Contingency Fees and Incentives in Commercial Lines Insurance

by

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Abstract

This dissertation addresses the potential agency conflicts arising between an insurance broker and its commercial clients. Though the broker is hired to find its client the best insurance quote on the market, the broker's contractual arrangements and private information may lead it to stray from this ideal. The first chapter introduces the institutions of commercial lines insurance in the interest of providing a foundation for the empirical inquiries to follow. The second chapter asks whether contingency fees, which are annual payments rewarding the broker for attaining premium volume and profitability targets with an insurer, distort the broker's sales behavior. The analysis uses data on policies written through a privately-held insurance broker in Arizona from 1994 to 2000. I am able to identify the effect of contingency fees because individual agents working at the broker make placement decisions, and only some agents have an incentive to respond to this compensation. Contingency fees are found to distort sales toward insurers that have contracts in effect at the broker. Moreover, agents appear to respond to contractual nonlinearities and are more inclined to place business with insurers offering high marginal incentives. The third chapter asks whether the broker can effectively communicate its private information to the client if it is in the broker's immediate interest to avoid costly search. The client would like the broker to search if the client's current insurer is no longer pricing its coverage competitively. In contrast, the broker would like to avoid costly search, while retaining the client. Thus, the broker has an incentive to distort the information provided to the client, always arguing that the client's current coverage is priced competitively. If search is only warranted when a client faces an idiosyncratic price increase, the moral hazard may still induce heightened search activity in response to *systematic* price increases. The broker cannot credibly communicate to the client the fact that all prices (not just its price) have increased. Using the data set employed in the second chapter, systematic price increases are found to significantly increase client turnover among insurers consistent with the moral hazard hypothesis.

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Contents

Chapter 1

Contingency Fees and Commissions in Commercial Lines Insurance

1.1 Introduction

Much commercial insurance is marketed by insurers through insurance brokers. Insurers compensate brokers with commissions and contingency fees. Commissions are paid as a percentage of the premium on policies written through the broker. Contingency fees are paid annually by insurers opting to utilize such contracts. Payments are conditioned on the broker attaining premium volume and profitability targets with the insurer. Insurers often refer to contingency fee contracts as profit-sharing agreements, but it is clear that they are also intended to generate incentives for the broker to place coverage with the insurer. Insurers recognize that the broker often has some discretion in this dimension, as it faces policies from competing insurers that are fairly good substitutes and its commercial clients are reliant on its expertise and advice.

This chapter uses data on commissions and contingency fee contracts from two insurance brokers in Arizona from 1994 to 2000. The chapter discusses the nature of the interaction between the broker and the insurer and then turns to the broker's compensation. Particular emphasis is placed on the incentives generated by these contractual arrangements as well as the risks borne by the broker. Though much of the discussion is aimed toward providing greater context for the empirical analyses to follow in the second and third chapters of this thesis, references to these chapters are confined to the footnotes. There are two principal conclusions drawn in this study. First, there is little empirical evidence that commissions and contingency fees are used as substitutes by insurers

when compensating brokers. That is, insurers opting not to offer contingency fee contracts do not adopt higher commission rates. Second, contingency fee contracts impose considerable risks on insurance brokers. It is suggested that such 'risk-sharing' has perhaps contributed to the recent wave of consolidation in the brokerage industry.

The discussion presented here is most similar to Levine (1987) and Borenstein (1991). Those studies note the role of travel agency commission overrides (TACOs) in the airline industry and the potential moral hazard they introduce. Such TACOs are strikingly similar to the contingency fee contracts studied in this chapter. Levine (1987) and Borenstein (1991) argue that TACOs induce travel agents to favor their dominant carriers by generating strong marginal incentives to place business with these airlines. Other papers explore the response of agents to compensation schemes that lead to discrete thresholds or quotas similar to those resulting from contingency fee contracts. Asch (1990) studies the yields of Navy recruiters facing quotas. Healy (1985) and Oyer (1998) explore the possibility that bonuses based on fiscal year ends induce sales distortions.[1] Brown, Harlow, and Starks (1996) and Chevalier and Ellison (1997) study nonlinearities that arise implicitly by virtue of fund inflows. Fund managers distort portfolio risk to achieve high rankings or to lock in good performances. Finally, the current chapter is related to a host of papers that discuss alternative forms of distribution and compensation in the insurance industry. Some examples include Joskow (1973), Etgar (1976), Etgar(1977), Sass and Gisser (1989), and Gron (1998).

This chapter is organized as follows. Section 2 discusses the role of the broker as an intermediary between the insurer and the client. Section 3 introduces the data used in the analysis. Section 4 describes commission compensation, which constitutes the bulk of the broker's revenue. Section 5 turns to contingency fee contracts. It catalogues the various provisions found in these contracts, discusses how such provisions affect the broker's incentives, and highlights some contractual provisions that explain the volatility of contingency fee compensation. Section 6 asks the question of whether insurers utilize commissions and contingency fees as substitutes in compensating the broker. Section 7 concludes.

[1]These papers differ from the current study in that they envision the timing of sales being altered by agents. In Healy (1985) timing is distorted via accounting accruals, in Oyer (1998) real distortions in sales timing are envisioned. In contrast, insurance coverage cannot be timed in this fashion. Leaving the client exposed to risk or doubling up on coverage is unethical and very rare in the industry.

1.2 The Institution of the Insurance Broker

A firm faces numerous exposures to risk, each of which falls into a particular line of insurance coverage. Adopting somewhat broad definitions relative to those employed in the industry, all commercial exposures fall into one of the following lines: property, liability, commercial auto, umbrella, and workers' compensation. Commercial lines insurance thus refers to all lines of insurance purchased by firms to mitigate their exposure to risk. Commercial lines insurance is marketed via three channels, as depicted in figure 1-1. Exclusive agencies work exclusively for a single insurer. A firm approaching such an agency must itself incur any costs of searching for competing policies. Independent agencies, in contrast, represent several insurers, and each insurer cedes property rights over a client's business to the agency by virtue of an agency contract. The agency is accordingly free to place its client's business without fear of preemption by an insurer. Insurance brokers are large independent agencies that offer access to a greater number of insurers, a higher degree of specialization, and a broader suite of supplemental services. Which means of marketing is most effective depends largely on the client. Smaller clients are in the market for highly standardized policies and can easily search across insurers by approaching competing exclusive agencies or an independent agency. As clients grow in size and in the complexity of their business operations, the extended services of the broker become increasingly appealing.

The principal service offered by the insurance broker is risk analysis. The broker identifies precisely where the client bears risk and the coverage necessary to reduce that risk to levels consistent with the firm's risk tolerance. This is not the simplest of tasks, for day-to-day contracting by the client often exposes it to numerous unforeseen liabilities. As an example, contractors face significant exposure for construction work after a project's completion. Because this liability is written explicitly into its contracts, effective risk analysis requires the broker read and understand these contractual terms. This task done, the broker structures the client's coverage and shops it among competing insurers. Generally, the broker has access to a wide array of insurers directly through agency contracts. Such agency contracts grant the broker some legal authority to write insurance coverage binding the insurer.[2] In addition, the broker can access many insurers specializing in particular risks through wholesalers. Wholesalers have agency contracts in place with such insurers and act as additional intermediaries on behalf of the broker. This comes at some

[2] As mentioned above, agency contracts also place property rights to the client with the broker. Thus, the insurer cannot preempt the broker's right to placement of business by approaching the client directly or through a competing broker.

cost, with wholesalers extracting a commission from the sale. Upon being approached to write the coverage, insurers send out loss control experts to inspect the potential insured's exposures, provided they are of sufficient size to warrant this expenditure. Some insurers will simply decline to quote a price at this point, as the process is fairly costly. Insurers will also request the firm's financial records and claims history. The former is reviewed to ensure the firm has the ability to pay its requested deductibles in the event of a claim.[3] The claims history helps give the insurer a sense of the expected claims activity on the exposure.[4] After having seen the firm's financials and claims history, insurers will submit bids to the broker. These should not be thought of simply as price quotes. In reality, some insurers will shy away from particular provisions on certain risks. For example, an insurer might quote property coverage, but with a subsidence restriction such that the client bears any risk in the event its property falls into a sink hole. This can make the process of search for a client without the assistance of a broker rather difficult, for there is no explicit price in the market for a subsidence restriction. The broker, however, with experience transacting in the market, derives implicit prices for such restrictions on a policy and has a sense of how relevant the exclusionary provision is likely to be. With these quotes in hand, the broker bargains with the competing insurers, providing guidance to each with respect to the deficiencies of its quote. Generally speaking, the broker will not reveal the exact quote of any competitor. This negotiation eventually comes to an end after the incumbent insurer on the exposure has been given a final opportunity to match its competitors' quotes. The client has the ultimate say concerning which of these quotes it will accept, but only rarely will it not defer to the broker.[5] The broker is paid a commission, a percentage of the premium on the policy that is contracted upon with the insurer for its services. If the insurer has contingency fee contracts in effect, the policy placement contributes to any year-end payment. Most policies expire after one year. Though some will last for two or

[3]In the event of a claim, the insurer immediately accepts fiduciary liability to the limit on the policy and the client becomes its debtor (for the deductible). If the client cannot pay its deductible, the insurer bears this loss.

[4]The insurer currently insuring the exposure is mandated by law to provide the exposure's claims history. In practice, this does not ensure that the incumbent insurer and its competitor are on equal footing when interpreting this claims history. Claims do not settle instantly. The incumbent has a much better sense of which unsettled claims are without merit and accordingly is in a better position to price coverage.

[5]In addition, the broker provides a number of supplementary services to the client. First, the broker will occasionally provide loss control for the client and negotiate on the client's behalf arguing this cost need not be borne by the insurer itself and thus the quoted premium ought to be more generous. Loss control involves sending experts into the field to inspect premises and mitigate risk through employee training and other measures. Insurers normally bear this burden, and this is sensible as it is in their best interest: any loss that could have been prevented is borne by the insurer. Second, the broker engages in claims review and monitoring. Subsequent to a claim being reported to the underwriting insurer, the insurer rarely invests much time in keeping the client informed of litigation and progress on that claim's resolution. The broker satisfies the client's need to remained informed on this front, monitoring the claim and providing the client with regular updates.

three years, these are increasingly uncommon.[6] After this period, the incumbent insurer will quote a renewal price. The broker can either accept this quote immediately or engage in search as detailed above. If the policy is renewed, the commission is paid afresh and does not decrease.

Clients migrate between brokers either because they become dissatisfied with their broker's service or because they are approached by a competitor. When multiple brokers compete for business, the competitive process is complicated somewhat by the presence of agency contracts that restrict an insurer from quoting the same coverage through two brokers. While brokers will have agency contracts with different sets of insurers, there is significant overlap. In practice, the client will give the incumbent broker an opportunity to submit quotes from a handful of insurers and allow the competing broker to query from those remaining.[7] Clients also migrate between brokers owing to mergers. When the broker's client is acquired, the account is almost inevitably lost to the broker of the acquiring entity.

The broker is comprised of many individual insurance agents (producers), account executives, and a management team. Agents are the lifeblood of the broker, actively pursuing clients and nurturing relationships once established. The incentive schemes they face reflect the importance of their marketing activity. Agents are typically paid a percentage of the commission revenue they generate for the broker, where the percentage can vary depending on whether the commission derives from new or renewal business. This percentage might be around 30% on new business commission and 20% on renewal business.[8] Often agent compensation includes little or no fixed component.[9] Agent compensation is not normally conditioned on contingency fee revenue earned

[6]Clients also buy bonds, which are specific to an event and cease subsequent to the event's termination. For example, a fidelity bond might be purchased if a company's employees are asked to deal with large sums of money during a fund-raiser. Provided nothing is stolen, once this cash has been handled and deposited, the bond is no longer active. Bonds are known as surety business. They are excluded from all analysis of this dissertation, though both brokers write surety business. Insurers also offer separate contingency fee contracts for surety business.

[7]In theory, if the incumbent broker could anticipate the most competitive bidders and access those with which it did not have agency contracts through wholesalers, the incumbent could ensure retention of its clients. However, it is often difficult to make this assessment *ex ante*. Also, there is no restriction that a given insurer will offer its best quote through the incumbent broker. Often insurers will quote more aggressively through particular brokers with which they have strong underwriting relationships. Thus, it is possible that different sets of insurers will be competitive on a risk at different brokers.

[8]This compensation scheme results in new agents bearing significantly more risk than their older counterparts. As an agent establishes herself, her portfolio of renewal business grows. Renewal business thus generates a large, and relatively secure, portion of her annual compensation. This can become a problem for brokers. Agents who have landed a particularly large account can simply stop pursuing new business altogether. Often agents find their percentage take on renewals being ratcheted down over time as brokers respond to this potential hazard.

[9]There is some heterogeneity with respect to insurance agent compensation. As a rule, insurance agents are paid a percentage of the commission revenue they generate. One might, however, see a new agent being guaranteed an annual income for a few years. An agent failing to generate commission revenue sufficient to justify this salary will likely be fired, while an agent achieving this level will be switched to a new, purely commission-based compensation scheme. When an agent is compensated on a commission-based scheme, the broker usually smooths the agent's monthly pay. The agent receives a monthly paycheck based upon an estimate of the annual commission revenue on

by the broker. It is often very difficult to assess the contribution of a particular agent's policies to such revenue, and conditioning compensation on total contingency fee revenue exposes the agent to additional risk, for contingency fee revenue is very volatile. Agents within a broker do not actively compete against each other for clients. Generally, such competition is not encouraged by the broker. Moreover, many agents are specialists in particular industries and accordingly are rarely in pursuit of similar clients. Account executives handle claims and interactions with clients when policies are in effect. Generally, account executives are salaried, but may be given a percentage of the commission on renewal business under their charge. Management staff tends to be made up of agents and account executives who have come to assume a management role over time.[10] Many continue to be active in their original capacities, although to a lesser extent. Generally, managers are salaried or face a hybrid compensation scheme that still provides some incentive for agents to pursue new business.

Privately-held insurance brokers are often owned by established agents who dedicate some portion of their time to management. Many such agents are among the broker's founders. Others were offered equity positions as an enticement to leave a competing broker or an insurance company. Irrespective of the formal compensation scheme before such agents, the broker's partners have incentives to consider all sources of revenue to the broker owing to their profit stake. Thus, most partners are keenly aware of the contingency fee contracts in effect at the broker as well as the historical payoffs on these contracts. In contrast, employed agents are often not informed of this source of revenue to the broker. That is not to say that the broker's partners exert no influence over the placement decisions of the employed agents. On the contrary, partners will often encourage agents to write with preferred insurers when it is feasible.[11] Partners will also make placement decisions on house business, which is business that is not in the portfolio of an individual agent. As an example, an insurance agent might retire leaving his portfolio with the broker. Some business will be reassigned, but other business will simply be reclassified to the house. Acquisition of a competing insurance agency might also result in business being assigned to house accounts.

Publicly-traded brokers, such as Marsh and Aon, differ in that none of the managers has a

her portfolio, and adjustments are made to compensation at the end of the year.

[10]This prediction does not hold true of the upper echelons of publicly-traded brokers at which managers often have no experience as insurance agents or account executives prior to assuming a management role.

[11]The observation that partners influence the placement decisions of employed agents works against finding that contingency fees induce significant sales distortions in the second chapter of this thesis. The identification strategy turns on partners and employed agents having different incentives to respond to contingency fee contracts. If employed agents respond to contingency fee contracts via this informal mechanism, taking employed agents' sales as a control is not entirely appropriate.

significant equity position. Often such brokers will pay managers as a function of branch profit to generate incentives for managers to respond to contingency fee revenue and encourage agents to place business where it is likely to be most profitable.

1.3 Data

This study employs data from two insurance brokers in Arizona from 1994 to 2000. The first is the smaller of the two, generating approximately $40 million in premium annually through 2000. The broker employs eleven agents, three of whom have equity, and transacts with over 150 insurers. Insurers are defined at the level of the insurance group (or, holding company, in most cases). Figure 1-2 presents all the member companies of the American International Group (AIG) as an example of the many entities through which a single insurance group will issue insurance.[12] Many insurers have only a negligible presence at the broker: the fifteen largest insurers in terms of premium volume at the first broker write over 70% of its premium volume annually. The data for this broker are particularly good. I observe premium, commission, insurance agent, line, and underwriting insurer for 8705 policies. I also observe 51 contingency fee contracts offered by twelve insurers, along with contingency fees paid to the broker. The second broker is significantly larger, writing approximately 125 million in premium annually at the beginning of the sample and nearly 300 million in premium in 2000. Over this period, the number of agents actively placing business increases from ten to seventeen. The data from this broker are comprised only of contingency fee contracts from 1994 to 2000 with its five largest insurers paying contingency fees. This results in a total of 35 contractual observations. Inclusion of the second broker's contracts in the study does much to inform the analysis, for it provides an opportunity to see two contracts offered by the same insurer to brokers of different sizes.

Table 1.1 provides descriptions of the variables used in the analysis. Table 1.2 presents summary statistics. The mean commission rate is approximately 14% on a mean policy premium of nearly $15,000. The high standard deviation on *Premium* is indicative of the right skew of the distribution of policy premia. The variables *Auto–WorkComp* are line dummies. Package policies constitute approximately 40% of the sample; this dummy is excluded in specifications throughout the analysis.

[12]This list is taken from *Best's Key Rating Guide–Property-Casualty* (1999).

1.4 Commissions

When the broker places coverage with an insurer, the placement generates a commission, calculated as a percentage of the policy's premium. Commissions are normally set by each insurer, in accordance with its commission schedule on file with the broker. Commission rates do not differ for new and renewal business.[13] Figure 1-3 presents a sample commission schedule active in 1999 at the first broker. Commissions vary considerably by line. Property coverage has the highest commission at 20% in figure 1-3, while workers' compensation is the lowest at 4–5%. Figure 1-4 presents histograms by line of commission rates on policies written at the first broker in 1999. These histograms generally mirror the commission rates suggested by the sample commission schedule. Commission rate differentials are principally driven by differences in the broker's costs of servicing the account. For example, commission rates are high for property insurance because claims activity is very high on these accounts, owing to vandalism, theft, fire, as well as other forms of exposure. Commission rates for workers' compensation and liability policies, for which claims are less frequent, are markedly lower in comparison.

Commission rates can depart from those stipulated on the commission schedule. Exceptions will be made when the broker bears above average costs. For example, a broker usually earns a higher commission rate when it assumes some of the loss control responsibilities on an exposure that would normally be handled by the insurer. Also, when warranted by competitive conditions, insurers will deviate from their standard rates. To be competitive on an exposure when pricing against other brokers, a broker might cede a percentage point on its commission and ask the insurer to decrease its quote equivalently. This tendency explains why large clients are often able to bargain down commission rates. Finally, when an insurer is looking to make inroads in a particular market segment, commission override amendments may be issued that promise the broker an additional percentage point or two on any such business placed with the insurer over a stipulated time period.

Commission rates vary by insurer, but this variation is relatively mild in comparison to variation across lines. Quoted commission rates on an exposure usually fall within two percentage points on a policy with a commission rate of 15%.[14] While this variation is modest, for larger accounts

[13] This contrasts with life insurance, where commission rates are heavily front-end loaded: the agent's commission rate drops precipitously after the first year the coverage is written. This gives agents incentives to 'churn' business, moving it from insurer to insurer upon renewal.

[14] This assertion is impossible to verify from the data in the sample, for only the commission rate on the accepted policy is observed, not all those put forward for consideration. However, agents with whom I spoke agreed that commission rates fall within this interval over 90% of the time. As a check, I run a regression of commission rate on policy line. The standard deviation on the distribution of this regression's residuals is .04.

a one percentage point difference can result in a significant revenue swing for the broker, and more importantly, the agent placing the policy. While it is clearly disreputable to place clients with inferior coverage in response to superior commission rates, agents generally acknowledge that variation in commissions plays a role in determining which quote prevails when two insurers submit similar quotes. It should also be noted that a particular insurer will not necessarily be paying all brokers the same commission rate on a given policy. Agencies that write sufficient business with an insurer often qualify for preferred agency status. Such status entitles the agency to a preferred commission schedule, with higher commission rates, and a more generous contingency fee contract. Needless to say, these agency classes negatively affect the viability of smaller brokers that are unable to qualify.

