insurance (see, for instance, Regan and Tennyson, 2000). In life insurance markets the broker is mainly concerned with writing new business and matching consumers with appropriate insurance products. In property-liability insurance, typically renewal business matters significantly besides new business. Depending on the line of insurance the broker also has an important function in collecting and providing risk information for the insurance company in order to prevent adverse selection.

Commissions paid by insurance companies are still the major source of underwriting-related income for independent intermediaries. Most commission payments are related to the signing of the contract and condition mostly on the insurance premium. In addition to these "premium-based commissions", intermediaries may also receive "contingent commissions". These commissions are ex post payments of insurance companies which base on various performance criteria such as profitability of the business placed or the volume of business with that specific insurer.

Recent events involving major insurance companies and insurance brokerage firms have directed the focus of attention to the remuneration of independent agents and brokers. In one rather prominent case, collusion between one of the biggest American insurance brokers and several insurance

companies took place.<sup>1</sup> A coalition of commercial insurance companies agreed to pay contingent commissions for brokers, and in return, the receiving brokers presented their consumers high premium pseudo-offers from other coalition members. Partly in response to the above-mentioned incident, regulatory changes have been introduced around the world. For example, Finland and Denmark have implemented a ban of any insurance company-paid commissions.<sup>2</sup> Other European countries have yet not gone that far, but introduced voluntary codes of conduct according to which brokers are not allowed to be compensated by both sides of the market, insurance companies and consumers, at the same time.<sup>3</sup> These developments amplify an ongoing discussion which had already led to interventions, such as the European Directive (2002/92/EC) on insurance intermediation. The latter aimed at improving broker service quality by means of information and documentation requirements in combination with professional liability and mandatory liability insurance. In addition to this, some regulators address transparency of compensation directly. As part of its reform of insurance contract law, Germany, for instance implemented an act that makes life insurance companies disclose the amount of acquisition and distribution costs as part of the insurance premium.<sup>4</sup>

In order to understand and evaluate existing compensation customs, the economic implications of different feasible compensation regimes have to be analyzed. In our view, the current compensation-related discussion boils down to answering the following questions: Who should pay the broker (consumer vs. insurer)? What is an adequate compensation basis (in particular volume vs. profitability)? Should the amount of broker compensation be transparent for the consumer? Naturally, well-founded answers to these questions require an analysis that pays attention to the characteristics of the specific insurance markets in question.

In this paper, we are concentrating on lines of insurance where the broker is mainly concerned with adequate matching and the broker's role in collecting and providing information for the insurer

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<sup>1</sup>See, e.g., Ruquet and Hays (2004).

<sup>2</sup>See, European Commission (2007), p. 100.

<sup>3</sup>See, Ladbury (2007), p. 29.

<sup>4</sup>See, German Ministry of Justice, "Bundestag adopts new law on insurance contracts," Press Release, July 5, 2007.

is of minor importance. Examples may be certain markets for life and property-liability insurance, where products are complex for the consumer and the main task for a broker is finding an adequate product. Of course we acknowledge that in these lines of insurance information regarding the consumer's risk type is critical and is actually normally collected by the broker as part of the underwriting process. Our point, however, is that most information collected is "hard" in the sense that this information is verifiable ex post, implying that truthful information disclosure can be enforced by means of contractual provisions. Therefore, the broker's discretion or in other words her influence on the quality of information for an insurance company is limited. Given the focus of our theoretical analysis, we are able to derive some general results with respect to the question of who should compensate the broker. Regarding the compensation basis and transparency, our results suggest intuitive and straightforward conclusions which however strongly depend on the structure of our framework. Hence, further analytical research into these aspects seems to be quite promising.