With brokers being paid commissions based on written premium, the broker generally faces immediate financial *disincentives* to searching for better price quotes. If the broker does manage to find its client a lower premium, it is likely to result in lower total commission. This suggests one justification for contracting with the broker on a fee basis, a practice insisted upon by some larger clients. Under this form of compensation, the broker is paid a fixed fee for its services. Provided the fee does not vary with the policy chosen, search no longer imposes this particular financial cost. This is not to say that search is not costly. It utilizes the broker's resources and time that might otherwise be dedicated elsewhere. Thus, the broker must be given incentives to search. Such incentives derive from constant competition across brokers and the client's threat to initiate such competition.

1.5 Contingency Fees

A contingency fee contract is an annual compensation contract written between an insurer and a broker that rewards the broker for attaining premium volume and profitability targets with the insurer. Such contracts are based on sales over the calendar year and are generally negotiated toward the end of the previous year.[15] A broker must generate sufficient sales volume with an insurer before the insurer will consider establishing a contingency fee contract. Premium volume around $200,000 usually suffices. From 1994 through 2000, a total of 51 contingency fee contracts

[15]Contracts are often signed early in the year in which they are active, perhaps in February or March. This is potentially problematic for the identification strategy of the second chapter of this thesis, in which contingency fee contracts are taken to be exogenous. Sales in January or February could influence contractual form or even whether an insurer chooses to offer the broker a contract. However, signing in February or March is often more of a formality, the decision of whether to offer the broker a contract having been made some months earlier.

are in effect at the first broker. Table 1.3 presents the series of all contingency fee contracts for the fifteen insurers with the greatest premium volume at the first broker over the sample period, from largest to smallest by volume. An entry of 1 indicates the presence of a contingency fee contract; 1* denotes payment on the contract. No payments are recorded in 2000 because the data end in July 2000. No insurer outside of the top thirteen has a contingency fee contract in effect. There are two observations to take from this figure. First, contracts are persistent. Once the broker establishes sufficient volume, the broker and the insurer work to maintain that volume to ensure the broker qualifies for contingency fee contracts in future years. Second, payments on these contracts are fairly sporadic. Even for the largest insurers at this broker, payments are by no means a foregone conclusion. A similar table cannot be constructed for the second broker, for only contractual data from select insurers is available. This amounts to 35 contingency fee contracts over the sample period, offered by five insurers.

In principle, these contracts allow large premium volume insurers at the broker to sustain very strong marginal incentives off profit on inframarginal sales. How effective these incentives can be will depend on the substitutability of competing insurers' products. This observation perhaps explains why specialty insurers that have carved out niche markets, in which they have developed expertise in handling claims and performing loss control, choose not to offer contingency fee contracts. In contrast, standard lines insurers, with many competitors offering substitute products, consistently utilize contingency fees. Though this discussion has focused on the contingency fee contract as an incentive mechanism, there are alternative explanations for its existence. First, such contracts might be the manifestation of the increased bargaining power of larger brokers, which are able in turn to extract greater surplus. Second, contracts might simply reflect economies of scale in the marketing of insurance. It is reasonable to assert that such economies exist. For example, drafting up and implementing an agency contract, establishing an underwriting understanding between the insurer and the broker, and bargaining on commission schedules, all surely involve some fixed cost component. Yet, from a careful study of the provisions of these contracts it becomes clear that they are designed with an eye toward maintaining strong sales incentives for profitable business.

1.5.1 Volume Discounts

All contingency fee contracts are built around the premise of rewarding the broker for attaining premium volume targets with the insurer. Figure 1-5 provides a graphical representation of a contingency fee contract that abstracts away from profitability provisions found in actual contracts. A

broker failing to attain a minimum premium level (T_0), receives no contingency fee. Premium beyond the minimum results in the contingency fee slowly increasing until the next premium threshold ($T_1, T_2, ..$) is met. At these premium thresholds, compensation jumps markedly. These contracts are renegotiated annually, and often only the minimum premium is adjusted in response to the broker's current premium volume and growth expectations with the insurer. Implicitly this adjustment involves changing the other premium thresholds as well, for these thresholds are often defined in percentage terms relative to the minimum. Thus, for example, T_1 might be set at 125% of T_0.

Typically, insurance clients opt to pay their premia in monthly or quarterly installments. Insurers thus face a fairly smooth income stream over the life of a policy and are generally not inclined to make large contingency fee payments upfront for policies written near the end of the calendar year. As little as 1/12th of the revenue on the policy has accrued to the insurer, and it can be canceled at anytime. On the other hand, if the contribution of these late-year policies is discounted in the contingency fee calculation, the broker faces increasingly weak incentives to respond to contingency fees as the calendar year draws to a close. To strike a balance between these countervailing factors, insurers define premium in two ways and use both to calculate the contingency fee. *Written premium* accrues the date a policy takes effect. All the premium on a policy written on December 1st is thus written in the current calendar year. In contrast, *earned premium* is amortized over the life of a policy. A policy's premium is said to be earned after the risk has been borne. If a policy lasts one year, 1/12th of its premium is earned in each month. Accordingly, only 1/12th of the premium on a policy written on December 1st is earned in the current year, with the remainder being earned in the next year. How the two definitions of premium interact in the context of contingency fee contracts is best shown by example.

Figure 1-6 depicts a contract in place at the first broker in 1999. The contract defines two factors, a premium volume factor (λ_1) and a profit factor (λ_2). These factors are then multiplied by earned premium with the insurer to calculate the contingency fee. Note that the premium volume thresholds are generated entirely through the volume factor, which is based on *written* premium. For this reason, the broker's ability to attain these thresholds does not deteriorate toward year's end. In contrast, the contribution of each policy's premium to the earned premium base will erode over the course of the year, and in this sense the broker's incentives decline over time. Even so, with an earned premium base of, say, $500,000, the broker is far more concerned with hitting these premium thresholds, for the contribution of small policies can be very significant. Assume a policy with $1000 in premium, generating $150 in commission, is written on December 31st. Effectively,

such a policy makes no contribution to the earned premium base. However, if the written premium on the policy allows the broker to attain the minimum premium target of $500,000, the broker's compensation can be significant. Assuming $\lambda_2 = 1.0$, the contingency fee increases from $0 to $12,500 ($.025 \times \$500,000$). At 83 times the broker's commission revenue, it stands to reason that a competitor without a contingency fee contract in effect is severely disadvantaged.

However strong these incentives may be, it is important to acknowledge that the same contract offers very weak incentives if the broker has already attained its target above. Adopting such marked nonlinearities can be very costly, and it is not clear that the strong marginal incentives of the first scenario outweigh the weak incentives of the second. This contrast grows more pronounced over the course of the year. Toward the beginning of the year, all policies have a marginal aspect to them. Without each policy's premium contribution, it is possible the minimum premium will not be met and the contingency fee foregone. As the year progresses, the broker develops a much better sense of whether the target will be easily attained or is not realistic given written premium volume to date. If either of these cases prevails, the broker's incentive to respond to the contingency fee contract will be very low. Thus, all contingency fee contracts generate incentives to place with the insurer early, incentives that either grow stronger over the course of the year or weaken, depending on the evolution of premium volume.[16]

Looking at the contracts at the two brokers, all the contracts at the second and larger broker have stipulated minimum premium targets. Recall, however, that only data from the largest contingency fee insurers at the broker are available. The first broker, in contrast, appears to have some contracts, for which data on contractual provisions are scarce, which are making payments on very low premium levels. This percentage is below 15%. The highest minimum premium requirement at the first broker is $1 million, though this was somewhat aberrant and never achieved for the insurer offering it. The median minimum is $500,000. At the second broker, the highest minimum on a base contract is $3 million in premium, while the median is $1,000,000 in premium.

1.5.2 Profitability

Contingency fee contracts also require that business placed with the insurer be profitable to qualify for a contingency fee. All such calculations are based on an earned loss ratio. The earned loss

[16]The second chapter of this thesis explores whether intertemporal effects of this sort exist. Though little evidence of such effects is found, the defect might lie with the methodology. It proved impossible to identify how close premium volume was to contractual targets for lack of good contractual data in this respect and information on excluded business from contingency fee calculations. The latter point is discussed in greater detail in the body of the text below.

ratio is the total losses on all policies with the insurer over the calendar year divided by the earned premium. Figure 1-6 presents an sample calculation of a profit factor in λ_2. Because the profit factor is based on earned premium, this factor becomes increasingly resilient to the composition of policies introduced toward the end of the year. Were this not so, the broker could manipulate this factor by placing large policies with an insurer toward the end of the year, driving written premium up with minimal implications for losses. Calculation of the earned loss ratio is complicated by the fact that claims often take many years to settle. In practice, the insurer sets aside a loss reserve when a claim is filed. The loss reserve represents the insurer's best estimate of its ultimate financial exposure. Because the insurer can set aside a very large loss reserve and eliminate any contingency fee to the broker, this introduces another margin on which moral hazard can be a problem. This behavior is generally held in check by the repeated nature of the game played between the broker and the insurer. However, when the insurer is financially distressed, it might succumb to the temptation of overestimating loss reserves, leading to an attenuation of its relationship with its brokers and independent agencies.

With contracts conditioning on profitability, it would seem likely that the broker has private information on the profitability of a risk.[17] There are a number of reasons this might be the case. First, the broker often has expertise in certain risks and might be able to price them as well as, or better than, insurers. Second, the broker observes competing price quotes and has a good sense of how the market is pricing the coverage. Third, if the broker has previous experience servicing a client's account, it might have significantly more information regarding its inherent risk than that conveyed by the claims history. When these factors are considered, the profitability provision acts as a sort of insurance contract for the insurer. If the insurer errs in its pricing and quotes a premium below market (which is likely to be unprofitable), the broker will be hesitant to place the coverage with the insurer. Thus, the profitability provision mitigates the insurer's exposure to pricing errors. On the other hand, this contractual provision exposes broker and insurer alike to risk induced by large exogenous claims on policies. The broker risks losing a large contingency fee owing to a single catastrophic loss. The insurer, in turn, risks having its incentive scheme undermined when the broker realizes its loss ratio with the insurer is too high to qualify for a contingency fee. Ostensibly in response to this, many insurers utilize profitability factors calculated off three

[17] Alternatively, it might be argued that insurers should not be paying contingency fees on business which proves to be unprofitable. However, this is an insurance argument, and insurers are generally considerably larger than brokers and invariably reinsure their portfolios. Efficiency would thus dictate that insurers bear this risk. Large publicly-traded brokers are a possible exception to this argument.

year moving average loss ratios. Such loss ratios are far more persistent and less susceptible to large losses. The obvious downside is that severe losses in a single year can diminish the contract's incentives for years to come. When this happens, the broker's relationship with the insurer can become quite strained, and there is a temptation to recontract. Perhaps for this reason, several insurers move from employing three year moving average loss ratios to single year loss ratios over the sample period.

Instead, most insurers opt to add stop loss provisions to their profitability calculations. A stop loss provision limits the contribution of a single claim when calculating losses. Very common are stop loss limits around $100,000 or $200,000. Generally, the broker is given some flexibility over the stop loss limit implemented, with a lower stop loss limit coming at the expense of a less generous profitability or premium volume factor. The stop loss limit is a very sensible approach, as it effectively insures the broker against catastrophic losses while still providing it incentives to place profitable business with the insurer. Stop loss limits themselves, however, can induce distortions because different lines are more likely than others to have very large losses for which the stop loss limit binds. Contrast an umbrella policy with the property coverage on commercial auto. The umbrella very rarely has any losses, but such losses tend to be very large when they occur. The property on the commercial auto, on the other hand, has relatively small losses with great frequency. If both are priced actuarially fairly, the broker clearly prefers putting the umbrella in the contingency fee contract over the commercial auto: the wide tail on the losses on the umbrella policy is effectively truncated by the stop loss limit.[18]

Approximately 45% of contracts observed at the two brokers use moving average loss ratios, though this percentage decreases toward the end of the sample period. Most contracts have stop loss provisions. The larger broker generally opts to forego stop loss limits, in favor of more generous calculations, when given the opportunity. Thus, the first broker has stop loss limits in effect on approximately 65% of its contracts, while the second broker has stop loss limits on 30%.

[18]The second chapter of this thesis initially pursued the possibility that stop loss limits on contingency fee contracts resulted in selection bias. No clear patterns emerged. Data to test such a hypothesis would ideally be collected from an insurer. Brokers for whom the insurer has active contingency fee contracts might place risks with greater loss dispersion with contingency fee insurers in response to these (unintended) incentives. Commercial auto might be a difficult place to look for such an effect, for it is often bundled together with property and liability in a package policy. The broker thus has little flexibility in placing it.

1.5.3 Policy Exclusions

Contingency fee contracts exclude certain lines of business from their calculations. Often this is done because the insurer has another contingency fee contract in effect for a particular business segment. Surety business (commercial bonds) are typically excluded for this reason. Also, insurers looking to grow or nurture particular business segments will write separate contracts emphasizing those markets. For example, an insurer might offer special small commercial bonuses that put less weight on total premium and more weight on new policy counts and retention rates. Also for large program business insurers will often write separate contingency fee contracts. Program business involves a broker servicing a very particular type of risk, buying coverage from an insurer in bulk, and then selling individual portions of this coverage to a client base. For example, all franchises of a particular fast food chain might have the option of buying insurance independently or through the broker administering an insurance program on the chain's behalf. Umbrella and excess policies will also be excluded on some occasions, perhaps owing to the selection bias suggested above. Also, participatory workers' compensation policies in which the insurer and the client agree to share risk up to a certain limit on the policy are excluded.

In the sample of contracts, all contracts exclude surety business. All programs are excluded from the base contingency fee calculation, with separate contingency fee contracts being written on this business. Workers' compensation (non-participatory) is excluded in 5% of the contracts, and umbrella coverage in 45% of the contracts. Curiously, one insurer's contracts condition payment on both its commercial lines and its personal lines volume in aggregate. Personal lines insurance, though not the subject of this study, is also written through these brokers to insure personal auto, homes, and other personal risks. This has the potential to generate strong incentives on commercial lines business despite very little premium volume in that segment. The insurer phased this contract out in 1998.

1.5.4 Competitive Performance Evaluation

Two insurers adopt provisions in their contingency fee contracts that lead brokers to face competitive performance evaluation schemes. It is not clear from memoranda between insurance underwriters and brokers, however, that this is the express intent of these provisions. Rather, it seems likely that insurers adopted these schemes to smooth their compensation year to year. The first contract defines an additional factor that enters multiplicatively as in the sample contract. When

a preliminary calculation of the insurer's total contingency fees across all brokers departs from a specified target (as a percentage of total premium), contingency fees are adjusted proportionally. The second contract is a side contingency fee contract offered for construction coverage. A total of $750,000 is set aside for brokers placing more than $1,000,000 in construction premium with the insurer. The $750,000 pot is then divided among these brokers in proportion to their written premium contribution. In both instances, the compensation of an individual broker is decreasing in the performance of its competitors.

Such provisions are significantly underutilized in the industry, for they insure brokers against at least three forms of risk over which they have no control. First, because contingency fees are based on premium volume, contingency fee compensation is very sensitive to changes in price levels.[19] A 10% decrease in insurance prices can make minimum premium targets exceptionally difficult to attain. The only sense in which brokers are typically insulated from this risk is on occasions in which compensation is based on new policy counts and renewal rates. Such contracts are, however, rare. Second, brokers bear considerable risk through the profit factor when either regulations or competitive conditions change the profitability of underwriting. Such risk is often highly correlated with price level (premium volume) risk. Consider a softening insurance market in which prices are declining and margins are shrinking. Volume is decreasing, making volume targets more difficult to attain, and loss ratios are increasing, as expected losses per dollar of premium begin to rise. Both compensation factors are squeezed. Finally, brokers often face risks associated with the insurer's bidding aggressiveness in the market. No amount of marketing by the broker can sell the insurer's product if such marketing is not coupled with competitive bidding by the insurer. An insurer that begins to pursue a conservative strategy will lose premium volume and market share across all its brokers.

In each case, tying broker compensation to some measure of total premium volume and profitability, mitigates these risks and ensures more consistent incentives. Whether this is justifiable depends on whether the insurer construes its contingency fee contracts as strict profit-sharing arrangements. If it does, insofar as such risks reflect themselves through insurer profits, the insurer might opt to have its brokers incur some of these costs. However, if contingency fee contracts are fundamentally about generating persistent incentives to the broker, some form of competitive performance evaluation clauses are warranted. There are several reasons that insurers should adopt

[19]It is well-known that insurance prices are cyclical, with periods of low prices known as soft markets and periods of high prices as hard markets. Gron (1994) documents this phenomenon and advances a possible capacity-based explanation for its persistence.

the latter mind set when writing contracts with its privately-held regional brokers. First, insurers operate nationally and have natural venues for diversifying against risk by moving into different lines in different regional markets that are not available to these brokers (without expanding dramatically). Second, the insurer is generally the larger concern and, if capital markets are imperfect, is better able to weather such shocks. Third, insurers invariably reinsure their portfolios of business. Much risk is accordingly borne by internationally diversified reinsurance companies. Fourth, by protecting regional brokers from negative profitability shocks, insurers can potentially reduce the incentives to consolidate in the brokerage industry. With the downstream brokerage industry less concentrated, insurers will be in a better position to negotiate compensation agreements with brokers.

1.5.5 Guarantees

Upon inspecting contracts written by the same insurer with the two brokers, it becomes clear that a broker's size can have a significant impact on contractual form.[20] The second, and larger, broker generally has amendments to its contracts with insurers with which it is placing considerable business. The first form of amendment guarantees a minimum contingency fee will be paid irrespective of premium volume and profitability. Though it is unclear why the insurer does not simply increase its front-end commissions, the practice might result from preferred agency contracts that guarantee other qualifying brokers the lowest commission rates offered by the insurer. Other amendments establish more generous factor calculations. Occasionally, contractual form itself will change. Recall the basic structure of the sample contract in effect at the first broker in 1999 as detailed in figure 1-6,

$$Fee = \lambda_1 \lambda_2 EP, \tag{1.1}$$

where λ_1 is a function of written premium, λ_2 is the earned loss ratio, and EP is the earned premium. Either failing to achieve the minimum premium target or writing business that is on aggregate not profitable results in the broker receiving no contingency fee. Figure 1-7 presents the contract offered to the second broker by the same insurer in 1999:

$$Fee = max(0, \lambda_1 WP_R + \lambda_2 WP_N + \lambda_3 EP). \tag{1.2}$$

[20] An alternative explanation of the smaller broker's contracts being less generous is that it is simply not as good at bargaining. However, the larger broker tends to extract guarantees and other concessions from the insurers with which it is placing the most business.

Written premium is decomposed into renewal written premium (WP_R) and new written premium (WP_N). The factor λ_1 is now a function of renewal written premium, λ_2 is a function of new written premium, and λ_3 is a function of the earned loss ratio. Comparing the relative generosity of these contracts is not straightforward simply because contractual form has changed. There are, however, two important alterations that are worth noting. First, written premium now contributes to the premium base multiplied by λ_1 and λ_2. Thus, a large policy placed toward the end of the year will significantly increase the contingency fee even if it does not allow the broker to attain a premium threshold. Second, no amount of marketing activity by the first broker can result in a contingency fee if losses exceed the earned premium on policies with the insurer. The second broker, however, can guarantee a contingency fee simply by ensuring that $1,000,000 in premium is renewed with the insurer.[21] It is particularly interesting to find the larger broker extracting concessions that reduce the variability of its contingency fee compensation. Standard principal-agent theory would suggest smaller brokers would choose contracts in which they face less risk, provided they are more risk averse. Of course, small brokers are not being offered a menu of contracts, and when presented with options to avoid risk are often more inclined to take them—e.g. in the form of stop loss limits.