Generally, in respect to the compensation of brokers there is a general intuition that favors a fee-for-advice system, where the broker is compensated by the consumer. One rather naive reason for this kind of opinion is that in a fee-for-advice system advice and the insurance product are sold separately. Thus, welfare would be greater under a fee-for-advice system, because in this remuneration system the broker is not directly affected by the purchasing decision of the potential policyholders. Gravelle (1993, 1994) tackles this type of argument by a theoretical comparison of commission and fee-for-advice based compensation systems for independent life-insurance agents. In his model brokers face search cost, and entry in the broker market is endogenous. One of the problems he identifies is that too few consumers become informed under a fee regime. Consequently, even though a fee-based compensation system may lead to a higher intermediation quality, it is not necessarily superior to a commission system once the number of brokers and overall purchases by consumers are taken into account. Hofmann and Nell (2008) compare a fee-for-advice and a commission system in a duopoly market with uninformed consumers where only matching matters. They show that in a situation with a completely non-strategic broker commissions are superior

to a fee-for-advice system, due to consumers' transaction cost. In contrast to their model, we explicitly consider the impact of compensation on the quality of advice which in our view is one of the key issues with respect to the discussion about regulatory action. Schiller (2008) considers a duopoly market where both matching and risk classification of consumers matter. In this setup also the commission system is superior, as it provides incentives for proper risk classification. Cummins and Doherty (2006) emphasize that profit-related contingent commissions should align insurance companies' and brokers' interests with respect to consumers' risk classification. In this respect, Regan and Kleffner (2007) empirically explore the impact of contingent commissions on the underwriting performance of insurance companies. Among other things they find that higher proportions of contingent commissions are associated with lower loss ratios which supports the incentive argument for contingent commission payments. In contrast to this result Ma et al. (2008) show that the usage of contingent commissions is associated with cost and revenue inefficiencies.

This paper challenges recent regulatory ambitions to ban commissions in a specific environment where the broker is only concerned with matching consumers with appropriate insurance products. One of our first straightforward results is that the choice of compensation system and hence the question of who should compensate the broker is irrelevant as long as the broker acts completely non-strategic. In this setting both a commission and a fee-for-advice system are – apart from bargaining power issues – payoff equivalent. The broker's superior information about the consumers' best match together with the ability to mismatch gives the broker endogenous bargaining power with respect to insurance companies. In a pure fee-for-advice system the broker is unable to execute her bargaining power because she cannot collect any payments from insurance companies. This limitation, on the one hand side, has the advantage that the broker does not have any incentives for mismatching, as mismatching reduces the consumers' willingness to pay for the intermediation service and consequently the feasible fee-for-advice. On the other hand, the broker is tempted to engage in side-contracting with insurance companies in order to transform her bargaining power into monetary payments. As long as side-contracting is efficient, both insurance companies will agree on side-payments (contingent commissions) to the broker in order to prevent losing market share



and consumers will in equilibrium be perfectly matched. Hence, when strategic mismatching by the broker is feasible, a fee-for-advice system with efficient side-contracting is again payoff equivalent to a commission system, because in a commission system insurance companies explicitly compete in commission rates and mismatching is actually not taking place in equilibrium. However, if brokers are by law not allowed to collect any payments from insurance companies, efficient side-contracting is questionable. As the broker is still interested in executing her bargaining power, she might be tempted to illegally collect certain payments from a limited number of insurance companies which might imply mismatching incentives. In consideration of our results, one can argue that any regulatory action which gears into a ban of commission payments to the broker's is likely to be ineffective or even worse might unintentionally lead to mismatching incentives.

The remainder of the paper is organized as follows. In section 2 the model framework is introduced and a situation without intermediation is analyzed. Section 3 determines outcomes in intermediated insurance markets and in particular compares a fee-for-advice with a commission system when brokers act completely non-strategic. Consequently, in section 4, we compare both remuneration systems when the broker strategically matches consumers and discuss further implications of the model regarding recent regulatory reforms and voluntary codes. Finally, section 5 concludes.

## 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<sup>5</sup> who have heterogeneous preferences. A consumer is located at  $x \in [0, 1]$ , which represents his risk profile.<sup>6</sup> For simplicity reasons, each individual risk

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<sup>5</sup>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 basic trade-offs and hence qualitative results. For a model with risk-averse consumers see, e.g., Hofmann and Nell (2008).

<sup>6</sup>"Risk profile" here refers to the consumer's individual preferences concerning the insurance product characteristics.

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 he purchases one insurance policy at most. There are two insurance companies,  $j = 0, 1$ , which are located at the two extremes of the risk profile interval. 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  $\phi \in (0, 1]$  of consumers is informed about their precise risk profile or, technically, their location in the interval  $[0, 1]$  and the firms' "location". Informed and uninformed consumers are uniformly distributed.