1.6 Are Commissions and Contingency Fees Substitutes?

Having discussed both commissions and contingency fees, there remains the question of whether insurers treat the two as substitutes when designing their compensation schemes.[22] It might be that insurers that do not have contingency fee contracts in effect at the broker compensate with higher commission rates. In addressing this question, the analysis can only make use of data from the first broker, as no commission data are available from the second. At the first broker, from 1994 through 2000 commission revenue is fairly stable at 13–14% of premium. Contingency fee revenue is much

[21] This guaranteed contingency fee assumes the earned premium with the insurer does not dwarf the renewal written premium. Though this is possible, it is not likely unless the broker's portfolio with the insurer has declined dramatically *and* retention still meets the $1,000,000 premium threshold.

[22] Answering this question proves to be important to the identification strategy of the second chapter. In that chapter, it is maintained that agents respond to variation in the compensation faced when placing insurance coverage. This variation takes two forms. First, a subset of insurers offer contingency fees. These contracts are observable (to the econometrician) and exogenous, as they are written at the beginning of the calendar year. Second, all potential insurers have commissions on their quoted policies. These are not observable to the econometrician; only the commission on the policy actually written is observed. If contingency fees and commissions are substitutes, with insurers that offer no contingency fee compensating with higher commission rates, this introduces a problem. Envision a scenario in which agents only respond to variation in commission rates. If only a subset of agents has a claim to contingency fees, it will appear as if these agents are favoring insurers with contingency fee contracts. In reality, it is simply that their incentive to respond to (unobservable) variation in commission rates is weaker as commissions contribute only a fraction of these agents' income.

smaller, constituting 1–11% of the broker's revenue over the sample period. Moreover, the total contingency fee series is very volatile from year to year. This can be attributed to the sensitivity of these contracts to claims activity, price movements, and other marketing risks. Insurers with active contingency fee contracts pay out on average only 10% of their compensation to the broker in contingency fees; the remainder is disbursed as commissions.

If insurers view commissions and contingency fees as substitutes, insurers with contingency fee contracts should be quoting lower commission rates, holding all else equal. Unfortunately, only the commission rate on the policy that is chosen is observed in the data. No information is available on competing insurers, their quoted premia, and commission rates. This problem should not be too pronounced, however, because most commission rates are derived directly from commission schedules in place between the insurer and the broker. Observing an insurer's commission rate on a single policy written on a line of coverage provides a good proxy for the insurer's quoted commission rate on all coverage on that line. Accordingly, restricting the sample to observed commission rates is likely to result in minimal bias. To test whether observed commission rates respond to the presence of a contingency fee contract, I run a linear regression on a sample of 8705 policies written from 1994 through 1999 at the first broker.[23] The basic specification is,

$$CommissionRate_{ijt} = \beta_0 + \beta_1 Fee_{ijt} + \beta_2 ln(Premium_{ijt}) + \xi_j + \gamma_t + \epsilon_{ijt}, \qquad (1.3)$$

where $CommissionRate_{ijt}$ is the commission rate on policy i for line j in year t. Fee takes the value one if the insurer writing the line has a contingency fee contract in effect at the broker in year t. $ln(Premium)$ is the natural logarithm of the policy's premium in dollars. It is included here to control for size effects that might influence commission rates as described above. When a policy is priced on a fee basis, this is simply converted into an implicit commission fee by dividing the broker's fee by the policy's premium. Line fixed effects, ξ_j, are included to control for variation in commission rates by line. Finally, a set of year fixed effects, γ_t, allows commission rates to trend over time.

The results of this specification are presented in column (1) of table 1.4.[24] The dummy variables for package policies and the year 1994 are omitted from the specification. The positive and significant coefficient on Fee suggests that insurers offering contingency fees quote commission rates

[23]This sample does not include policies written in 2000 because these policies are right-truncated in the data. It is impossible to observe the entire flow of payments and thus accurately estimate the commission rate.

[24]Standard errors are corrected for correlation in commission rates across all policies written each year by an insurer on a particular line.

that are on average one percentage point *higher* than those of insurers without active contracts. One reason such positive correlation might result is that brokers can often attain different agency classes with an insurer, with higher classes resulting in more generous commission schedules and contingency fee contracts. For insurers with contingency fee contracts in effect, the likelihood the broker also receives the insurer's most generous commission schedule is high. Another potential explanation turns on the observation made earlier that specialty insurers do not offer contingency fees. The specification is such that the coefficient on Fee is being identified off cross-sectional as well as time-series variation. If insurers with contingency fee contracts are inherently dissimilar to insurers without contracts, offering different products at different commission rates, it might be more appropriate to identify off within-insurer variation. This can be achieved by introducing insurer fixed effects to the core specification. This poses the more specific question: Does an insurer's commission rates respond to its implementing or cancelling a contingency fee contract? Column (2) reports the result of this modified specification. Interestingly, the coefficient on Fee is no longer significant at conventional confidence levels. This suggests the first specification was simply capturing heterogeneity across insurers.

In both specifications, the coefficient on $ln(Premium)$ is negative and significant at the 5% confidence level. This is consistent with the argument that larger clients are able to extract lower commission rates. Line fixed effects are always significantly estimated and economically large. This simply reflects the disparities in commission rates by line as reported in figure 1-3. Estimation of the year fixed effects suggests that commission rates decline through the mid to late 1990s and begin to increase in 1998–1999.

The above specifications provide fairly compelling evidence that contingency fees and commissions are not utilized as substitutes by insurers in the sample. This empirical evidence finds anecdotal support from agents working at the first broker who claim that insurers offering contracts utilize similar commission schedules to those without contracts. A slightly different picture emerges from the second broker. On occasion, this broker has turned down a contingency fee contract with an insurer asking instead for more generous commission rates. If this practice is sufficiently common, it could clearly induce negative correlation in commissions and contingency fees.

1.7 Conclusion

The preceding discussion of commissions and contingency fees highlights some of the risks borne by brokers owing to contractual arrangements with insurers. Commissions constitute the bulk of the broker's revenue and are a relatively secure source of income. Though the broker's commission revenue can decline in response to decreases in price levels, the broker can normally anticipate this and cut costs accordingly. Exposure from contingency fees is much more severe. The broker's ability to attain volume targets can suffer from decreases in price levels, while its ability to attain profitability targets can decline in response to decreases in prices, profitability, and the insurer's bidding aggressiveness. This volatility is quite clear when it is considered that the contribution of contingency fees to the first broker's revenue fluctuates wildly between 1% and 11% from 1994 through 2000.

From analysis of contracts at the second broker, it is apparent that brokers often use their size to extract guarantees that ensure more consistent contingency fee revenue from insurers. In this environment, in which brokers bear considerable risk and in which insurers have historically been willing to offer larger brokers contracts that mitigate this risk, it is not surprising that mergers are common. The last few years have witnessed fairly dramatic consolidation in the insurance brokerage industry, with large publicly-traded brokers acquiring smaller regional brokers across the United States. This trend should be disturbing for insurers. These large brokers are now in a position to cut such insurers out of the supply chain altogether by providing loss control in house and selling their portfolios of risk directly to large reinsurance companies. Moreover, smaller insurers often complain that publicly-traded brokers, that leverage off national volume to negotiate contingency fees, extract provisions that make it very difficult for these insurers to underwrite profitably. As a general prescription, this study recommends that insurers make an effort to eliminate the profit-sharing elements of contingency fee contracts to make the brokerage environment more palatable to smaller regional brokers.

Table 1.1: DESCRIPTION OF VARIABLES

Variable	Description
CommissionRate	Commission rate on a policy
Fee	Takes the value one if the policy is written by a fee insurer, zero otherwise
Premium	Policy premium in dollars
Auto	Takes the value one for commercial auto policies, zero otherwise
Liability	Takes the value one for liability policies, zero otherwise
Property	Takes the value one for property policies, zero otherwise
Umbrella	Takes the value one for umbrella policies, zero otherwise
WorkComp	Takes the value one for workers' compensation policies, zero otherwise
YearXX	Takes the value one if the policy is written in year XX, zero otherwise
Duration	Policy duration in months

Table 1.2: SUMMARY STATISTICS (N = 8705)

Variable	Mean	Standard Deviation	Minimum	Maximum
CommissionRate	.136	(.045)	.05	.25
Fee	.579	(.494)	0	1
Premium	14467	(68613)	23	3437419
Auto	.089	(.285)	0	1
Liability	.160	(.367)	0	1
Property	.101	(.301)	0	1
Umbrella	.140	(.347)	0	1
WorkComp	.083	(.276)	0	1
Duration	11.602	(2.083)	1	36

Table 1.3: CONTINGENCY FEE CONTRACTS AT FIRST BROKER

Insurer Premium Rank	1994	1995	1996	1997	1998	1999	2000
1	0	0	0	0	0	0	0
2	1*	1	1*	1*	1*	1*	1
3	1	1*	1*	1*	1*	1*	1
4	0	1	1*	1*	1*	1	1
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
7	0	1	1*	1*	1*	1	0
8	0	1*	1	1*	0	0	0
9	0	0	1*	1	1*	1*	1
10	0	0	1	1*	1	1*	1
11	1	1*	1	1*	1	0	0
12	1	1	1	0	0	0	0
13	1	1*	1*	1	1*	0	0
14	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0

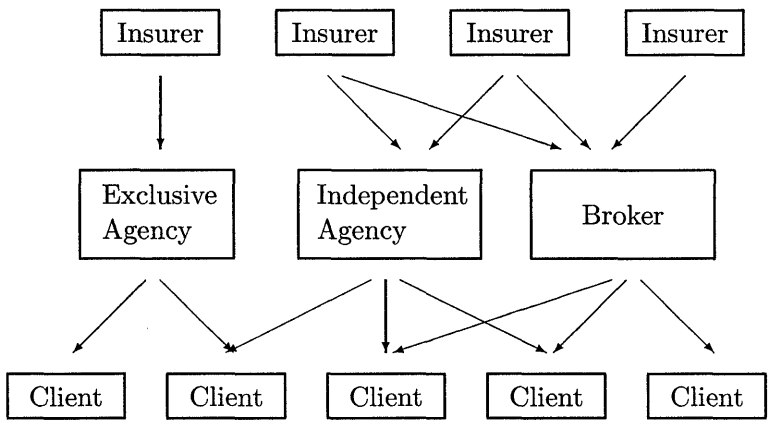
NOTE.—1 denotes an active contingency fee contract. 1* denotes payment. Insurers are ranked by written premium at the first broker over the sample period. The fifteen largest insurers in alphabetical order are AIG, Chubb, Cincinnati, CNA, Fireman's Fund, Fremont Indemnity, Great States, Hartford, Home, Reliance, Royal, Safeco, St. Paul, TIG, and Travelers.

Table 1.4: COMMISSION RATES AND CONTINGENCY FEES AS SUBSTITUTES

	CommissionRate	
Independent Variable	(1)	(2)
Fee	.011**	.001
	(.003)	(.003)
PolicySize	−.005**	−.002**
	(.001)	(.001)
Line Dummies:		
Auto	−.020**	−.015**
	(.003)	(.003)
Liability	.010**	.007**
	(.003)	(.003)
Property	.018**	.019**
	(.003)	(.003)
Umbrella	−.008**	−.008**
	(.003)	(.003)
WorkComp	−.048**	−.044**
	(.003)	(.003)
Year Dummies:		
Year95	−.005	−.003
	(.004)	(.003)
Year96	−.008**	−.005**
	(.003)	(.002)
Year97	−.014**	−.007**
	(.005)	(.003)
Year98	−.002	.004
	(.004)	(.003)
Year99	.002	.011**
	(.003)	(.003
Insurer Dummies	NO	YES
R^2	.25	.39
Observations	8705	8705

NOTE.—Results are from a linear regression with *Commission-Rate* as the dependent variable. Estimated standard errors (in parentheses) are corrected for correlation within line-insurer-year clusters. * denotes significance at the 10% confidence level, ** at the 5% confidence level.

Figure 1-1: MARKETING OF COMMERCIAL LINES INSURANCE



NOTE.—This figure depicts the three marketing channels employed by commercial lines insurers: exclusive agencies, independent agencies, and broker.

Figure 1-2: MEMBER COMPANIES OF THE AMERICAN INTERNATIONAL GROUP (AIG)

American International Group
AIG Global Trade & Pol. Risk
AIU Insurance Company
American Home Assurance Co
American Int'l Ins Co of PR
American Int'l Pacific Ins Co
American Int'l South Ins Co
American Int'l Specialty Lines
Audubon Indemnity Company
Audubon Insurance Company
Birmingham Fire Ins Co of PA
China America Ins Co Ltd
Commerce and Industry Ins Co
Granite States Insurance Co
Illinois National Ins Co
Ins Co of the State of PA
National Union Fire Ins of LA
National Union Fire Ins Co Pa
New Hampshire Insurance Co

AIG Personal Lines Pool
AIG Hawaii Insurance Co, Inc
AIG National Ins Co, Inc
American Int'l Ins Co
American Int'l Ins Co of CA
American Int'l Ins Co of NJ
American Pacific Ins Co, Inc
Minnesota Insurance Company
New Hampshire Indemnity Co

American Int'l Ins Co of DE

Lexington Insurance Pool
Landmark Insurance Company
Lexington Insurance Company
Starr Excess Liab Ins Co, Ltd

Transatlantic Holdings, Inc Gp
Putnam Reinsurance Company
Transatlantic Reinsurance Co

20th Century Ins Co of Arizona

20th Century Insurance Group
20th Century Insurance Co
21st Century Casualty Co

United Guaranty Commercial NC

United Guaranty Credit Ins Co

United Guaranty Insurance Co

United Guaranty Mortgage Ind

United Guaranty Mortgage Ins

United Guaranty Mortgage NC

United Guaranty Residential

United Guaranty Residential NC

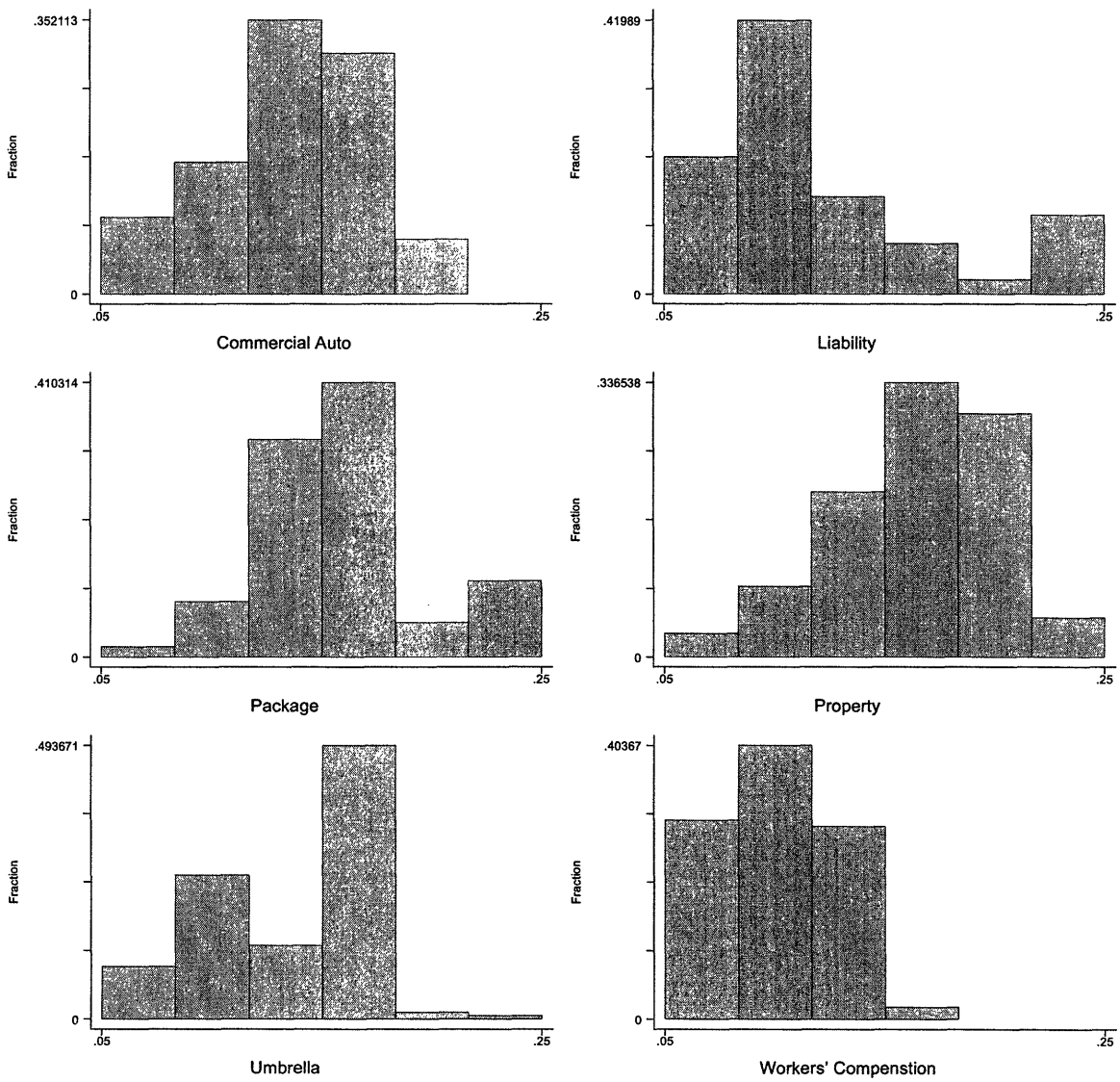
NOTE.— AIG is chosen as an example to illustrate that a single insurance group issues insurance through numerous corporate subsidiaries.

Figure 1-3: SAMPLE COMMISSION SCHEDULE

SPECIALTY	
Financial Institutions Bonds	Refer to Company
Directors' and Officers' Liability	Refer to Company
Errors and Omissions	Refer to Company
Securities Blanket Bonds	10%
Transit Cash Letter Bonds	10%
Excess Bank Employee Dishonesty Bond	10%
Kidnap and Ransom	Refer to Company
COMMERCIAL	
Automobile	15%
Boiler and Machinery	10%
Liability, Occurrence and Claims Made, Limited Pollution	15%
Crime, Bond, and Glass	15%
Excess and Umbrella	Refer to Company
Property and Inland Marine	20%
Exception: Difference in Conditions	Refer to Company
Exception: Highly Protected Risks	Refer to Company
Workers' Compensation	
Participating	Refer to Company
Non-participating	
$< \$100{,}000$ in premium	5%
$\geq \$100{,}000$ in premium	4%
International	15%

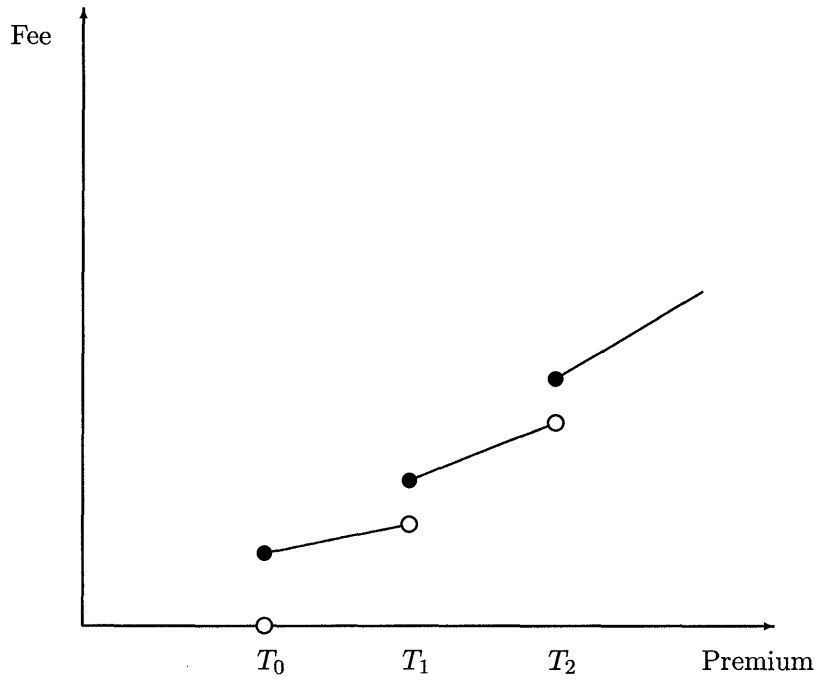
NOTE.— The above is a portion of a commission schedule in effect at the first broker in 1999. Specifically, it applies to coverage written for financial and professional services, though pricing on the lines noted does not vary significantly. References to "Refer to Company" indicate that the insurers numerous subsidiaries have different commission rates on these lines.