Consumers face a disutility from purchasing an imperfectly matching insurance product. If insurance companies charge premiums  $\alpha_0$  and  $\alpha_1$ , consumer  $x$  receives a net utility  $v - \alpha_0 - tx$  from buying a policy from insurer 0 and  $v - \alpha_1 - t(1 - x)$  from buying a policy from insurer 1, where  $t > 0$  measures the marginal disutility of a mismatch.<sup>7</sup> An informed consumer is indifferent between buying from company 0 and 1 if she is located at

$$x = x(\alpha_0, \alpha_1) \equiv \frac{\alpha_1 - \alpha_0 + t}{2t} \quad (1)$$

Uninformed consumers only form expectations  $x^e$  and  $\alpha^e$  regarding their actual own risk profile  $x$  and prices  $\alpha$ . Their respective net utility of buying insurance coverage is  $v - \alpha_0^e - tx^e$  if coverage is purchased from company 0 and  $v - \alpha_1^e - t(1 - x^e)$  if consumers buy from insurer 1. Since we concentrate on symmetric Nash equilibria in pure strategies<sup>8</sup> where both insurance companies set the same price  $\alpha^*$  and serve both groups of consumers, uninformed consumers with rational expectations  $x^e = \frac{1}{2}$  are ex ante indifferent between both firms, since  $\alpha_0^e = \alpha_1^e = \alpha^*$ . Consequently, they randomly choose their insurance carrier. Subsequently, we assume that each insurance company attracts half of the uninformed consumers.

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<sup>7</sup>If the consumer is neither located in  $x = 0$  nor in  $x = 1$ , he is not able to buy a perfectly matching product. This leads to a difference between his 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  $t$ .

<sup>8</sup>For further analyses concerning mixed strategy equilibria and the existence of a pure strategy equilibrium see, e.g., Hofmann and Nell (2008), Schultz (2005) and Varian (1980).

In order to simplify our analysis, the willingness to pay for consumers  $v$ , is assumed to be<sup>9</sup>

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

Insurer 0's demand is given by

$$D_0(\alpha_0, \alpha_1) = \phi \frac{\alpha_1 - \alpha_0 + t}{2t} + (1 - \phi) \frac{1}{2}. \quad (3)$$

and firm 1's respective demand is given by  $D_1(\alpha_1, \alpha_0) = 1 - D_0(\alpha_0, \alpha_1)$ . Given (3) the profit of company 0 is

$$\pi_0(\alpha_0, \alpha_1) = (\alpha_0 - c) \left[ \phi \frac{\alpha_1 - \alpha_0 + t}{2t} + (1 - \phi) \frac{1}{2} \right]. \quad (4)$$

Equilibrium prices are given by

$$\frac{\partial \pi_0}{\partial \alpha_0} = \frac{\phi [\alpha_1 - 2\alpha_0 + c] + t}{2t} \stackrel{!}{=} 0. \quad (5)$$

Using the symmetry of the problem, one can obtain the symmetric Nash equilibrium price level of

$$\alpha^* = c + \frac{t}{\phi} \quad (6)$$

and a resulting equilibrium profit of

$$\pi_j^* = \frac{t}{2\phi}. \quad (7)$$

The expected ex ante net utility of uninformed consumers  $u_u^e$  is given by

$$u_u^e = v - c - t \left( \frac{2 + \phi}{2\phi} \right), \quad (8)$$

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<sup>9</sup>The opposite case is not considered, since without intermediation there would be two separated monopolistic markets, in which both insurance companies can set their prices independently.

whereas informed consumers derive the respective expected ex ante net utility of

$$u_i^e = v - c - t \left( \frac{4 + \phi}{4\phi} \right). \quad (9)$$

Comparing (8) and (9) highlights the welfare loss due to the random matching of insurance companies and uninformed consumers. Since the latter do not have any 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

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

Using (7), (8), and (9), the overall welfare in the economy, given by the weighted sum of ex ante net utilities  $(u_u^e, u_i^e)$  and insurers' profits  $\sum_j \pi_j^*$  is

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

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

### 3 Intermediation

In this section a completely non-strategic insurance broker 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 broker can only be valuable, if she has – compared to uninformed consumers – access to superior information. To keep things as simple as possible, the broker 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 different consumer types.