Figure 1-4: DISTRIBUTION OF WRITTEN COMMISSION RATES BY LINE IN 1999



NOTE.—Histograms of *CommissionRate* by line of coverage in 1999.

Figure 1-5: CONTINGENCY FEE PREMIUM THRESHOLDS



NOTE.—A graphical representation of a contingency fee contract. The figure abstracts away from the profitability requirements normally in place. Unless the broker writes T_0 in premium with the insurer, no contingency fee is paid.

Figure 1-6: A SAMPLE CONTINGENCY FEE CONTRACT AT THE FIRST BROKER IN 1999

WRITTEN PREMIUM TARGET = $500,000

% OF WRITTEN PREMIUM TARGET ACHIEVED	FACTOR (λ_1)
0 - 99.9%	0.0%
100-119.9%	2.5%
120-139.9%	3.0%
140-159.9%	3.5%
160-179.9%	4.0%
180-199.9%	4.5%
200 & Over	5.0%

EARNED LOSS RATIO	FACTOR (λ_2)
0.0 - 70%	1.00
70.1 - 80%	0.75
80.1 - 90%	0.50
90.1 - 100%	0.25
100.1 & Above	0.00

FEE = $\lambda_1 \times \lambda_2 \times$(EARNED PREMIUM)

NOTE—. Contingency fee compensation is based on premium and loss measures calculated over the calendar year. Earned premium is written premium amortized over a policy's duration. Thus, 1/12th of a policy lasting one year will be earned in each month. The earned loss ratio is losses on the insurer's business at the broker divided by the insurer's earned premium at the broker.

Figure 1-7: A SAMPLE CONTINGENCY FEE CONTRACT AT THE SECOND BROKER IN 1999

RENEWAL WRITTEN PREMIUM (WP_R)	FACTOR (λ_1)
< $500,000	0.0%
500,001 - 750,000	1.0%
750,001 - 1,000,000	2.0%
> 1,000,000	3.0%

NEW WRITTEN PREMIUM (WP_N)	FACTOR (λ_2)
< $350,000	0.0%
350,001 - 500,000	1.0%
500,001 - 750,000	2.0%
> 750,000	3.0%

EARNED LOSS RATIO	FACTOR (λ_3)
< 65.0%	1.0%
65.1 - 70.0%	0.5%
70.1 - 75.0%	0.0%
75.1 - 85.0%	-0.5%
> 85.0%	-1.0%

$$\text{FEE} = max(0, \lambda_1 WP_R + \lambda_2 WP_N + \lambda_3 EP)$$

NOTE—. Contingency fee compensation is based on premium and loss measures calculated over the calendar year. Earned premium (EP) is written premium amortized over a policy's duration. Thus, 1/12th of a policy lasting one year will be earned in each month. The earned loss ratio is losses on the insurer's business at the broker divided by the insurer's earned premium at the broker.

Chapter 2

Competing for the Effort of a Common Agent: Contingency Fees in Commercial Lines Insurance

2.1 Introduction

In markets in which middlemen facilitate transactions between buyers and sellers of a good, a supplier can gain a competitive advantage by offering these middlemen incentives to favor its product. Particularly common is the practice of writing contracts that present middlemen with marginal compensation that increases in sales volume with a supplier. For example, many insurance companies offer insurance agencies 'contingency fees' based on premium volume; airlines pay travel agencies 'commission overrides' on sales volume; and similar contracts are purportedly written between drug companies and pharmacy benefit managers.[1] As a result of such contracts, middlemen have strong incentives to encourage sales with dominant firms even if this is not in the best interest

[1]Contingency fees in insurance are a frequent topic of discussion among insurance trade journals. Of note, risk management associations representing the interests of commercial clients won concessions regarding disclosure of contingency fees from the industry's three largest insurance brokers—Aon, Marsh, and Willis—in 1999. Each agreed to fully disclose its contingency fee agreements if requested by clients (National Underwriter, May 1, 2000), (Business Insurance, June 5, 2000). Even so, it is not clear this does much to alleviate the problem given that fewer than 4% of corporations responding to a 1998 survey were aware of the role played by contingency fees in broker compensation (Business Insurance, April 27, 1998). Levine (1987) discusses travel agency commission overrides in detail. For evidence on incentive schemes in place between drug companies and pharmacy benefit managers, see "Drug Middlemen Are Facing Pressure Over Rising Prices", (New York Times, January 5, 2002).

of the buyer.

This chapter addresses the question of whether such nonlinear contracts distort sales behavior. The question is posed in the context of the market for commercial lines insurance, which is the market for all insurance bought by firms, and focuses, in particular, on insurance sold through an insurance broker. A broker is a large insurance agency at which many individual insurance agents assess clients' needs and find appropriate coverage among insurance companies. As mentioned above, many insurance companies opt to write annual contingency fee contracts with insurance brokers in addition to paying commissions on policies. Such contracts reward the broker for attaining volume and profitability targets with an insurer and can generate strong incentives to favor insurers already writing significant premium volume through the broker. Do brokers respond to the incentives inherent in these contracts or is the broker-client principal-agent relationship sufficiently strong that these incentives have little sway on the broker's placement decision?

To respond to this question, I collected monthly data on policies and contingency fee contracts from a privately-held insurance broker in Arizona. The sample includes approximately 7400 commercial policies written from 1994 through 2000. Asking directly whether the broker favors insurers with contingency fee contracts suffers from the drawback that it is difficult to disentangle the incentive effects of these contracts from unobservable heterogeneity across insurers. If, for example, more aggressive insurers offer the broker more generous marginal compensation, should the large market shares of these insurers be attributed to unobservable aggressiveness or the incentives of these contracts? What makes this a particularly nice empirical setting in which to address these agency issues is the fact that individual insurance agents working at the broker place business, and only some agents have incentives to respond to contingency fee compensation. Because the broker compensates the agents it employs (non-equity agents) solely as a function of the commission revenue they generate, only insurance agents with equity in the broker (equity agents) have a claim to contingency fees. Using non-equity agents as the control group, I ask whether equity agents favor contingency fee insurers relative to non-equity agents. The approach controls for unobservable heterogeneity across insurers and exploits the natural experiment resulting from the broker's compensation scheme.

The empirical analysis proceeds in two stages. In the first, as only a subset of insurers have active contingency fee contracts at the broker in a given year, insurers are classified as either fee or non-fee insurers in each year, and the analysis asks whether fee insurers are favored by equity agents. Equity agents are found to be more likely than non-equity agents to place new business

with fee insurers, with the effect being particular pronounced for the least price-sensitive business in the equity agent's portfolio.[2] Moreover, as business comes up for renewal, equity agents are much less likely than non-equity agents to move business from fee to non-fee insurers. Thus, the presence of contingency fee contracts appears to significantly influence the equity agent's placement decision.

Yet the marginal incentives faced by equity agents should also vary *within* the set of fee insurers because these contracts condition payment on both volume and profitability, which no doubt vary by insurer. The second stage of the analysis addresses this observation. Restricting attention to policies written with fee insurers, choice over the set of fee insurers is modeled as a function of the attributes of each insurer. I find that equity agents are more likely than non-equity agents to place both new and renewal business with larger volume fee insurers. I also find that equity agents are less likely than non-equity agents to place business with fee insurers whose contracts have been 'swamped' by losses and thus offer low marginal compensation. These effects are, however, limited to the less price-sensitive business handled by these agents.

This chapter contributes to a better understanding of the role of incentives in agency relationships,[3] especially those involving intermediaries. A strong analogy can be drawn between contingency fees and travel agency commission overrides (TACOs), which have been studied by Levine (1987) and Borenstein (1991). Borenstein (1991) finds evidence that marketing schemes in the airline industry—among them, TACOs and frequent flyer programs—work to the advantage of dominant airlines. However, without micro-level responses of individual agents to these incentives as well as airline revenue at an agency, it is impossible to say to what extent these effects are attributable to TACOs specifically. My finding that insurance agents respond to nonlinearities in contingency fee contracts is similar to those of Chevalier and Ellison (1997). They find that fund managers respond to investment inflows that are nonlinear in annual fund performance by making bets or playing it safe as the year draws to a close.[4]

[2]A nice feature of the data is that equity agents place both the business in their own portfolios and house business, where the latter is business that is not assigned to a particular agent but is placed by equity agents. House business is business that has remained at the broker despite the initial client-agent relationship having been severed. New house business, for example, is business that has been acquired through the purchase of another agency. It is customary to observe the client look to competing brokers when this relationship with the initial agent terminates. That which remains is, on average, not being shopped among competing brokers as aggressively. References to less price-sensitive business throughout the introduction pertain to this house business.

[3]Empirical contributions to this literature include Healy (1985), Asch (1990), Anderson, Burkhauser, and Raymond (1993), Knoeber and Thurman (1994), Brown, Harlow, and Starks (1996), Cragg (1997), Hubbard (1998), Oyer (1998), and Lazear (2000).

[4]The inquiry into how incentives faced by equity agents might evolve over the course of the year is also related to the work of Ehrenberg and Bognanno (1990a, 1990b) on tournaments, though these contributions do not involve

I am aware of no empirical study of contingency fee contracts, nor of individual agents responding to commission rates, in the insurance literature. The topic has likely escaped scrutiny because addressing it requires proprietary data from an insurance agency. There are a number of studies, however, that have compared the relative merits of alternative forms of insurance distribution and the commission rates associated with each. Of note here are Joskow (1973), Etgar (1976), Etgar(1977), Sass and Gisser (1989), and Gron (1998).

The chapter is organized as follows. Section 2 introduces the institutions of commercial lines insurance. Sections 3 and 4 present the empirical results of the chapter. Section 3 traces out the life-cycle of insurance coverage at the broker, with three subsections each addressing empirically whether contingency fees influence equity agents' behavior. Section 4 looks at the specifics of contractual form. A short model motivated by a survey of contracts at the broker leads into the empirical analysis. Section 5 concludes.

2.2 Institutions of Commercial Lines Insurance

Commercial lines insurance refers to all lines of insurance bought by corporations. Lines are not industry-specific, but are instead descriptive of the nature of the risk. This study classifies risks broadly into the following lines: property, liability, commercial auto, umbrella, and workers' compensation. A firm facing each of these exposures to risk will generally buy several lines of insurance, or, alternatively, a package policy subsuming a number of individual lines. Commercial lines insurance for relatively small businesses tends to be marketed directly through insurers because such policies are fairly standardized. Larger clients, however, often employ the services of an insurance broker in the face of greater complexity and the need to customize insurance coverage to the particular characteristics of the client. The broker incurs a fixed cost to structuring the client's coverage and then shops the coverage among potential insurers, bargaining on the client's behalf.

The set of potential insurers is restricted to those insurance companies with which the broker has agency contracts.[5] An agency contract confers limited authority to the broker to underwrite risk as the legal agent of the insurer. Moreover, it prohibits the insurer from quoting directly to a client or through an alternative broker after the broker has effected a match. This makes competition in

agency relationships, who find that golfers' performance responds to the large marginal incentives they face in the final round of a tournament.

[5]In practice, a broker will also access insurance companies through wholesalers that have contracts in place with insurers to underwrite on their behalf. When the broker needs to underwrite a very specialized risk best served by an insurer with which it does not regularly do business, it generally avails itself of the services of a wholesaler, which takes a cut of the broker's commission revenue on the business.

the industry somewhat peculiar: a client cannot simply move its business to another broker while keeping its original insurer, as this is prohibited by the agency contract.[6] Moreover, when several brokers represent the same insurer, as is often the case, it is unclear which broker will be given precedence. In practice, the client will usually allow the incumbent broker to choose a handful of insurers through which to quote and give the competing broker a choice over those remaining. With this system in place, a broker does lose policies. Insurance brokers might not have access to the same set of insurers, and, when they do, it is often difficult to assess ex ante which insurer will submit the lowest quote.

Upon writing a policy with an insurance company, the insurer compensates the broker by paying a commission on the policy's premium. Commission rates vary significantly by line of insurance owing principally to variation in the costs of servicing each type of risk: the greater the need for customization of a policy or for the insurance broker to supplement the services of the insurer, the higher the commission rate. A typical commission rate on workers' compensation policies in the 1990s would be around 8%. For property and liability, the rate would be around 15%. In addition to cost-driven variation, commission rates quoted on a particular risk will often vary by insurer. This variation is comparatively small, with quoted commission rates usually falling within a range of two percentage points on a policy with a commission rate of 15%.[7] With few exceptions, policies expire after one year, at which point a new policy must be written with the incumbent or a competing insurer. Insurers usually offer the same commission rates on new and renewal business.[8]

In addition to commission revenue, the broker may receive contingency fees from insurers. Provided the insurer writes sufficient volume with the broker, the insurer and the broker will negotiate a contingency fee contract with an annual premium target prior to the start of the calendar year. Though contracts fit no standard mold, all provide increasing marginal incentives to placing business with the insurer coupled with restrictions that the business be profitable. A broker that fails to attain the target premium or places business with the insurer for which, on aggregate, claims exceed premium revenue will not receive an annual contingency fee payment. Conditioning payment on volume encourages the broker to increase its business with the insurer. Conditioning

[6]There are some instances in which this can occur given the consent of the original broker. But it is very rare.

[7]This assertion is based on conversations with insurance agents. It is impossible to verify in the data because I observe only the commission rate at which a policy is written, not all commission rates on quoted policies. When asked, agents agreed that over 90% of the time commission rates fall within this range. The standard deviation of the residuals off a regression of *observed* commission rates on policy line is .04.

[8]This contrasts with life insurance, where we observe commission rates that are heavily front-end loaded: the agent's commission rate drops precipitously after the first year the coverage is written. This gives agents incentives to 'churn' business, moving it from insurer to insurer upon renewal.

on profitability, on the other hand, ensures the broker does not wantonly place business with the insurer, but instead reserves its 'good' risks for the insurer.[9] It is reasonable to think the broker is better informed regarding the inherent risk of writing a policy with a client, particularly if the broker has experience servicing a client's insurance needs. Though prior insurers are mandated by law to provide the client's claims history, the claims history can be difficult to interpret without some knowledge of the underlying circumstances which the broker will generally have. Including a profitability condition of this sort comes at some cost to the insurer, however. Because large claims early in the calendar year can completely eliminate hopes of an insurer's business through the broker being profitable, the insurer runs the risk of having its incentive scheme undermined by catastrophic claims. Insurers generally recognize that such claims have ruinous effects on their contingency fee incentives and thus cap the contribution of a particular claim in profit calculations at, say, $200,000. Whether such 'stop loss' provisions mitigate the deleterious effects of large claims depends ultimately on the volume of the insurer's premium at the broker. If the insurer is only generating a few hundred thousand in premium at the broker, a stop loss provision at $200,000 will not be very effective in preserving incentives subsequent to a large claim.

Not all insurance companies underwriting insurance through a broker will have contingency fee contracts in effect. This will depend both on whether the insurer compensates via this mechanism and, if so, whether the insurer writes sufficient premium volume through the broker as to warrant a contract. Insurers that do not offer contingency fees tend to be more specialized and focus on underwriting particular risks. As an example, an insurance company might dedicate itself exclusively to writing workers' compensation policies.[10]

Within privately-held insurance brokers, insurance agents with equity work alongside those who are strictly employees of the broker. Partners, or equity agents, generally fill a managerial role in addition to soliciting business. They are salaried and have a claim to any profits of the broker. In contrast, employed insurance agents are usually compensated solely as a function of the commission revenue on their business and often have no fixed component to their income.[11] In addition, there

[9] One might also argue that these contracts condition on profitability so insurers can avoid paying bonuses in years in which profits are negative. It would seem to be suboptimal to have the broker bearing this risk for this reason alone, for the insurer is generally the larger of the two concerns and has access to reinsurance markets to insure its portfolio.

[10] It is difficult to say why these insurers opt to compensate solely via commission. However, if contingency fees induce brokers to consolidate business among a few dominant insurers, a possible explanation relies on the fact that specialists are less concerned with achieving this type of dominance. To return to the example above, an insurance company specializing in workers' compensation is not looking to write, say, 70% of the premium volume at a broker. Instead, it is interested in writing profitable workers' compensation policies at all brokers.

[11] There is some heterogeneity with respect to insurance agent compensation. As a rule, insurance agents are paid

will typically be some business handled by a broker that is not assigned to a particular agent. This business is designated as 'house' business and placed by equity agents. House business has two principal sources: (1) business the broker has acquired upon purchasing another insurance agency, and (2) business remaining at the broker despite the initial insurance agent retiring. In each case, the business is at the broker despite the initial client-agent relationship having been severed. This is informative because it is customary to see many clients shop their business across brokers after the client-agent relationship has terminated. It is reasonable to think that the population of clients that remain are, on average, less willing to look to other brokers to find lower quotes.

The broker used in this sample generally conforms to the characterization of the insurance broker introduced above. Insurance agents place it among the ten largest brokers in Arizona toward the end of the 1990s. It generates around $40 million in premium annually over this period, which should be contrasted with about $250 million for the largest broker in Arizona. More than 150 insurers write policies through the broker over the sample period, which is a large number of insurers by any industry standard.[12] Still, many of these insurers have only a negligible presence: the fifteen largest insurers in terms of premium volume at the broker write over 70% of the premium annually. Table 2.1 presents the contingency fee contracts on file at the broker for these fifteen insurers ranked by total premium over the sample period. An entry of 1 indicates the presence of a contingency fee contract; 1* denotes payment on the contract. No payments are recorded in 2000 because the data end in July 2000. Of these fifteen insurers, those without contracts in place from 1994 through 2000 do not offer contingency fee contracts and underwrite specialized risks through the broker. No insurer outside of the top fifteen has an active contingency fee contract over this period.

Contingency fee revenue is dwarfed by, and is far more volatile than, commission revenue over the period. Commission revenue is fairly steady at 13–14% of premium volume at the broker from 1994 through 2000. In contrast, contingency fees contribute between 1% and 11% of the broker's total revenue annually over the sample period, with little trend. These payments tend to

a fixed fraction of the commission revenue they generate. One might, however, see a new agent being guaranteed an annual income for a few years. An agent failing to generate commission revenue sufficient to justify his salary will likely be fired, while an agent achieving this level will be switched to a new, purely commission-based compensation scheme. It is somewhat peculiar that brokers do not condition agent compensation on contingency fees if these fees are an important source of revenue for the broker. But it is perhaps understandable when it is acknowledged that assessing the contribution of a single policy or set of policies to the final contingency fee payment is a difficult task. It requires knowing the losses on these policies, and this information can be gathered only imperfectly and at significant cost. A broker might consider tying agent compensation to year-end contingency fees, but this introduces yet another element of uncertainty into agent compensation.

[12]The number is particularly large when it is considered that the insurance company here is usually defined at the level of the holding company. Thus, AIG's many corporate subsidiaries are treated as a single underwriting entity.

be very erratic because of claims activity on accounts that can completely eliminate an insurer's contingency fee. The relatively small contribution of contingency fees to total revenue does not imply that contingency fees are not an important consideration on the margin. Fee insurers pay out approximately 10% of their compensation to the broker through contingency fees over the sample period. Thus, holding all else equal, a commission rate of 15% offered by a fee insurer is, on average, equivalent to a commission rate of 16.5% for a non-fee insurer. This begs the question of whether it is possible to hold all else equal. One might imagine that insurers without contingency fee compensation offer more generous commission rates in the first place. The data do not support this scenario. Contingency fee status and commission rates in the sample are actually slightly positively correlated after controlling for policy line, year, and size.[13]

The broker in this sample employs a total of eleven insurance agents, three of whom have equity. Those without equity are compensated with a fixed fraction of the commission revenue they generate, usually 30%.[14] The agents with equity are salaried and have a claim to the final profits of the firm. Importantly, an agent with equity has the same incentives to place business whether it is within his own portfolio or attributed to the house. What will differ is the caliber of the agent's relationship with the client as well as the agent's familiarity with the client's needs. Both will be appreciably higher for business in the agent's own portfolio, for this business is actively solicited by the agent and is generally a better fit with the agent's specialization.

2.3 Data

The data used in this chapter derive from accounting transactions at an insurance broker in Arizona from January 1994 through May 2000. These transactions are aggregated to construct a data set which includes premium, commission, line, duration, underwriting insurer, and insurance agent for all policies written in each month of the sample period.[15] The data are supplemented with the contingency fee contracts at the broker and payments made over the sample period. The sample excludes policies written subsequent to a policy that is either terminated prematurely or extended beyond its normal duration. These policy placements are often distressed in the sense that they are

[13]Moreover, insurance agents at the broker testify to there being no relationship between an insurer's contingency fee status and its quoted commission rate.

[14]In practice, because business is somewhat lumpy, the broker will smooth the agent's compensation. The agent receives a monthly paycheck based upon an estimate of the annual commission revenue on her book, and adjustments are made to compensation at the end of the year.

[15]Because accounting transactions provide little guidance as to when a policy is beginning or ending, policy starts are generally identified by relying on descriptive notes in the accounting data as well as observed transitions between billing insurers.

driven by market conditions, not the normal renewal process. Commercial lines surety business for which insurers normally write separate contingency fee contracts is excluded from the sample. The remaining sample contains 7396 policies written for 1894 commercial clients.[16] The median annual insurance bill for clients in the sample is $3700, while the mean is $28,400. The median commission rate is 15%, though this varies by line. The median for workers' compensation policies, for example, is 8%. The sample contains around $25 million in written premium annually, though the broker generates additional revenue off surety business, personal lines business sold to individuals, benefits, and consulting.

Table 2.2 describes the variables used throughout the analysis of the following section. Because I am concerned with how equity agents behave differently than non-equity agents, *EqAgents*, a dummy variable for business held in an equity agent's portfolio, and *EqHouse*, a dummy variable for house business, are central to the analysis. Identifying the incentive effects of contingency fees will always involve these two dummy variables, either in isolation or interacted with the characteristics of the incumbent insurer upon renewal. *Auto–WorkComp* are line dummies. Omitted here and throughout the analysis is the dummy for package policies. As mentioned above, this is a hybrid line that contains some combination of commercial auto, property, and liability. *Match* attempts to control for the match quality of an agent's portfolio of risks with the set of fee insurers. To understand the construction of this variable, it is necessary to distinguish between written and earned premium. Premium is said to be earned when the insurer has borne the underlying risk on a policy. Thus, on a policy of duration one year, 1/12th of its written premium is earned in each month. A measure of earned premium with an insurer at the beginning of a month is an equally weighted average over all the business written with the insurer for the last twelve. Earned premium has the desirable property of being much smoother than the written premium series and a much better indicator of where the agent places business. For each line of insurance, *Match* is the share of earned premium attributable to the current month's contingency fee insurers in an agent's portfolio in the previous month. The variables in the lower half of the table, beginning with *Switch*, only apply to renewal business, where it is possible to condition on the characteristics of the policy up for renewal. *IncMatch* is similar in spirit to *Match*, but applies to the share of earned premium in

[16] I emphasize 'commercial clients' here because often many corporations will buy insurance through insurance programs that are negotiated directly through trade associations. As an example, an insurance agent might approach a state bar association and offer to underwrite a very large policy for all the malpractice insurance of its member law firms. Each law firm has the decision to buy the standard policy through the association or pursue insurance through other channels. In the latter case, the individual firm will not appear in the data. I treat all such programs as a single observation in the data. In reality, 2598 individual corporations are represented in the sample.

the agent's portfolio held by the incumbent insurer, as opposed to the set of fee insurers.

Table 2.3 presents summary statistics. The mean of *Fee* ranges from .47 to .61 across the samples. Thus, slightly in excess of half of all business is placed with a fee insurer. *Switch* takes the value .15 on renewal business. This is the percentage of business that switches upon renewal, provided the business is retained by the broker. Summing *EqAgents* and *EqHouse* gives the percentage of business being placed by an agent with incentives to respond to contingency fees. This measure ranges from .35 to .39.

Figure 2-1 reports the results of various tabulations of the raw data to get a preliminary sense of how equity and non-equity agents differ in their behavior with respect to fee and non-fee insurers. Reported flows of insurance coverage between fee and non-fee insurers are conditional on the coverage remaining at the broker.[17] The upper left portion of the diagram shows that 53% of new business by non-equity insurance agents is placed with non-fee insurers. Upon renewal, 6% of their business is switched to a fee insurer, 14% is switched to another non-fee insurer, and 80% ($= 100\% - 6\% - 14\%$) is retained by the incumbent. While both equity and non-equity agents divide their new business nearly equally among fee and non-fee insurers, new house business is placed with a fee insurer 69% of the time. Another striking feature of the house business is the disparity in the flows between fee and non-fee insurers. While 12% of renewal business with a non-fee incumbent switches to a fee insurer, a scant 1% of renewal business with a fee incumbent switches to a non-fee insurer.

2.4 Contingency Fees and Incentives

Though an insurance agent's principal concern when placing a client's coverage is finding the most competitive quote in the market, in many instances the agent will face several quoted policies that are roughly equivalent. Here, the agent's expected return to writing the policy with each insurer likely plays a role in determining where the coverage is ultimately placed. For agents with no equity in the insurance broker, the decision amounts to choosing the policy generating the highest commission. Those with equity positions, however, should consider both a policy's commission and its expected contribution to contingency fee revenue. Thus, agents implicitly face different incentives as a result of their equity holdings. If these contracts have important incentive effects, contingency fees ought to induce insurance agents with equity to favor fee insurers while inducing

[17]The broker's client retention over this period varies between 85% and 90%.

no distortion in the behavior of non-equity agents. Observed differences in the treatment of fee insurers by these two groups of agents can be attributed to the incentive effects of the contingency fee contracts.

This section walks through the life-cycle of insurance coverage at the broker, at each step asking how contingency fees might be expected to distort the behavior of insurance agents and testing whether this is indeed the case. Subsection 2.4.1 looks at the placement of insurance coverage when it is first written at the broker. Subsection 2.4.2 turns to policies that are coming up for renewal. The insurance agent faces the choice of whether to solicit quotes from competing insurers or simply to rewrite the coverage with the incumbent insurer. Though this decision to shop the business is unobservable, heightened shopping activity might manifest itself through higher switching frequencies. Finally, subsection 2.4.3 focuses on business that is switched upon renewal, inquiring into the likelihood that it is placed with a fee insurer.

2.4.1 Placement of New Business

If contingency fees have significant incentive effects, equity agents should exhibit a disproportionate tendency to place new business with fee insurers. Moreover, the effect should be more pronounced when equity agents place house business, for agents likely have greater flexibility in placing this less price-sensitive business. To test this assertion, I run a probit model on the sample of new business written at the broker, which includes 1604 policies written from 1994 through 2000. The dependent variable, Fee_{ilad}, takes the value one if line l of client i is placed by agent a with a fee insurer at date d (monthly frequency):

$$\begin{aligned} Fee^{*}_{ilad} &= \beta_0 + \beta_0 EqAgents_a + \beta_1 EqHouse_a + \beta_2 Match_{lad} + Z_d\Gamma + \eta_y + \delta_l + \epsilon_{ilad}, \\ Fee_{ilad} &= \begin{cases} 1 & \text{if } Fee^{*}_{ilad} > 0 \\ 0 & \text{otherwise.} \end{cases} \end{aligned} \tag{2.1}$$

With the dummy for non-equity agents omitted, *EqAgents* and *EqHouse* measure the extent to which equity business is more likely than non-equity business to be placed with a fee insurer. *Match* is included to control for variation in match quality with the set of fee insurers across agents' portfolios. It is the share of the earned premium on line l in agent a's portfolio attributable to the current month's fee insurers in the previous month.[18] A vector of variables, Z_d, fit a linear

[18] *Match* suffers from the drawback that it is difficult to say whether a fee insurer has a large presence in an equity agent's portfolio owing to high match quality or the agent's tendency to favor the insurer in the past in response to

trend within each calendar year to capture any evolution in the relative bidding aggressiveness of the two types of insurers. The regression also includes line and year fixed effects, δ_l and η_y respectively.[19]

Table 2.4 presents the marginal effects of this probit specification.[20] The coefficients on *EqAgents* and *EqHouse* are both positive, as was expected if contingency fees have significant incentive effects. While the coefficient on *EqAgents* is not significant, that on *EqHouse* is significant at the 1% confidence level and very large. The point estimate evaluated at the means implies that new house business is approximately 50% more likely to be placed with a fee insurer after controlling for observable portfolio differences across agents. The predicted probability of placement with a fee insurer is .51 at the means of the independent variables, and the marginal effect of *EqHouse* extrapolated out is .256. A test of the equality of the coefficients on *EqAgents* and *EqHouse* can be rejected at the 1% confidence level. It is reasonable in this context for the effect for equity agents to be much smaller than that for house business. Equity agents are actively soliciting the accounts in their own portfolios and are likely competing against other brokers. In contrast, new house business is being acquired through the purchase of competing agencies and on most occasions is not being contested by other brokers. If the underlying coefficient on *EqAgents* is much less than a third of that on house business, it will not be very precisely estimated given the standard error on *EqAgents* of .043.

2.4.2 Switching of Renewal Business

As policies come up for renewal, usually after one year, the insurance agent must decide whether to solicit quotes or simply to rewrite with the incumbent insurer without shopping the business among its competitors. Unfortunately, this decision is unobservable in the data: business retained by the incumbent is either not being shopped or is being placed with the incumbent despite being shopped. Whether business is moved to a new insurer upon renewal, however, is observable. This I will take as a rough proxy for underlying shopping activity

If the incentives of these contracts matter, they ought to induce agents with equity to shop business with a non-fee incumbent more frequently in the hope of finding a fee insurer quoting

contingency fees. If incentive effects are indeed important, match quality will be overestimated for contingency fee insurers in an equity agent's portfolio, biasing the results against finding significant incentive effects.

[19]The inclusion of both year fixed effects and the piecewise linear function is necessitated by the redefinition of the set of contingency fees insurers at the beginning of the calendar year. This ought to a induce Fee^*_{ilad} to jump from any previous trend, a feature accommodated by the year fixed effects.

[20]The standard errors are corrected for correlation across lines within client at a given time. This accommodates the tendency of multiple lines of a client to be placed with a single insurer.

competitively. By the same token, equity agents will likely shop business with fee insurers less frequently because the present compensation is relatively high. This argument is complicated by unobservable client-insurer match quality, however. If contingency fees have important incentive effects, contingency fees will induce equity agents to favor fee insurers when placing business on which both contingency and non-fee insurers are equally competitive. The placement of this marginal business for non-equity agents, on the other hand, will not favor the fee insurer, for the non-equity agent faces no incentive to do so. In equilibrium, the equity agent's portfolio of business will be more aggressively sorted between fee and non-fee insurers on these unobservables. An equity agent's portfolio will include only the specialized risks which the fee insurers are unable to quote competitively. (Recall that all specialty insurers are among the set of non-fee insurers.) With the equity agent holding a more specialized portfolio with non-fee insurers, it is no longer clear that the equity agent will shop this business with greater frequency than will the non-equity agent. However inclined the equity agent might be to move some of his non-fee business to fee insurers, fee insurers are simply not quoting it competitively.

Despite this ambiguous prediction, I run a probit regression on the sample of renewal business, which includes 5549 renewals for which the business remains at the broker. The dependent variable, $Switch_{iladj}$, takes the value one if line l of client i is switched by agent a from incumbent insurer j to a new insurer at date d:

$$\begin{aligned} Switch^{*}_{iladj} =& \beta_0 + \beta_1 EqAgents_a + \beta_2 EqHouse_a + \beta_3 IncFee_{dj} \\ &+ \beta_4 IncFee_{dj} \times EqAgents_a + \beta_5 IncFee_{dj} \times EqHouse_a + \beta_6 IncMatch_{ladj} \\ &+ \beta_7 IncRelativeCommission_{ldj} + \beta_8 PolicySize_{ild} + \beta_9 IncDuration_{ij} \\ &+ \beta_{10} BrokerDuration_i + Z_d\Gamma + \delta_l + \xi_j + \epsilon_{iladj}, \end{aligned} \tag{2.2}$$

$$Switch_{iladj} = \begin{cases} 1 & \text{if } Switch^{*}_{iladj} > 0 \\ 0 & \text{otherwise.} \end{cases}$$

IncFee is a dummy taking the value one for a contingency fee incumbent. Dummies for non-equity agents and non-fee insurers are omitted. The coefficients on *EqAgents* and *EqHouse* are the change in the probability of business with a non-fee incumbent being switched if held by an equity agent or the house, as opposed to a non-equity agent. The interactions *IncFee*×*EqAgents* and *IncFee*×*EqHouse* allow testing of the null hypothesis that contingency fee incentive effects do not lead to increased switching for non-fee business relative to contingency fee business. To

control for match quality in this context, *IncMatch* is the share of the earned premium on line l in agent a's portfolio attributable to the incumbent in the previous month. The idea behind this measure is that insurers with a strong presence in an agent's portfolio for a particular line are likely to have very high match quality with that segment of her portfolio. *IncRelativeCommission* is the incumbent insurer's median commission rate offered on the line in the present year less this median across all insurers. This variable acknowledges the role played by commission rates in influencing an insurer's retention. *IncPolicySize* is the premium (in \$100,000s) at which the policy up for renewal was initially written. *IncDuration* and*BrokerDuration* are the duration in years of the client's relationship with the incumbent insurer and the broker respectively. Z_d fits a piecewise linear trend, with kinks at the beginning of each year, to allow competitive conditions in the market to evolve over time. δ_l is a line fixed effect and ξ_j an incumbent insurer fixed effect. Because the sample contains many small insurers who write only a handful of policies with 100% or 0% retention—recall that I condition on the policy's continuing to be serviced through the broker—I assign a single fixed effect to the 'fringe,' which includes any insurer writing less than 1% of the premium at the broker over the sample period.

The marginal effects of the explanatory variables of the specification corresponding to equation 2.2 are presented in column (1) of table 2.5. Column (2) extends the basic specification by including interactions of incumbent insurer and year, allowing insurer aggressiveness to vary over time. This addition comes at some cost, with the model fitting perfectly for roughly 400 observations which are subsequently dropped. The coefficients on both *IncFee*$\times$*EqAgents* and *IncFee*$\times$*EqHouse* are not significant at standard confidence levels. This suggests that the net effect of contingency fee incentives on shopping activity is negligible. The results highlight the differences between house business and the business within agents' portfolios. Bearing in mind the insignificance of *IncFee*$\times$*EqHouse*, the point estimate of -.077 on *EqHouse* (significant at the 1% confidence level) indicates that house business is about 1/5th as likely as non-equity business to be switched, irrespective of the incumbent.[21] This business does not appear to be shopped frequently. Presumably this is response to the fact that it is not very price sensitive.

IncRelativeCommission is negative, as expected, though not significant at standard confidence levels. This does not imply that agents do not respond to commission rates when choosing whether to switch a policy, only that insurers with commission rates on a line that are systematically higher do not have higher retention. One possibility for this result is that the meaningful variation across

[21]The predicted probability of *Switch* at the means is .10.

commission rates is idiosyncratic to the business being quoted, which would not be captured with these measures based on medians. It is also possible that systematic differences in commission rates are negatively correlated with unobservable insurer aggressiveness. The coefficient on *PolicySize* is positive and significant at the 1% confidence level. Insurance agents more actively service large policies and tend to solicit quotes annually. Neither *BrokerDuration* nor *IncDuration* is significant in these specifications.

2.4.3 Placement of Switched Business

The analysis now focuses on business that agents choose to move to a new insurer upon renewal. If contingency fees have important incentive effects, the expectation is that equity agents will exhibit a disproportionate tendency relative to non-equity agents to place business with fee insurers. Any such tendency should be magnified for house business, which equity agents have greater latitude in placing. As before, unobservable match quality and the potential for selection induced by contingency fees complicate the discussion. I argued above that the incentive effects of contingency fee contracts encourage agents with equity to move marginal business to fee insurers and thus leave these agents with relatively more specialized portfolios of business with non-fee insurers. If this is so, we might expect reduced flows between the two types of insurers' renewal business because risks have been sorted. The effect complements the initial expectation that equity agents will be less likely to move business to a non-fee insurer when held by a contingency fee insurer. However, it works against the anticipated effect when focusing on the renewals of non-fee insurers. On the one hand, the equity agent has a greater willingness to place this business with a fee insurer. On the other hand, because selection has reduced the competitive overlap between the two types of insurers, the equity agent will rarely be presented with an occasion on which a fee insurer is competitive on a risk held by a non-fee insurer.

To test for these incentive effects, I estimate a probit model on the sample of 846 switches of renewal business. The dependent variable, Fee_{iladj}, takes the value one if line l of client i with

incumbent j is placed by agent a with a fee insurer at date d:

$$\begin{aligned} Fee^{*}_{iladj} =& \beta_0 + \beta_1 IncFee_{dj} + \beta_2 IncFee_{dj} \times EqAgents_a + \beta_3 IncFee_{dj} \times EqHouse_a \\ &+ \beta_4 IncNonFee_{dj} \times EqAgents_a + \beta_5 IncNonFee_{dj} \times EqHouse_a \\ &+ \beta_6 Match_{lad} + Z_d\Gamma + \eta_y + \delta_l + \xi_j + \epsilon_{iladj}, \end{aligned} \tag{2.3}$$

$$Fee_{iladj} = \begin{cases} 1 & \text{if } Fee^{*}_{iladj} > 0 \\ 0 & \text{otherwise.} \end{cases}$$

The dummy variables are excluded for non-equity agents and non-fee incumbents. However, *EqAgents* and *EqHouse* are interacted with both *IncFee* and *IncNonFee*, the excluded dummy for non-fee insurers, to allow direct tests relative to non-equity agents. As an example, the coefficient on the interaction *IncNonFee*×*EqAgents* allows testing of the null hypothesis that equity and non-equity agents are equally likely to place renewal business with a contingency fee insurer if the incumbent is a non-fee insurer. The coefficients on the remaining interactions can be interpreted similarly. The model's specification emphasizes the identification assumption made above: any heterogeneity across agents leading equity agents or house business to favor fee insurers will be attributed to the presence of contingency fee contracts. *Match* controls for match quality with the set of fee insurers as in equation 2.1. A vector of time-varying variables, Z_d, and year dummies, η_y, allow for linear time trends within year and jumps in the probability of placement with contingency fee insurers at the beginning of the year as the set of contingency fee insurers is redefined. δ_l is a line fixed effect and ξ_j an incumbent insurer fixed effect. These allow different lines and business with different insurers to have varying degrees of match quality with the set of fee insurers.