### 3.1 Fee-for-advice

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  $\alpha_j$ . Then, at stage 2, the broker makes a take-it-or-leave-it offer  $f$  (fee-for-advice) for an individual risk analysis.<sup>10</sup> 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.<sup>11</sup>

Solving the game by backward induction, we start analyzing stage 4. At this last stage we have to distinguish two different types of initially uninformed consumers: uninformed who requested a risk analysis at stage 3 and those who decided to stay uninformed. Both groups have three options: Buy insurance from company 0, buy insurance from company 1 or stay uninsured. If consumers prefer to stay uninformed, they will at stage 4 expect symmetric price offers  $\alpha_j = \alpha \forall j$  and randomly purchase insurance from one of the two insurance companies. Therefore, if  $\alpha \leq v - \frac{1}{2}t$ , uninformed consumers prefer to buy insurance. As any fee-for-advice is sunk at stage 4, consumers at the location  $x \in [0, 1]$  who consulted with a broker are indifferent between purchasing insurance

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<sup>10</sup>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 broker and insurance companies.

<sup>11</sup>Since in equilibrium all uninformed consumers either ask for the broker's services or remain uninformed, other game 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.

from company 0 and company 1 if

$$v - \alpha_0 - tx - f = v - \alpha_1 - (1 - x)t - f \quad (12)$$

and therefore

$$x = \frac{\alpha_1 - \alpha_0 + t}{2t}. \quad (13)$$

Thus, if insurance companies charge symmetric prices with  $\alpha_j = \alpha \ \forall j$ , initially uninformed consumers, who became informed at stage 3, prefer to buy their insurance policy at the “nearest” insurance company if  $\alpha \leq v - \frac{1}{2}t$  holds. In this case, the expected utility of becoming informed is  $v - \alpha - f - \frac{1}{4}t$ . Without loss of generality, we now use the interim assumption that both consumer types purchase insurance at stage 4. The fact that insurance is purchased by all types of consumers in equilibrium will be shown subsequently.

At stage 3 uninformed consumers prefer to become informed about their own risk profile if

$$v - \alpha - f - \frac{1}{4}t \geq v - \alpha - \frac{1}{2}t \Leftrightarrow f \leq \frac{1}{4}t. \quad (14)$$

At stage 2 the broker offers her risk analysis service at  $f = \frac{1}{4}t$  and yields non-negative profits of<sup>12</sup>

$$\kappa^f = (1 - \phi) \left( \frac{1}{4}t - k \right). \quad (15)$$

In this situation – due to (12) – all uninformed consumers purchase the risk analysis and become informed about their own risk profile. As the broker makes a take-it-or-leave-it offer, the equilibrium fee-for-advice is  $f = \frac{1}{4}t$ . Otherwise, if  $k > \frac{1}{4}t$  holds, all uninformed consumers prefer to remain uninformed about their risk profile. Therefore, no intermediation takes place and the equilibrium results derived in section 2 are unchanged.

The profitability condition  $k \leq \frac{1}{4}t$  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,

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<sup>12</sup>For the sake of simplicity, we assume that uninformed consumers accept the offer if they are indifferent between accepting and rejecting.

we cannot directly model different types of markets. Our model, however, 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.

Given that the risk analysis performed by the broker is profitable, eventually each consumer makes an informed decision at stage 4. Therefore, the insurers' price decision at stage 1 is as if all consumers are initially informed. Using  $\phi = 1$  and  $f = \frac{1}{4}t$ <sup>13</sup>, the analysis of section 2 leads directly to the equilibrium premium

$$\alpha^f = c + t \quad (16)$$

and a resulting equilibrium profit of

$$\pi_j^f = \frac{t}{2} \quad (17)$$

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

$$u_i^f = v - c - \frac{5}{4}t \quad (18)$$

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<sup>13</sup> Again, a variation of  $f$  can be interpreted as a change in the allocation of bargaining power between the parties involved.

and

$$u_u^f = v - c - \frac{3}{2}t \quad (19)$$

The resulting overall welfare  $\Phi^f$  in this situation equals the weighted sum of the ex ante net utilities of consumers (18) and (19) and both the profits of the broker (15) and the insurance companies (17) with

$$\Phi^f = v - c - (1 - \phi)k - \frac{1}{4}t = \Phi^*. \quad (20)$$

In this case, intermediation leads to an increase in welfare if and only if  $k \leq \frac{1}{4}t$ . 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 (17) indicates that market intermediation by a broker reduces the insurers' profits. This is due to an increase in market transparency which intensifies price competition in the insurance market.

### 3.2 Commission system

Turning towards the commission system, we now address whether or not the latter result concerning the social profitability of intermediation remains the same. Generally, in a commission system brokers are compensated by insurance companies for successful intermediation. Therefore, in this system insurance companies have the opportunity to discriminate prices between informed consumers, uninformed consumers and initially uninformed consumers who received information from the broker. First of all, a commission system has the potential advantage for insurance companies to extract additional rents from uninformed consumers if they can prevent these consumers from buying contracts designed for informed ones. With respect to price discrimination we consider two cases which differ in regard to price differentiation abilities between uninformed and informed consumers.

In line with the previous section the sequence of the game with a commission system is as follows: At stage 1 insurance companies simultaneously announce their prices  $\alpha_{ij}$  for informed and  $\alpha_{uj}$  for uninformed consumers. Then, at stage 2, the broker makes a price offer  $g$  (commission) for



an individual risk analysis. At stage 3, uninformed consumers decide whether or not to request a risk analysis. Finally, at stage 4, all consumers decide whether and where to purchase an insurance policy.

In a commission system the decision problem for uninformed consumers at stages 3 and 4 is only slightly changed compared to the fee-for-advice system. The request for a risk analysis on stage 3 is initially free of charge as the insurance company bears the commission  $g$ . If uninformed consumers utilize the broker's risk analysis service and subsequently purchase insurance, the commission  $g$  will affect prices for insurance at stage 4.

Considering the group of informed consumers first, the price  $\alpha_{ij}$  for informed consumers can be derived directly from the analysis in section 2 using  $\phi = 1$ . The equilibrium insurance premium for informed consumers therefore corresponds to

$$\alpha_i^c = c + t \quad (21)$$

If markets for informed and uninformed consumers cannot be separated, uninformed consumers are able to buy insurance products which are designed for informed consumers. Consequently, they have three available options: Not purchasing any insurance, directly purchasing insurance without any risk analysis and buying insurance after utilizing the broker's service. In a commission system not buying insurance is in any case associated with a net utility of zero. If uninformed consumers decide to buy insurance, they will be able to directly buy insurance from a randomly chosen insurance company at the price. Purchasing insurance after the performance of a risk analysis is profitable for uninformed consumers as long as

$$v - \alpha_u - \frac{1}{4}t \geq v - c - \frac{3}{2}t \quad (22)$$

holds. The LHS of (22) corresponds to the utility of uninformed consumers from buying insurance coverage via the broker, whereas the RHS relates to the utility from randomly buying insurance coverage from one of the two insurance companies in the market for informed consumers.

In equilibrium, insurers will set premiums such that (22) holds as an equality. Rearranging this, we get

$$\alpha_u^c = c + \frac{5}{4}t. \quad (23)$$

Obviously,  $\alpha_u^c = \alpha_i^c + \frac{1}{4}t$ . Due to (2) both uninformed and informed consumers derive a positive net utility from purchasing their designated contract at the prices  $\alpha_i^c$  and  $\alpha_u^c$ .

At stage 3, the broker makes a take-it-or-leave-it commission offer  $g$  to the insurance companies. Due to the fact that the broker would still be able to offer her services under a fee-for-advice system directly to uninformed consumers, who could subsequently purchase insurance at the price for informed consumers, the commission offer  $g$  makes insurance companies indifferent between both remuneration systems. Therefore,

$$\frac{1}{2}(\phi\alpha_i^c + (1 - \phi)[\alpha_u^c - g] - c) = \pi_j^f \quad (24)$$

must hold. Rearranging (24) by using (17), (21), (23) yields

$$g = \frac{1}{4}t \quad (25)$$

Consequently, as the broker extracts the revenue of intermediation, insurance companies' profits

$$\pi_j^c = \frac{t}{2} \quad (26)$$

as well as social welfare for  $k \leq \frac{1}{4}t$

$$\Phi^c = v - c - (1 - \phi)k - \frac{1}{4}t = \Phi^* \quad (27)$$

are unchanged compared to the fee-for-advice system.