Table 2.6 reports the marginal effects of various permutations of this core specification.[22] Column (2) extends the specification of column (1) by including insurer-year interactions. This allows the match quality of an incumbent insurer's renewal business with the set of fee insurers to evolve over time. The coefficients of interest increase in both significance and magnitude subsequent to cleaning out this variation. In interpreting the results, I will focus on column (2). *IncFee* is omitted from this specification because no fee insurer is among the fringe.

The one clear prediction of the discussion above is borne out by the data. Equity business is significantly less likely than non-equity business to be placed with a non-fee insurer when switched from a fee incumbent. *IncFee*×*EqAgents* and *IncFee*×*EqHouse* are both positive and significant at

[22]Standard errors allow for correlation across lines within a client's portfolio of coverage.

the 1% confidence level. Moreover, the effect is more pronounced for the less price-sensitive house business as anticipated, though a test of the equality of the coefficients on *IncFee*×*EqAgents* and *IncFee*×*EqHouse* cannot be rejected at standard confidence levels. These effects are economically very significant. The predicted probability evaluated at the means of placing switched business with a contingency fee insurer is .48. The point estimate of .491 on *IncFee*×*EqHouse* suggests this probability more than doubles when house business with a contingency fee incumbent is switched.[23] Thus, contingency fees dramatically increase retention levels of fee insurers when the business is placed by an equity agent.

The results are less easily interpretable when looking at the business with non-fee incumbents. Equity agents do not appear to favor fee insurers when placing this business, with *IncNonFee*×*EqAgents* insignificantly estimated. This is consistent with contingency fees inducing sorting on unobservables as I have argued. The house business, however, is significantly more likely to be placed with a contingency fee insurer when switched. *IncNonFee*×*EqHouse* is significant at the 1% confidence level and large. This begs the question: why was this business not with a fee insurer initially? To inquire further into this, I exploit the fact that after 1996 the set of non-fee insurers can be decomposed into those insurers that have never offered contingency fees through the broker (*IncNeverFee*) and those that have previously offered such contracts but have since let them expire (*IncOnceFee*). The distinction is important in the present context because the latter set includes insurers for which match with the set of fee insurers is fairly high. Recall that specialty insurers do not offer contingency fee contracts and thus will never be among this set of insurers. Column (3) reports the results of this decomposition. *IncNeverFee*×*EqHouse* is positive, though not very precisely estimated. In contrast, *IncOnceFee*×*EqHouse* is positive and significant at the 1% confidence level. Apparently the results of column (2) are being driven by the business that has historically found a good fit with the set of fee insurers. Once the insurer drops its contingency fee compensation, the house business that is switched flows to an insurer with an active contingency fee contract. At the same time, the coefficient on *IncOnceFee*×*EqAgents*, which is negative and significant at the 5% confidence level, does not accord with expectations.

The results of this section taken collectively tell a fairly compelling equilibrium story. New house business arriving at the broker is very likely to be placed with a fee insurer, while placement of equity agents' business appears to be constrained by portfolio considerations. As business with

[23]Extrapolating out point estimates for dummy variables can be misleading when effects are this large. A better estimate derived from the underlying probit model evaluated at the means, with the exception of *EqAgents* and *EqHouse* which are set to zero, suggests this probability increases from .41 to .83.

fee insurers comes up for renewal, both equity agents' business and house business churns among the set of contingency fee insurers but rarely switches to an insurer failing to offer such compensation. When contingency fee contracts do expire, house business flows to an insurer with an active contract.

2.5 Contractual Form and Incentives

Having thus far treated contingency fee contracts rather crudely as either being offered or not, the analysis now turns to the particulars of these contracts and inquires whether equity agents respond to them as they place business. The discussion begins with a survey of contracts in place at the broker over the sample period. It then focuses on a theoretical model that incorporates some of the salient features of these contracts. It concludes with some empirical tests of whether equity agents respond to the marginal incentives they face.

2.5.1 A Survey of Contracts

From 1994 through 2000, a total of 51 contingency fee contracts are in effect at the broker.[24] Figure 2-2 reproduces one such contract in place in 1999 that nicely captures the spirit of contingency fee compensation. Prior to the calendar year, the broker and the insurer negotiate a target premium, in this instance $500,000 in written premium for the year. If the broker fails to attain this target, it receives no payment. Provided it meets the target, however, the contract generates a factor, λ_1, that is increasing in written premium. In addition, the contingency fee contract defines a factor, λ_2, that increases as the earned loss ratio on the insurer's premium at the broker declines. The earned loss ratio is defined as an insurer's total losses divided by its earned premium.[25] Both factors are multiplied by the insurer's earned premium at the broker for the year to generate the year-end contingency fee. Thus, the broker is remunerated for both the volume and the profitability of the business it places with the insurer.

In a setting with many such contracts, equity agents will face higher marginal incentives to place business with those insurers with higher written premium. An exception occurs when the expected written premium for an insurer is near a premium threshold at which λ_1 increases. Of

[24] Table 2.1 presents the series of all contingency fee contracts.

[25] In practice, because claims on policies often take several years to settle, losses are calculated off 'loss reserves' set aside by an insurer to pay realized claims. These reserves represent an insurer's best estimate of ultimate losses. The insurer has an opportunity to renege on payments by setting aside unduly generous reserves. This moral hazard is generally held in check by the repeated nature of the relationship, but this is one reason a contingency fee relationship can terminate. The partners at a broker, feeling slighted, can begin to move their business away from the fee insurer. Something akin to this happens at this broker over the sample period.

course, early in the year it is difficult to say whether written premium will be near a threshold for an insurer given the uncertainty of the environment. However, as the year comes to a close, agents have a much better sense of which premium thresholds are attainable among the contracts in place. When some contracts are near these compensation jumps, marginal incentives can become very pronounced. Consider a $1000 policy with a 15% commission rate placed on December 31 so that, effectively, none of its premium is earned in the present year. Assume that our sample contract is in force, $\lambda_2 = 100\%$, and the broker's written premium with the insurer stands at $499,000 and its earned premium at $500,000.[26] If the policy is written with the contingency fee insurer, the premium threshold is attained and the broker earns 2.5% on all the business done with the insurer. This results in a contingency fee of $\$500,000 \times .025 = \$12,500$, which is nearly 100 times the commission on the policy of $150.

Another occasion on which the larger insurer will not be offering higher marginal incentives arises if claims activity on the larger insurer's business is high. This increases its earned loss ratio and decreases the expected marginal return to placing business with the insurer. That said, contingency fees of larger insurers are probably more resilient to claims activity. As the insurer's written premium grows, the earned loss ratio on its business becomes increasing deterministic. Intuitively, this argument has some appeal, and it is buttressed by the inclusion of 'stop loss' provisions that cap the contribution of a particular claim to the earned loss ratio when calculating the contingency fee payment. There is no stop loss provision in this sample contract, but this is rare, with over 90% of the contracts in the sample having a stop loss limit. Whether stop loss provisions are observed depends on the negotiation process prior to the calendar year. Typically, stop loss limits can be 'bought' by the broker in exchange for a less generous written premium factor (λ_1). The standard observed stop loss limit among the contracts at the broker is $200,000.

With the exception of a few contracts in effect early in the sample period that appear to have no minimum premium targets, all contracts at the broker share the general features of the sample contract that I have emphasized: a target premium, increasing marginal incentives as volume and profitability grow, and discrete compensation thresholds.[27] Upon this basic template, insurers have incorporated a number of variations. As an example, many insurers offer growth and retention bonuses if the broker has exceeded the written premium and retention levels of the previous year.

[26] It is entirely plausible for earned premium to exceed written premium because much of the earned premium in the current year is attributable to policies written in the prior year.

[27] The percentage without minimum premium targets is certainly below 15% of the contracts at the broker. Data on contractual provisions are scarce for a few insurers' contracts in 1994 and 1995. What can be said is that some insurers are paying contingency fees on very low premium volume.

Another common variation involves conditioning contingency fee payments on an earned loss ratio that is based on current as well as past losses. 47% of the contracts on file rely on prior years' claims activity in this way. Of these, most calculate the loss ratio off a three year moving average of the within-year loss ratio. These contracts lead to heightened persistence of the incentives faced by equity agents when placing business. A few good years with low claims activity result in a low earned loss ratio that is relatively insensitive to losses in the current year. On the other hand, catastrophic claims today can dramatically reduce the equity agent's marginal incentives to place business with the insurer for years to come.

Approximately 10% of the contracts, all offered by a single insurer, calculate contingency fees using both commercial and personal lines written premium. Though this study has focused exclusively on commercial lines insurance, the broker also markets some personal lines—homeowner's, auto, etc.—to individual consumers. This business is written by an entirely different set of agents, though it falls under the same ownership. When insurers write contingency fee contracts of this variety, there is the possibility that the commercial lines equity agent can piggy-back on high personal lines volume. This actually occurs in this sample for a few years. When this insurer chose to restructure compensation and create separate contracts for personal and commercial lines business, the broker no longer had the volume to qualify for a contingency fee contract on its commercial lines business.

2.5.2 A Model with Convex Payoffs and Premium Thresholds

The above discussion highlights a fundamental tension between the tendency to consolidate business with the largest fee insurers, in response to the higher marginal incentives they offer on average, and the desire to meet written premium thresholds to secure potentially large compensation bonuses. This subsection develops a model that addresses how equity agents ought to respond to both of these elements if they aim to maximize contingency fee revenue. Consider a two period model with periods $t = 0$ and $t = 1$. In each period, a non-equity agent moves first, placing business randomly between contingency fee insurers 1 and 2, each with probability 1/2. A risk neutral equity agent follows and chooses to place business with insurer 1 or 2 so as to maximize the total contingency fee revenue of the broker over the two periods. Assume that insurer $j \in \{1, 2\}$ has the following

contingency fee contract in place:

$$FEE_j = \begin{cases} A + p_j^2 & p_j \geq M \\ 0 & p_j < M, \end{cases}$$

where $M \geq 0$ is a minimum premium level set by the insurer, assumed to be the same across insurers in this application; $A \geq 0$ is a fixed component to the contingency fee compensation provided the minimum is met; p_j is the total premium placed with insurer j by both the equity and the non-equity agent. I assume that each agent places one indivisible unit of insurance each period and, thus, that four units of insurance are placed over the two periods.

I confine the model's solution to Appendix 2.6 but summarize the equity agent's behavior in the following proposition. Let 'consolidate' refer to placing business with the insurer with the greatest written premium (the leader) and 'diversify' to placing business with the follower.

Proposition 1

1. *If $M = 0$, the equity agent consolidates at $t = 0$ and $t = 1$.*
2. *If $0 < M \leq 1$, the equity agent consolidates at $t = 0$.*
   (a) *If $A \leq 6$, the equity agent consolidates at $t = 1$.*
   (b) *If $A > 6$, the equity agent diversifies at $t = 1$ if the follower is one policy short of its premium target.*
3. *If $1 < M \leq 2$,*
   (a) *If $A \leq 8$, the equity agent consolidates at $t = 0$,*
      i. *If $A \leq 1$, the equity agent consolidates at $t = 1$.*
      ii. *If $1 < A \leq 8$, the equity agent diversifies at $t = 1$ if the follower is one policy short of its premium target.*
   (b) *If $A > 8$, the equity agent diversifies at $t = 0$ and $t = 1$.*
4. *If $M > 2$, the equity agent consolidates at $t = 0$ and $t = 1$.*

Figure 2-3 shows the set of equilibria graphically, with each panel depicting the equity agent's equilibrium action at the respective time. No shading indicates consolidation, and 'D' diversification. 'DT' indicates diversification at $t = 1$ if the follower is one unit of insurance short of its target premium.

Less parsimoniously, if the premium targets are set too high to reach both, the equity agent simply consolidates with the leader (as in part 4 of the proposition). If, instead, both targets are attainable, the agent is faced with the question of how difficult it will be to achieve them and if doing so is worth it. If threshold bonuses, A, are particularly high but only attainable with some effort, the equity agent will immediately pursue a diversification strategy, making the opposite choice of the non-equity agent in both periods, to ensure both are reached (e.g. 3(b)). If bonuses are somewhat lower, the agent pursues a 'wait-and-see' strategy. She does not preoccupy herself with the premium thresholds until the last period, instead focusing on consolidating with the leader (e.g. 2(b) and 3(a)ii). The motivation for this is that the non-equity agent might do the work for her, randomly placing the business necessary to meet the follower's target premium. If the non-equity agent does not, the equity agent returns in the last period and places business to achieve the target premium, provided the compensation bonus is sufficiently high as to warrant foregoing the marginal incentives offered by the leader. If the non-equity agent does place business with the follower, the equity agent will simply consolidate. If bonuses are very low or trivially attained, the equity agent will choose to consolidate in both periods (e.g. 1, 2(a), and 3(a)i).

Provided compensation does not jump too markedly when premium thresholds are met, the model suggests that equity agents will begin each year by consolidating business among the insurers with the greatest expected written premium. As the year draws to a close, equity agents will grow increasingly aware of whether the broker is close to premium thresholds with some insurers. If it is, the tendency to consolidate will give way to selective placement in response to these thresholds.

2.5.3 Empirical Methodology

This subsection asks the general question of whether equity agents respond to the marginal incentives of contingency fee contracts when placing business among fee insurers. Ideally, the analysis would involve a measure of marginal incentives constructed directly off the incentive schedules of the contingency fee contracts in the data set. Unfortunately, this is impossible because the data collected often do not include the full contract in place, only a payment calculation with some hints as to the underlying contractual provisions.

Instead, I construct two measures to proxy for the marginal incentives offered by contingency fee insurers. The first is *PremiumShare*, the insurer's share of the total earned premium among the current month's fee insurers in the previous month. Personal lines earned premium is incorporated into this share for the insurer in the sample offering contingency fee payments conditioned on both

commercial and personal lines business. While this contract is in force, this insurer is offering fairly high marginal incentives despite its commercial lines volume being fairly low. This adjustment corrects for this. I have opted to construct this measure using earned premium despite the fact that targets are based on written premium. In practice, multiplying an insurer's lagged earned premium by twelve provides a very good prediction of year-end written premium. Earned premium is also far less volatile, and its use anticipates renewals to come later in the year. If an insurer, for example, has a large policy up for renewal in June, it is reasonable to include this business in a measure of expected written premium calculated in the first half of the year. Employing earned premium does precisely this, because it incorporates the earned premium from the policy that was written in the previous year. My expectation is that equity agents will respond positively to this measure.[28] As mentioned above, this might become a poorer proxy of marginal incentives toward the end of the year if the premium thresholds of the lower volume insurers prove to be relevant.

While claims are not directly observable in the data set, for contracts calculating payments off lagged profitability measures, last year's contingency fee is informative of the equity agent's marginal incentives in the current year. When, for example, no payment is made in the previous year on a contract despite the premium target having been attained, it is a good indication that a moving-average loss ratio has been 'swamped' by past losses. A contract that has been swamped offers the equity agent very low marginal incentives to place business with the insurer. I create a second measure to capture variation in marginal incentives, *Swamped*, that takes the value one if the insurer has a rolling contract in place and no payment was made in the year despite the premium target having been attained. I expect equity agents to avoid insurers with swamped contracts when placing business.

To test these hypotheses, I estimate conditional logit models on the samples of new and renewal business placed with fee insurers, comprised of 815 and 412 policies, respectively.[29] In the basic specification, whether a policy is written with a given fee insurer is estimated as a function of the

[28]Strictly interpreting the sample contract would suggest including target premiums in this measure. However, these contracts are negotiated, and the broker will generally be able to extract more favorable contractual terms from those insurers with greater premium volume. (Recall that the agency contracts in place make the broker's threat of moving the business to another insurer very difficult for the insurer to counter.) These concessions do not tend to come in the form of lower target premiums—insurers with higher premium levels have higher targets— but instead as higher written premium factors (λ_1). Thus, if the broker is on track to meet the written premium targets of two contingency fee contracts, one with a target of $100,000 and the other with a target of $1,000,000, the latter will probably be offering the equity agent more generous marginal incentives.

[29]Policies that are retained by the incumbent fee insurer upon renewal are excluded from the sample of renewal business.

underlying attributes of the insurer interacted with the attributes of the agent placing the business:

$$\begin{aligned} P(ChosenInsurer_{iadj}) =& F(\alpha_i + \beta_1 AgentInsurerMatch_{adj} + \beta_2 PremiumShare_{dj} \\ &+ \beta_3 PremiumShare_{dj} \times EqAgents_a + \beta_4 PremiumShare_{dj} \\ &\times EqHouse_a + \beta_5 Swamped_{yj} \times EqAgents_a + \beta_6 Swamped_{yj} \\ &\times EqHouse_a + \beta_7 RelativeCommission_{iyj} + \theta_{yj}), \end{aligned} \tag{2.4}$$

where $F(z) = \frac{e^z}{1+e^z}$. $ChosenInsurer_{iadj}$ is a dummy variable taking the value one if policy i is written with insurer j at date d by agent a, and zero otherwise. *AgentInsurerMatch* is the insurer's share of the agent's earned premium with the current month's contingency fee insurers in the previous month. The dummy for non-equity agents is excluded from this specification. The coefficient on *PremiumShare* thus measures the response of non-equity agents to aggregate premium levels. The expectation is that this coefficient will be insignificant. It is possible, however, that the coefficient will pick up within-year variation in carrier aggressiveness that is not being absorbed by *AgentInsurerMatch*.[30] In this case, the coefficient might be positive and significant. The coefficients on *PremiumShare*×*EqAgents* and *PremiumShare*×*EqHouse* allow testing of the null hypothesis that equity business exhibits the same probability of being placed with insurers with higher premium levels as does non-equity business, controlling for agent-insurer match quality. If contingency fees have important incentive effects, both coefficients should be positive and significant, with that on house business being somewhat larger. *Swamped*×*EqAgents* and *Swamped*×*EqHouse* should be negative and significant if placement of equity business responds to past claims activity on these contracts. The main effect for *Swamped* is excluded from the specification because it is perfectly collinear with an insurer-year fixed effect, θ_{yj}. These fixed effects allow the relative aggressiveness of all insurers to vary freely by year. Finally, the specification includes the insurer's median commission rate on the line less the median of this measure across all insurers on the line. This provides a proxy for how aggressively the insurer compensates the broker for policies written on the line. If agents respond to this systematic component of commission rates when placing insurance, this effect will be positive.

[30] This variation is restricted to be within year by virtue of the insurer-year fixed effects, θ_{yj}

2.5.4 Results

The results of this specification are reported in table 2.8. Column (1) presents the results on the sample of new business, and column (3) presents the results on the sample of renewal business. The coefficient on *PremiumShare*×*EqHouse* is positive and significant at the 5% confidence level for both new and renewal business. As was anticipated, house business is more likely than non-equity business to be placed with insurers with high premium shares. There is, however, no evidence that equity agents exhibit similar behavior when placing their own business: the coefficient on *PremiumShare*×*EqAgents* is negative in both specifications, though imprecisely estimated on the sample of renewal business. The coefficient on *Swamped*×*EqHouse* is negative and significant at the 10% confidence level for both new and renewal business. Equity agents avoid placing house business with insurers with rolling earned loss ratios that have been swamped by past claims. As before, there is little no evidence the same is true for equity agents' portfolios. The coefficient on *Swamped*×*EqAgents* is not significantly estimated in either equation. The relative commission rate, *RelativeCommission* is positive, as expected, though not significant at conventional levels.

The model suggests that a tendency to consolidate early in the compensation period will be met with either further consolidation or diversification, depending on whether premium thresholds attract the attention of equity agents toward the end of the year. To address how the placement of equity business responds to *PremiumShare* over the course of the year, *PremiumShare* is interacted with a full set of quarterly dummies, $Q1$ - $Q4$. This allows the non-equity agents' response to *PremiumShare* to vary by quarter. These interactions are in turn interacted with *EqAgents* and *EqHouse*. The coefficient on *PremiumShare*×*EqAgents*×*Q3*, for example, allows testing of the null hypothesis that equity and non-equity agents exhibit the same response to *PremiumShare* in the third quarter. If the tendency to consolidate is systematically undermined toward the end of the year, these coefficients ought to be positive in the first two to three quarters and grow less significant toward year's end.

Columns (2) and (4) of table 2.8 present these results. Focusing first on the house, there is no evidence that the tendency toward concentrating business with the largest insurers deteriorates late in the year. The coefficients on the *PremiumShare*×*EqHouse* interactions in column (2) for new business tend, if anything, to grow over the year, while those in column (4) for renewal business are persistently positive and significant. The response of equity agents' business to *PremiumShare* relative to non-equity agents is generally not very precisely estimated. On new business, a statisti-

cally significant and relatively large negative coefficient on $PremiumShare \times EqHouse \times Q4$ might be read as evidence that premium thresholds are playing a role in the final quarter. I am disinclined to push that interpretation too aggressively, though, in light of the fact that a negative a significant coefficient is found in the second quarter as well.

The results of this section point to the marginal incentives offered among contingency fee insurers having important incentive effects, but only with respect to the placement of the less price-sensitive house business. Both new and renewal house business are more likely than non-equity business to be placed with larger premium volume insurers. This effect persists throughout the year. Moreover, house business is less likely than non-equity business to be placed with insurers for which the contingency fee contracts have been swamped.

2.6 Conclusion

This chapter has found contingency fee compensation to be an important determinant of where equity agents place business. Equity agents are more likely than non-equity agents to place both new and renewal business with fee insurers. Moreover, when business is placed with a fee insurer, I find that equity agents respond to variation in marginal incentives across contracts. Equity agents consolidate with the broker's dominant insurers in response to marginal incentives that are increasing in volume. They also avoid placing business with insurers offering low marginal incentives in the current year because their contracts have been 'swamped' by past losses.

An interesting byproduct of this study is the fact that I have found little evidence that agents respond to systematic variation in commission rates. Though the coefficients on commission rate measures are consistent with agents favoring insurers that offer higher commission rates, none is significant. This is of particular note because others have argued that commission rates are an important dimension along which insurance companies compete.[31] Though I am unable to perfectly control for variation across commission rates—I only observe the commission rate on the written policy, not on all quoted policies— this result suggests that the client's ability to monitor agent compensation may be an important check on insurance agent rent-seeking. While commission rates are observable, the marginal contribution of a policy to contingency fees is nearly impossible to assess without knowledge of both the underlying contract and the insurer's premium volume and profitability at the broker.

[31] Hensley (1962) argues that insurers compete for an insurance agency's business through commission rates.

Appendix A

Insurer $j \in \{1, 2\}$ compensates according to the function,

$$FEE_j = \begin{cases} A + p_j^2 & p_j \geq M \\ 0 & p_j < M, \end{cases}$$

where $M \geq 0$ is a minimum premium level set by the insurer, but assumed to be the same across insurers in this application; $A \geq 0$ is a fixed component to the contingency fee compensation provided the minimum is met; p_j is the total premium placed with insurer j by both the equity and the non-equity agent. I assume that each agent places one indivisible unit of insurance each period and, thus, that four units of insurance are placed over the two periods. Assume without loss of generality that the non-equity agent always places with insurer 1 at $t = 0$. Let an allocation of x units of insurance with insurer 1 and y units with insurer 2 be denoted $\{x, y\}$.

For $M = 0$, both premium targets are trivially attained, and the equity agent chooses 1 (consolidates) at $t = 0$ and $t = 1$. For $M > 2$, because both targets cannot be reached, the equity agent consolidates. In either case, the final outcome is {3,1} with probability 1/2 and {4,0} with probability 1/2.

If $0 < M \leq 1$, note that the equity agent will always consolidate at $t = 0$ because the target premium can always be attained at $t = 1$ and the total fee from {3,1} exceeds that from {2,2}. At $t = 1$, with probability 1/2, the equity agent faces {2,1}, in which case she consolidates. If instead she faces {3,0}, the profit to consolidating is $A + 4^2$, while the profit to diversifying is $(A + 1) + (A + 3^2)$. For $A > 6$, the jump in profits upon reaching the follower's target premium outweighs the increasing marginal incentives of placing business with the larger insurer, and, accordingly, the equity agent chooses to diversify.

If $1 < M \leq 2$, it is no longer clear the equity agent will choose to consolidate in the first period. Intuitively, if A is large enough, it is worth guaranteeing both targets are achieved by diversifying immediately. I proceed by backward induction. If the equity agent faces {3,0} at $t = 1$, it is impossible to achieve the lower target, and thus the agent consolidates. If instead the allocation is {2,1}, a strategy of diversification yields $2 \times (A + 4)$, while consolidation yields $A + 9$. For $A > 1$, diversification dominates. Assume that $A \leq 1$. At $t = 0$, anticipating consolidation at $t = 1$, there is no return to diversification. The equity agent thus consolidates at $t = 0$. Assume instead that $A > 1$. If the equity agent chooses to consolidate at $t = 0$, with

probability $1/2$ she faces $\{3,0\}$ at $t = 1$ and consolidates, and with probability $1/2$ she faces $\{2,1\}$ at $t = 1$ and diversifies. Choosing to consolidate at $t = 0$ thus yields total expected profit of $1/2 \times (A + 16) + 1/2 \times 2 \times (A + 4) = 3/2 \times A + 12$. Diversification at $t = 0$, on the other hand, will be met by diversification at $t = 1$, yielding $2 \times (A + 4)$. The equity agent will choose to diversify at $t = 0$ if $2 \times (A + 4) > 3/2 \times A + 12$, or $A > 8$.

Table 2.1: CONTINGENCY FEE CONTRACTS AND PAYMENTS

Insurer Premium Rank	1994	1995	1996	1997	1998	1999	2000
1	0	0	0	0	0	0	0
2	1*	1	1*	1*	1*	1*	1
3	1	1*	1*	1*	1*	1*	1
4	0	1	1*	1*	1*	1	1
5	0	0	0	0	0	0	0
6	0	0	0	0	0	0	0
7	0	1	1*	1*	1*	1	0
8	0	1*	1	1*	0	0	0
9	0	0	1*	1	1*	1*	1
10	0	0	1	1*	1	1*	1
11	1	1*	1	1*	1	0	0
12	1	1	1	0	0	0	0
13	1	1*	1*	1	1*	0	0
14	0	0	0	0	0	0	0
15	0	0	0	0	0	0	0

NOTE.—1 denotes an active contingency fee contract. 1* denotes payment. Insurers are ranked by written premium at the broker over the sample period. The fifteen largest insurers in alphabetical order are AIG, Chubb, Cincinnati, CNA, Fireman's Fund, Fremont Indemnity, Great States, Hartford, Home, Reliance, Royal, Safeco, St. Paul, TIG, and Travelers. This list is not exhaustive: 153 insurers write policies at the broker from 1994 to 2000.

Table 2.2: DESCRIPTION OF VARIABLES

Variable	Description
Fee	Takes the value one if the policy is written by a fee insurer, zero otherwise
EqAgents	Takes the value one if the insurance agent has equity in the broker, zero otherwise
EqHouse	Takes the value one if the business is coded to the house and thus placed by an agent with equity, zero otherwise
Auto	Takes the value one for commercial auto policies, zero otherwise
Liability	Takes the value one for liability policies, zero otherwise
Property	Takes the value one for property policies, zero otherwise
Umbrella	Takes the value one for umbrella policies, zero otherwise
WorkComp	Takes the value one for workers' compensation policies, zero otherwise
Match	Share of the premium on the line in an agent's portfolio earned by the current month's contingency fee insurers in the previous month*
Switch	Takes the value one if the coverage is switched to a new insurer upon renewal, zero otherwise
IncFee	Takes the value one if the incumbent insurer on renewal business is currently a fee insurer, zero otherwise
IncNonFee	Takes the value one if the incumbent insurer on renewal business is not currently a fee insurer, zero otherwise
IncNeverFee	Takes the value one if the incumbent insurer on renewal business is not currently a fee insurer *and* has never offered a contingency fee contract at the broker, zero otherwise
IncOnceFee	Takes the value one if the incumbent insurer on renewal business is not currently a fee insurer *but* has offered a contingency fee contract previously, zero otherwise
IncRelativeCommission	Incumbent insurer's median commission rate on the line less the median of the median commission rates of all insurers on the line
IncMatch	Share of the premium on the line in an agent's portfolio earned by the incumbent insurer in the previous month*
IncDuration	Duration (in years) of the relationship between the incumbent insurer and the client at the time of renewal
BrokerDuration	Duration (in years) of the relationship between the broker and the client at the time of renewal
PolicySize	Premium (in $100,000s) at which policy was last written

NOTE.—1/12th of the premium on a policy of duration one year is earned in each month. Thus, earned premium in a particular month is an equally weighted average of all premium written over the past 12 months.

Table 2.3: SUMMARY STATISTICS

Variable	New Business *(N = 1604)*		Renewal Business: Full Sample *(N = 5707)*		Renewal Business: Switched *(N = 878)*	
Fee	.508	(.500)	.612	(.487)	.469	(.499)
EqAgents	.241	(.427)	.186	(.389)	.229	(.420)
EqHouse	.127	(.333)	.204	(.403)	.122	(.327)
Auto	.097	(.296)	.078	(.269)	.060	(.238)
Liability	.148	(.356)	.145	(.352)	.141	(.348)
Property	.079	(.270)	.088	(.284)	.077	(.267)
Umbrella	.147	(.354)	.135	(.342)	.165	(.372)
WorkComp	.069	(.254)	.086	(.280)	.066	(.249)
Match	.512	(.340)	.546	(.331)	.492	(.327)
Switch			.154	(.361)	1.000	(.000)
IncFee			.621	(.485)	.521	(.500)
IncNonFee			.379	(.485)	.479	(.500)
IncNeverFee			.290	(.454)	.362	(.481)
IncOnceFee			.088	(.284)	.117	(.322)
IncRelativeCommission			.020	(.033)	.018	(.033)
IncMatch			.248	(.279)	.168	(.235)
IncDuration			1.956	(1.190)	2.055	(1.299)
BrokerDuration			2.324	(1.405)	2.388	(1.508)
PolicySize			.150	(.548)	.219	(.573)

NOTE.—Table 2.2 provides descriptions of these variables. Standard deviations are in parentheses.

Table 2.4: PLACEMENT OF NEW BUSINESS

Independent Variable	Dependent Variable *Fee*
EqAgents	.051
	(.043)
EqHouse	.256**
	(.049)
Match	.504**
	(.053)
Line Dummies:	
Auto	−.102**
	(.046)
Liability	−.148**
	(.045)
Property	−.083
	(.056)
Umbrella	.072**
	(.035)
WorkComp	.016
	(.058)
Year Dummies & Piecewise Trend	YES
Predicted Pr. at $\overline{X}$	.51
Pseudo R^2	.18
Observations	1604

NOTE.—Results are from a probit specification with the dependent variable, *Fee*, taking the value one if new business is placed with a fee insurer and zero otherwise. Marginal effects of independent variables are reported. Estimated standard errors, corrected for correlations across lines within a client's portfolio, are in parentheses. * denotes significance at the 10% confidence level, ** at the 5% confidence level.

Table 2.5: SWITCHING OF RENEWAL BUSINESS

	Dependent Variable: *Switch*	
Independent Variable	(1)	(2)
EqAgents	.002	.008
	(.019)	(.019)
EqHouse	−.066**	−.077**
	(.022)	(.025)
IncFee	.022	
	(.021)	
IncFee × *EqAgents*	.019	.016
	(.025)	(.027)
IncFee × *EqHouse*	.016	.023
	(.026)	(.029)
IncMatch	−.130**	−.145**
	(.020)	(.021)
IncRelativeCommission	−.161	−.101
	(.146)	(.157)
PolicySize	.020**	.023**
	(.006)	(.007)
BrokerDuration	.001	.006
	(.005)	(.006)
IncDuration	.009	.003
	(.006)	(.006)
Line Dummies:		
Auto	−.045**	−.046**
	(.015)	(.016)
Liability	−.030**	−.029**
	(.013)	(.013)
Property	−.020	−.025
	(.016)	(.017)
Umbrella	.003	.003
	(.010)	(.011)
WorkComp	−.002	.0002
	(.018)	(.019)
Piecewise Linear Annual Trend	YES	YES
Incumbent Insurer Dummies	YES	YES
Insurer-Year Interactions	NO	YES
Predicted Pr. at $\overline{X}$	.10	.10
Pseudo R^2	.12	.18
Observations	5549	5122

NOTE.—Results are from probit specifications on the sample of renewal business with the dependent variable, *Switch*, taking the value one if the policy is moved to a new insurer upon renewal and zero otherwise. Marginal effects of independent variables are reported. Estimated standard errors, corrected for correlations across lines within a client's portfolio, are in parentheses. * denotes significance at the 10% confidence level, ** at the 5% confidence level.

Table 2.6: PLACEMENT OF SWITCHED BUSINESS

Independent Variable	Dependent Variable: *Fee* (1)	(2)	(3)
IncFee	.052		
	(.108)		
IncFee × *EqAgents*	.233**	.395**	.392**
	(.077)	(.094)	(.094)
IncFee × *EqHouse*	.405**	.491**	.497**
	(.113)	(.145)	(.145)
IncNonFee × *EqAgents*	−.008	.010	
	(.086)	(.096)	
IncNonFee × *EqHouse*	.316**	.375**	
	(.110)	(.112)	
IncNeverFee × *EqAgents*			.074
			(.100)
IncOnceFee × *EqAgents*			−.489**
			(.244)
IncNeverFee × *EqHouse*			.130
			(.176)
IncOnceFee × *EqHouse*			.543**
			(.151)
Match	.496**	.442**	.460**
	(.088)	(.096)	(.097)
Line Dummies:			
Auto	.234**	.291**	.294**
	(.073)	(.081)	(.081)
Liability	−.014	−.070	−.064
	(.079)	(.083)	(.083)
Property	−.188*	−.314**	−.308**
	(.092)	(.103)	(.103)
Umbrella	.093	.069	.069
	(.057)	(.063)	(.064)
WorkComp	−.075	−.135	−.137
	(.122)	(.138)	(.138)
Year Dummies & Piecewise Trend	YES	YES	YES
Incumbent Insurer Dummies	YES	YES	YES
Insurer-Year Interactions	NO	YES	YES
Predicted Pr. at $\overline{X}$	.46	.48	.48
Pseudo R^2	.30	.35	.36
Observations	861	803	803

NOTE.—Results are from a probit specification with the dependent variable, *Fee*, taking the value one if switched renewal business is placed with a fee insurer and zero otherwise. Marginal effects of independent variables are reported. Estimated standard errors, corrected for correlations across policies within a client's portfolio, are in parentheses. * denotes significance at the 10% confidence level, ** at the 5% confidence level.

Table 2.7: VARIABLE DESCRIPTIONS AND SUMMARY STATISTICS FOR SECTION 2.5

Variable	Description
ChosenInsurer	Takes the value one if business is placed with the insurer, zero otherwise
AgentInsurerMatch	Insurer's share of agent's earned premium with the current month's fee insurers in the previous month
PremiumShare	Insurer's share of total earned premium with the current month's fee insurers in the previous month. This is adjusted for personal lines business when the contingency fee contract is joint, and is taken as a proxy for the relative marginal incentives faced by the equity agent.*
EqAgents	Takes the value one if the agent has equity, zero otherwise.
EqHouse	Takes the value one for house business (placed by equity agents), zero otherwise
Swamped	Takes the value one if the insurer has a rolling contingency fee contract in place and did not pay a contingency fee in the prior year despite having an active contract, zero otherwise*
RelativeCommission	Insurer's median commission rate on the line less the median of this measure across all insurers
Q1-Q4	Quarterly dummies

	New Business			Renewal Business		
	Obs.	Mean	S.D.	Obs.	Mean	S.D.
ChosenInsurer	5300	.154	(.361)	2593	.159	(.365)
AgentInsurerMatch	5300	.154	(.201)	2593	.159	(.183)
PremiumShare	5300	.154	(.103)	2593	.159	(.104)
EqAgents	5300	.304	(.460)	2593	.273	(.446)
EqHouse	5300	.146	(.353)	2593	.168	(.374)
Swamped	5300	.210	(.407)	2593	.187	(.390)
RelativeCommission	5300	.023	(.033)	2593	.021	(.033)
Q1	5300	.225	(.418)	2593	.293	(.455)
Q2	5300	.359	(.480)	2593	.243	(.429)
Q3	5300	.206	(.404)	2593	.243	(.429)
Q4	5300	.210	(.407)	2593	.221	(.415)

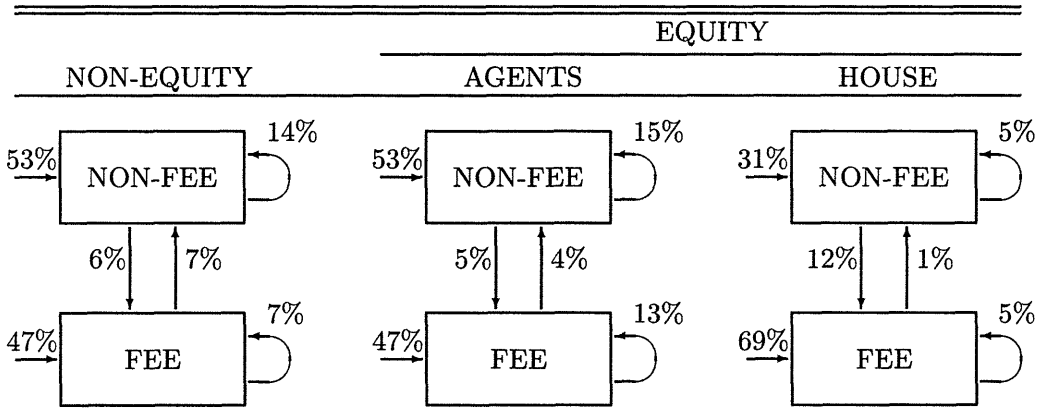
NOTE.—Personal lines business is all insurance sold to individuals through the broker. On one occasion in the sample, an insurer conditions contingency fee payment on commercial and personal lines premium volume. A rolling contract conditions payment on the claims activity in past years. Reported observations do not correspond with those in table 2.8. Here, I report all variables in the agent's choice set, in that context the number of choices made.

Table 2.8: CHOICE AMONG FEE INSURERS

	New Business		Renewal Business	
Independent Variable	(1)	(2)	(3)	(4)
AgentInsurerMatch	2.605**	2.666**	1.705**	1.631**
	(.193)	(.198)	(.355)	(.364)
PremiumShare	.549		−1.948	
	(.741)		(1.473)	
PremiumShare × *Q1*		1.386		−1.153
		(1.253)		(2.137)
PremiumShare × *Q2*		1.001		.949
		(.934)		(1.959)
PremiumShare × *Q3*		−1.083		−4.345**
		(1.308)		(2.188)
PremiumShare × *Q4*		−2.050		−2.884
		(1.273)		(1.817)
PremiumShare × *EqAgents*	−3.024**		−.968	
	(1.106)		(1.380)	
PremiumShare × *EqAgents* × *Q1*		−2.079		−.241
		(1.827)		(2.354)
PremiumShare × *EqAgents* × *Q2*		−5.423**		−3.176
		(1.706)		(2.863)
PremiumShare × *EqAgents* × *Q3*		1.759		3.556
		(2.257)		(2.669)
PremiumShare × *EqAgents* × *Q4*		−11.799**		−5.289
		(3.403)		(3.375)
PremiumShare × *EqHouse*	2.590**		6.695**	
	(1.111)		(1.795)	
PremiumShare × *EqHouse* × *Q1*		−1.441		7.447**
		(2.412)		(3.652)
PremiumShare × *EqHouse* × *Q2*		1.855		4.285
		(2.040)		(4.119)
PremiumShare × *EqHouse* × *Q3*		3.172		8.883**
		(2.243)		(3.031)
PremiumShare × *EqHouse* × *Q4*		7.832**		8.920**
		(2.494)		(3.607)
Swamped × *EqAgents*	−.269	−.276	.102	.032
	(.257)	(.264)	(.365)	(.377)
Swamped × *EqHouse*	−.770*	−.883**	−1.334*	−1.244*
	(.413)	(.422)	(.727)	(.746)
RelativeCommission	.606	.673	4.170	4.294
	(1.970)	(1.973)	(3.224)	(3.252)
Insurer-Year Interactions	YES	YES	YES	YES
Pseudo R^2	.24	.25	.28	.28
Observations	815	815	412	412

NOTE.—Results are from conditional logit specifications on the samples of new and switched business that are placed with fee insurers. Choice over the set of fee insurers is modeled as a function of the insurers' attributes. Estimated standard errors are in parentheses. * denotes significance at the 10% confidence level, ** at the 5% confidence level.