Our analysis so far has shown that the choice of compensation and hence the question of who

should compensate the broker is irrelevant as long as the broker acts completely non-strategic. Under the assumptions of this section, both commission and fee-for-advice system are – apart from bargaining power issues – payoff equivalent.<sup>14</sup>

## 4 Quality of advice

The previous analysis implicitly rests on the assumption that the broker acts completely non-strategic and matches each uninformed consumer with the appropriate insurance product. Comparisons for different broker's remuneration systems, however, should definitely account for strategic behavior of both the broker and the insurance companies, since a fee-for-advice and a commission system may lead to different incentives with respect to quality of advice. In respect to the quality of advice, maybe the most persistent reservation to a commission system is based on the argument summarized by Gravelle (1994) that

(...) "a commission system gives greater incentives to provide biased advice to unsophisticated potential consumers."<sup>15</sup>

In the light of this reservation we briefly evaluate a broker's incentives for bad advice under the different remuneration systems. In our model setup the broker might engage in matching uninformed consumers with the inappropriate insurance company, but she will only do so if this is profitable and increases her payoffs.

Let us now consider a situation in which the broker is interested in increasing her own payoffs by means of mismatching. As we assume that consumers are rational, any mismatching activities negatively affect the expected disutility of uninformed consumers and respectively the ex ante profitability of intermediation. At first we only consider the case in which the broker colludes

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<sup>14</sup>This result changes if insurance companies are able to distinguish between ex ante uninformed and informed consumers. It can be shown that in a commission system brokers and insurance companies have an incentive to separate markets in order to extract rents from uninformed consumers. If this separation of markets between ex ante uninformed and informed consumers is feasible, a commission system is the preferable compensation system both for the broker and the insurance companies. However, the separation of markets does not affect social welfare. It solely affects the allocation of rents.

<sup>15</sup>Gravelle (1994), p. 425

with insurance company  $j = 0$ . Hence, the broker is able to steer a total amount  $\lambda \in [0, \frac{1}{2}]$  of uninformed consumers whose appropriate provider of coverage is insurance company  $j = 1$  to insurance company  $j = 0$ .

Generally, for any given  $\lambda$ , the expected disutility of mismatching for uninformed consumers corresponds to

$$\left[ \left( \frac{1}{2} + \lambda \right)^2 + \left( \frac{1}{2} - \lambda \right)^2 \right] \frac{t}{2} = \left[ \frac{1}{4} + \lambda^2 \right] t \quad (28)$$

In a fee-for-advice system the ex ante participation constraint of uninformed consumers with mismatching changes to

$$v - \alpha - f - \left[ \frac{1}{4} + \lambda^2 \right] t \geq v - \alpha - \frac{1}{2}t \Leftrightarrow f \leq \left[ \frac{1}{4} - \lambda^2 \right] t. \quad (29)$$

As the disutility strictly increases in  $\lambda$ , an obvious implication of (29) is that any mismatching negatively affects the broker's ability to extract rents from uninformed consumers via a fee-for-advice  $f$ . Therefore, if the broker is not able to receive any payments from insurance companies, she will not engage in any mismatching activities. In this case the market outcome corresponds to our analysis in section 3.1.

However, considering the equilibrium in a pure fee-for-advice system, there are substantial incentives for side-contracting when the latter is feasible. In order to illustrate the incentives, let us consider a very simple situation, where the insurance premiums correspond to  $\alpha^f = c + t$  and the broker does not face any costs from mismatching, due to a future loss of reputation.<sup>16</sup> In this case, the broker can reach an agreement with insurance company  $j = 0$  that she – in return for certain payments – directs  $\lambda$  uninformed consumers whose appropriate provider of coverage is insurance company  $j = 1$  to insurance company  $j = 0$ . Any side-contracting opportunities give the broker endogenous bargaining power, because following the broker's advice is a weakly dominant strategy for uninformed consumers. Hence, the broker can threaten to steer all uniformed consumer to the other insurer if a side-contract is rejected.

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<sup>16</sup>See, e.g., Bolton et al. (2007) or Schiller (2008) for such models.

Subsequently, we illustrate this endogenous bargaining power for a simple bonus contract  $B(b) = \max\left(\left(D_0 - \frac{1}{2}\right)b, 0\right)$ . This contract pays a flat per capita bonus (contingent commission) for every redirected uninformed consumer. If company 0 accepts the side-contract, the resulting profits for both insurance companies are

$$\pi_0 = \frac{t}{2} + (1 - \phi)\lambda[t - b] \quad (30)$$

and

$$\pi_1 = \frac{t}{2} - (1 - \phi)\lambda t. \quad (31)$$

As long as  $b \leq 2t$ , company 0 always accepts the side-contract, because its profits are higher than its profits without any uninformed consumers ( $\phi \frac{t}{2}$ ). Hence, the broker maximizes her profits by offering the bonus contract  $B(2t)$  and choosing  $\lambda = \frac{1}{2}$ . Uninformed consumers anticipate that the broker will match all consumers with the same insurance company. Thus, they are indifferent between buying insurance coverage from the broker or randomly buying insurance from either insurance company. Their willingness to pay for the intermediation service is zero which implies  $f = 0$ , because all consumers that should be matched with company 1 are matched with 0.

However, side-contracting with only one insurance company is suboptimal if intermediation is profitable with  $k \leq \frac{1}{4}t$ . In this situation, performing the risk analysis and matching every consumer with the appropriate provider of insurance coverage increases the extractable rent and social welfare by  $\frac{1}{4}t - k$ . The broker will therefore offer a bonus contract  $B_j^{mf}(t) = \max(D_j t, 0)$  to each insurance company together with the fee-for-advice  $f^{mf} = \frac{1}{4}t$  for uninformed consumers. Both insurance companies weakly prefer to accept the bonus contract and uninformed consumers also weakly prefer to accept the fee-for-advice, because they will be matched with the appropriate insurance company with  $\lambda^{mf} = 0$ . Consequently, in a fee-for-advice system with efficient side-contracting consumers' expected utility is unchanged compared to a situation without side-contracting with  $u_i^{mf} = v - c - \frac{5}{4}t$  and  $u_u^{mf} = v - c - \frac{3}{2}t$ . Profits of insurance companies are reduced to  $\pi_j^{mf} = \phi \frac{t}{2}$ . The broker's profit is  $\kappa^{mf} = (1 - \phi)\left[\frac{5}{4}t - k\right]$ . Compared to a situation without strategic intermediation, side-

contracting only affects the distribution of rents between the broker and the insurance companies. Social welfare corresponds in this case to the situation with truthful intermediation with  $\Phi^{mf} = v - c - (1 - \phi)k - \frac{1}{4}t = \Phi^*$ .

Let us now turn to mismatching incentives in a commission system. Considering our previous results it is striking that the incentive pay in a side-contracting situation and in particular the bonus rate  $b$  resembles a contingent commission paid by the insurance company. This indicates that the analysis for a pure commission system works in a quite similar manner. The main difference in a commission system is the fact that both companies explicitly compete for uninformed consumers. In equilibrium the broker can offer the commission rate  $g^{mc} = \frac{5}{4}t$  to both companies. Hence, a commission system with mismatching opportunities for the broker will lead to a second-best outcome with  $u_i^{mc} = v - c - \frac{5}{4}t$ ,  $u_u^{mc} = v - c - \frac{3}{2}t$ ,  $\pi_j^{mc} = \phi \frac{t}{2}$ ,  $\kappa^{mc} = (1 - \phi) [\frac{5}{4}t - k]$  and  $\Phi^{mc} = v - c - (1 - \phi)k - \frac{1}{4}t = \Phi^*$ . In respect to real markets, a commission system seems to be the straightforward approach for reaching efficient market outcomes, due to the explicit competition for uninformed consumers.

Before we summarize our main results it may be worthwhile to discuss how our analysis relies on the specific model framework. First of all, one may suppose that whenever insurance companies have some bargaining power, they are actually able to realize additional profits from mismatching activities and mismatching may become some kind of rent-seeking activity for insurance companies. As a matter of fact, the distribution of bargaining power between the broker and the insurance companies should neither affect the distribution of rents nor the broker's mismatching intensity. The reason for this result is quite straightforward. Due to her discretion regarding whether and how to match uninformed consumers, the broker always has a certain endogenous bargaining power. An individual insurance company has incentives to outbid its opponent as long as accepting the side-contract leads to weakly higher profits than rejecting it. However, competition in the broker market may limit the broker's rent extraction abilities by the means of potential mismatching.

The assumption that mismatching does not negatively affect the broker is also not very restrictive. If mismatching is costly, for example due to associated future losses in credibility, the broker

may not mismatch all uninformed consumers. In a situation in which mismatching costs lead to  $\lambda < \frac{1}{2}$ , some uninformed consumers will be matched with insurance company 1. Hence, costs of mismatching limit the broker's ability to extract rents from insurance companies. However, consumers' utility is not affected by any mismatching costs. In respect to social welfare mismatching costs will be substituted by reputation costs.

## 5 Conclusions

The core question that this paper addresses is: which party (insurer or consumer) should compensate the insurance broker? The analysis shows that, when brokers act completely non-strategic, the choice of remuneration system in matching markets does not matter. In both remuneration systems the broker perfectly matches all uninformed consumers.

However, a meaningful analysis has to take the broker's incentive problem into account. Due to her private information and the ability to mismatch uninformed consumers, the broker has endogenous bargaining power dealing with insurance companies. In a situation with a strategic broker in which (efficient) side-contracting is feasible, insurance companies have to agree upon side-payments (contingent commissions) in order not to lose market share. As long as all insurance companies pay contingent commissions, uninformed consumers will be perfectly matched. In this situation, a fee-for-advice system is again payoff-equivalent to a traditional commission system. In the latter insurance companies explicitly compete in contingent commissions and mismatching is actually not taking place as long as all companies pay these commissions. In our model contingent commissions are paid due to a prisoners' dilemma situation. Here, these commissions are just a means for the broker to extract rents from insurance companies.

However, if brokers are by law not allowed to collect any payments from insurance companies, efficient side-contracting is questionable. As the broker is still interested in executing her endogenous bargaining power, she might be tempted to illegally collect certain payments from a limited number of insurance companies which might imply certain mismatching incentives. Therefore, as one important implication, our results indicate that any regulatory action geared towards a ban

of commission payments to brokers is likely to be ineffective, or even worse, might unintentionally lead to mismatching incentives.

It is important to note that our analysis rests on the assumption of rational expectations. This approach is straightforward and in line with existing theory. However, it can not explain why insufficient advice does actually take place in real-world insurance markets with intermediation. In the light of the recent financial crisis it seems fruitful to explicitly concentrate on the formation of expectations and in particular the role of intermediaries in this context. Still, an analysis based upon rational expectations is an important first step towards understanding insurance intermediation which can serve as a benchmark for future research.

Finally, let us briefly return to our initial questions regarding compensation basis and transparency. In the light of our analysis it is questionable why the transparency of compensation should have a significant impact on advice quality. The specific amount or differences in the size of commissions should not be informative per se. However, it might be advantageous for consumers to know whether contingent commission agreements exist or not.

Our analysis provides us with an explanation of why commissions and in particular contingent commissions are being used in the market. Due to superior information brokers may possess market power and commissions may enable them to collect rents based upon this advantage. Generally, contingent commissions are not necessary for efficient matching, as long as a ban of side-payments from insurance companies can be enforced. If this is not the case, insurance companies have to agree upon contingent commissions in order not to lose market share. It needs to be highlighted though that our assumption of a monopolistic broker market amplifies this argument. In a competitive setting, where brokers possess less or no market power, they cannot collect rents from insurance companies. In order to generate net income it seems likely that brokers in this situation focus on consumers via a fee-for-advice system and offer additional services.



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Universität Hohenheim  
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Fruwirthstr. 12

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Phone +49 (0)711 / 459-22476

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