Figure 2-1: TABULATIONS OF THE DATA



		EQUITY	
	NON-EQUITY	AGENTS	HOUSE
New Business (Policies)	1012	429	205
Renewal Business			
Polices with FEE Incumbent	2096	631	818
Policies with NON-FEE Incumbent	1398	457	350

NOTE—. This figure presents raw tabulations of both new and renewal business. The upper left hand portion of the figure shows that 53% of new business placed by non-equity agents is written with a non-fee insurer. As this business is renewed 6% is written with contingency fee insurers, and 14% is switched to another non-fee insurer. 80% remains with the incumbent. This discussion is restricted to business remaining at the broker.

Figure 2-2: A SAMPLE CONTINGENCY FEE CONTRACT

WRITTEN PREMIUM TARGET = $500,000

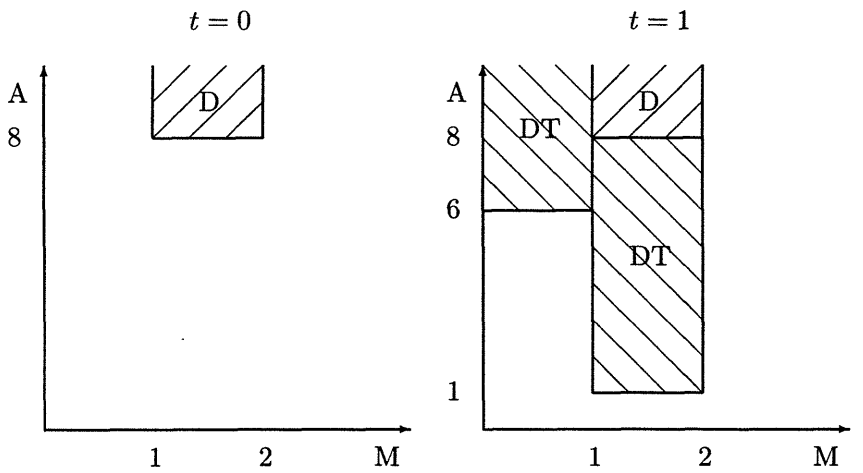
% OF WRITTEN PREMIUM TARGET ACHIEVED	FACTOR (λ_1)
0 - 99.9%	0.0%
100-119.9%	2.5%
120-139.9%	3.0%
140-159.9%	3.5%
160-179.9%	4.0%
180-199.9%	4.5%
200 & Over	5.0%

EARNED LOSS RATIO	FACTOR (λ_2)
0.0 - 70%	100%
70.1 - 80%	75%
80.1 - 90%	50%
90.1 - 100%	25%
100.1 & Above	0%

FEE = $\lambda_1 \times \lambda_2 \times$(EARNED PREMIUM)

NOTE.— Contingency fee compensation is based on premium and loss measures calculated over the calendar year. Earned premium is written premium amortized over a policy's duration. Thus, 1/12th of a policy lasting one year will be earned in each month. The earned loss ratio is losses on the insurer's business at the broker divided by the insurer's earned premium at the broker.

Figure 2-3: Equilibria and Parameter Space



NOTE.— This figure presents the equilibria to the two period model developed in subsection 2.5.2. A is a fixed component to contingency fee compensation. M is the minimum premium target for the contingency fee contract. The equity agent consolidates business with the leader in the unshaded region of each panel.'D' indicates that the equity agent diversifies, placing business with the follower. 'DT' indicates that the equity agent diversifies at $t = 1$ if the follower is one insurance policy short of its target premium.

Chapter 3

Client Turnover in Commercial Lines Insurance: Implications of the Moral Hazard Between the Insurance Broker and Its Client

3.1 Introduction

Firms purchasing insurance often employ insurance brokers rather than transacting directly with insurance companies. Such brokers specialize in the provision of information. Brokers identify both the risks borne by firms and the coverage necessary to mitigate these exposures. In addition, brokers know which insurance companies are competitively pricing coverage and often have access to specialized insurers that are particularly competitive on certain risks. Thus, for clients with somewhat specialized needs, working with a broker offers clear advantages. It also introduces the potential for moral hazard. If search is costly and its intensity unobservable to the client, it is in the broker's immediate interest to expend low search effort or forego search altogether. However dedicated the broker may be to serving the client's interests, this incentive has the potential to interfere with the broker-client relationship.

Consider the situation in which a client faces an increase in its quoted premium but cannot discern whether its premium increase owes to a systematic or an idiosyncratic price shock. In contrast, assume the broker can distinguish between systematic shocks, in which all prices have

increased, and idiosyncratic shocks, in which the client's current insurer is no longer pricing its coverage competitively. Were the client to demand search on its behalf only in response to idiosyncratic shocks, the broker would like to report such shocks to the client and rewrite the coverage with the current insurer at low cost. However, the moral hazard interferes, for the broker cannot credibly commit to truthfully report idiosyncratic price shocks. It has an incentive to represent all price increases as systematic to avoid costly search. As a result, clients facing systematic price increases will approach the broker's competitors for quotes, despite any assurances by the broker. The broker will anticipate this behavior and itself heighten search activity in response to systematic price shocks for fear of losing these clients.

This chapter employs a data set of 8705 commercial policies written through an Arizona insurance broker from 1994 to 1999 to assess whether systematic shocks induce search as suggested above. Though search is not directly observable, search activity ought to reflect itself in observed switching rates, both between insurers at the broker in question and between brokers. Systematic price increases are found to result in heightened switching of business among insurers, consistent with the moral hazard story advanced above. The likelihood of a client's business being moved to a new insurer upon renewal is found to increase 18% in response to a one standard deviation increase in the price level. There is no clear evidence that switching between brokers, as measured by the sample broker's rates of arrival and departure, responds to systematic price changes. This is not inconsistent with the story put forward. Heightened search by the broker might very well result in lower departure rates, even if the client is searching with higher intensity.

This chapter provides evidence that moral hazard distorts the broker's search activity. This result complements that of the second chapter of this thesis in which moral hazard is shown to play a role on another margin. In that context, however, the moral hazard is induced by explicit contracts written by competing insurers. Contingency fee contracts generate sales discounts, effectively encouraging the broker to consolidate business among its principal insurers. These contracts are found to achieve this end, with the placement of business responding both to the presence of contingency fee contracts as well as to their generosity. More generally, the analysis of this chapter is related to the empirical literature on moral hazard. The most similar study is that of Hubbard (1998), which suggests that repair shops with the potential to profit from servicing vehicles might be more likely to fail vehicles arriving for emissions testing. Ultimately, however, there is little evidence that the moral hazard influences the outcome of these tests. The chapter is also related to several papers on the unintended side effects of incentive schemes. Brown, Harlow, Starks (1996)

and Chevalier and Ellison (1997) show, for example, that fund inflows lead managers to alter the riskiness of their portfolios. Healy (1985) and Oyer (1998) find that bonuses based on the fiscal year induce accounting and sales distortions.

Section 2 models the broker-client relationship and formalizes the predictions sketched above. Section 3 discusses the data set. Section 4 constructs price indices to proxy for systematic price movements. Section 5 asks whether changes in these price indices influence switching of business within the broker as well as business arrivals and departures. Section 6 concludes.

3.2 A Model

Consider the following model of the interaction between the insurance broker and the client. The client has coverage with an insurer that can either be renewed or moved to a competing insurer. At time $t = 0$, the broker draws $p \in \{\underline{p}, \overline{p}\}$ from the current insurer on behalf of the client. In the event that $p = \underline{p}$, the broker presents the price to the client, the client accepts, and the game ends. If $p = \overline{p}$, however, search might result in finding a lower price $p = \underline{p}$. The probability that search is successful depends on whether $\overline{p}$ is the result of an idiosyncratic or a systematic price shock. These shocks are assumed to be mutually exclusive: price realization $\overline{p}$ owes either to an idiosyncratic shock, with probability q, or a systematic shock, with probability $1 - q$. If the shock is idiosyncratic, the quoted price is above market and the return to search is high. Provided the broker chooses to search for a better price quote, its probability of success is θ_H. If the shock is systematic, all prices have increased and thus its probability of successful search is lower at θ_L. While θ is unobservable to the client, the broker participates in many transactions and can distinguish between idiosyncratic and systematic price shocks. Thus, at $t = 0$ the broker observes both p and θ and, if $p = \overline{p}$, must decide whether to present $\overline{p}$ to the client or engage in search at cost c_1. Whether the broker chooses to search is unobservable to the client. If the broker chooses to forego search or search is unsuccessful, the client is presented with $\overline{p}$ at $t = 1$ and must decide whether to accept $\overline{p}$ or, at cost c_2, to approach a competitor. The competitor can costlessly draw from the distribution of p and offer the client a competing quote.[1] If both the incumbent broker and its competitor present the client with $\overline{p}$, the incumbent retains the business. The broker's profit is assumed to be invariant to the final price: $\Pi(\underline{p}) = \Pi(\overline{p}) = \Pi$.[2] Thus, all the broker's incentives

[1]The assumption that the competitor can costlessly draw from the distribution of p is made for convenience and avoids the need to address the competitor's participation constraint.

[2]Profit is defined as the (exogenous) present value of retaining the client. It includes any payment (or commission) on the policy placement as well as the value of serving the client in the future. In this light, Π might reasonably

to search on the client's behalf derive from the client's threat to look elsewhere.[3]

Let γ be the probability the client approaches a competitor upon facing price quote $\overline{p}$. The broker will search if and only if the activity is of positive expected value:

$$\theta\Pi + (1-\theta)[\gamma(1-\theta)\Pi + (1-\gamma)\Pi] - c_1 \geq \gamma(1-\theta)\Pi + (1-\gamma)\Pi.$$

If the broker chooses to search (LHS), with probability θ it draws $\underline{p}$, the game ends, and it earns Π. With probability $(1-\theta)$ the broker's search is not fruitful. The broker retains the business, however, if the client chooses to search but is unsuccessful ($\gamma(1-\theta)$) or the client chooses not to search $(1-\gamma)$. Under each of these scenarios, the broker incurs search cost c_1. On the other hand, if the broker foregoes search (RHS), it avoids the search cost, but only retains the business if the client searches unsuccessfully ($\gamma(1-\theta)$) or opts not to search altogether $(1-\gamma)$. Simplifying the above yields the following search rule for the broker: search if and only if

$$\gamma\theta^2\Pi \geq c_1. \tag{3.1}$$

That is, the broker will search if the probability the client approaches a competitor (γ), the broker's probability of success upon search (θ), and the profitability of the business (Π), are collectively high enough relative to the cost of search (c_1). The client's mixing probability will be determined endogenously in equilibrium.

Turning now to the client's search decision, let β_L be the probability the broker searches if $\theta = \theta_L$ and β_H the probability the broker searches if $\theta = \theta_H$. Upon observing $\overline{p}$, the client forms posteriors on θ based on its prior q and the broker's strategy $\{\beta_L, \beta_H\}$ according to Bayes' rule. Let $\hat{\theta}(\beta_L, \beta_H)$ be the expected value of θ formed by the client. The client searches if and only if its expected gain (weakly) exceeds the cost of search,

$$\hat{\theta}(\beta_L, \beta_H)(\overline{p} - \underline{p}) \geq c_2, \tag{3.2}$$

exceed any immediate gains from search $(\overline{p} - \underline{p})$.

[3]The assumption that the broker has no immediate financial gains to search mirrors the reality of the relationship. Brokers are generally paid commissions as a percentage of a policy's premium. Thus, successful search can often result in lower compensation for the broker, for the commission is paid on a lower premium.

where

$$\hat{\theta}(\beta_L, \beta_H) = \frac{q(1-\beta_L\theta_L)}{q(1-\beta_L\theta_L)+(1-q)(1-\beta_H\theta_H)}\theta_L + \frac{(1-q)(1-\beta_H\theta_H)}{q(1-\beta_L\theta_L)+(1-q)(1-\beta_H\theta_H)}\theta_H.$$

Equations 3.1 and 3.2 in hand, solving for the Perfect Bayesian Equilibria is straightforward. I restrict attention to those equilibria in which the broker conditions its search decision on its private information on θ. Three equilibria satisfy this criterion:

1. If $\theta_L^2\Pi < c_1 \leq \theta_H^2\Pi$ and $\hat{\theta}(0,1)(\overline{p}-\underline{p}) \geq c_2$, there exists an equilibrium in which the broker never searches subsequent to systematic shocks ($\theta = \theta_L$) and always searches in response to idiosyncratic shocks ($\theta = \theta_H$). The client always searches.

2. If $c_1 \leq \theta_L^2\Pi$ and there exists $\beta_L^* \in [0,1]$ such that $\hat{\theta}(\beta_L^*, 1)(\overline{p}-\underline{p}) = c_2$, there is an equilibrium in which the client searches with probability γ^* such that $\gamma^*\theta_L^2\Pi = c_1$. The broker searches with probability β_L^* in response to systematic shocks ($\theta = \theta_L$) and always searches when facing idiosyncratic shocks ($\theta = \theta_H$).

3. If $c_1 \leq \theta_H^2\Pi$ and there exists $\beta_H^{**} \in [0,1]$ such that $\hat{\theta}(0, \beta_H^{**})(\overline{p}-\underline{p}) = c_2$, there is an equilibrium in which the client searches with probability γ^{**} such that $\gamma^{**}\theta_H^2\Pi = c_1$. The broker never searches in response to systematic shocks ($\theta = \theta_L$) and with probability β_H^{**} following idiosyncratic shocks ($\theta = \theta_H$).

In each of the above equilibria, the client searches with positive probability ($\gamma > 0$). This is a necessary artifact of restricting attention to equilibria in which the broker conditions search on θ. In order for the broker to utilize its private information on θ, it must have an incentive to search, and this incentive can only be generated if the client is itself searching. Because the client cannot condition such search on θ, it is easy to show that the moral hazard problem induces inefficient search for certain parameter values. For example, if the second equilibrium obtains, it must be that $\theta_L(\overline{p}-\underline{p}) < c_2 = \hat{\theta}(\beta_L^*, 1)(\overline{p}-\underline{p})$. The client searches in response to systematic shocks ($\hat{\theta}(\beta_L^*, 1)(\overline{p}-\underline{p}) = c_2$) despite it being inefficient ($\theta_L(\overline{p}-\underline{p}) < c_2$). Yet the distortion induced by the moral hazard problem has the potential to be more severe. The client's inefficient search increases the cost to the broker of not searching itself, for it risks losing the client. This may induce the broker to search when it is inefficient.[4] This can be seen by again looking to the second equilibrium above.

[4]Even if the client could observe θ, for certain parameter values the broker will search inefficiently. If $c_2 \leq \theta(\overline{p}-\underline{p}) < c_1$, it is efficient for the client to search and inefficient for the broker to search. The client will search

Consider the case in which $\theta_L(\overline{p}-\underline{p}) < c_1 = \gamma^*\theta_L^2\Pi < c_2 = \hat{\theta}(\beta_L^*, 1)(\overline{p}-\underline{p})$. It is inefficient for client and broker alike to search subsequent to a systematic shock ($\theta_L(\overline{p}-\underline{p}) < c_1 < c_2$). Nevertheless, the client searches inefficiently, as the broker cannot credibly communicate its information on θ. With $\gamma > 0$, the broker's return to search is driven sufficiently high that search is now optimal from its perspective ($\gamma^*\theta_L^2\Pi = c_1$). Thus, the moral hazard has the potential to induce inefficient search by both the client and the broker.

This set of intuitions informs the empirical analysis to follow. It is assumed that systematic changes in insurance prices, derived from the sample of policies at the broker, should have no effect on both the broker's and the client's incentive to search other than through the moral hazard mechanism. Moreover, it is assumed that the broker can perfectly distinguish between systematic and idiosyncratic changes in price. This assumption is motivated by the broker's participation in many similar insurance transactions. If moral hazard plays no role in the broker-client relationship, systematic price changes should effect no appreciable changes in switching rates among insurers and brokers. If moral hazard is a concern, however, systematic price increases will lead the broker to heighten search activity in anticipation of search by its clients. This will lead to heightened business turnover among the broker's insurers. Whether switching of clients among competing brokers will increase is less clear. While the client's search activity when facing $\overline{p}$ might well increase, heightened search by the broker will result in the client arriving at the $\overline{p}$ subgame less often. Depending on which effect prevails, switching between brokers might increase or decrease subsequent to systematic price increases.

3.3 Data

The sample is comprised of 8705 commercial policies written through an Arizona insurance broker from 1994 through 1999.[5] For each policy, the data include premium paid, the insurer writing the coverage, the insurance agent working at the broker servicing the account, and the line of insurance

with probability one ($\gamma = 1$). The broker will also search if Π is sufficiently large and c_1 sufficiently small such that $\theta^2\Pi \geq c_1$. For this reason, the discussion focuses on parameter values for which efficient equilibria would obtain if the broker could credibly communicate its knowledge of θ but result in inefficient equilibria owing to the moral hazard problem.

[5]The sample differs from that used in the second chapter for two reasons. First, the sample used in this chapter is restricted to those policies for which payment flows are not right-truncated to guarantee accurate premium data for estimation of the price indices. The second chapter focuses on policy placements and thus includes policies through May 2000 for which complete payment data are not available. Second, this chapter uses all non-truncated policies to estimate price indices. In the second chapter, the sample is restricted to standard renewals—that is, policies written after the preceding coverage has expired.

coverage. A client typically buys several lines of coverage. In this paper, the following lines are adopted: property, liability, commercial auto, umbrella, and workers' compensation.[6] Throughout this chapter, a client is assumed to buy at most one policy per line to ease exposition. Thus, each client-line pair constitutes a different exposure to risk for which the client must purchase coverage. A client might instead purchase a single package policy that provides property, liability, and commercial auto coverage. Owing to data limitations, package coverage is treated as a separate line throughout the analysis. A client might purchase all its coverage from a single insurer or choose to have different lines underwritten by competing insurers. The sample contains approximately $25 million in premium annually from 1994 to 1999. The mean insurance premium on a policy is slightly less than $15,000. Eleven insurance agents at the broker place business with a total of 153 insurers over the sample period. Table 3.1 provides descriptions of the variables used in this chapter. Summary statistics are presented alongside the empirical results at each stage of the analysis.

3.4 Price Indices

To begin to test the moral hazard hypothesis, it is necessary to identify systematic variation in prices by constructing price indices from the sample. In this analysis, prices are assumed to trend separately by line of coverage, reflecting differences in competitive conditions, costs, and the regulatory environment that are specific to individual lines.[7] Two sets of line-specific price indices are proposed, each motivated by an alternative assumption regarding how premia evolve over time. This additional complication is necessitated by the fact that a premium is not a price, but rather a price per unit of exposure that is multiplied by an exposure base.[8] The relationship between the premium, price per unit of exposure, and exposure base can be represented in natural logarithms as,

$$ln(Premium_{ijt}) = ln(Price_{ijt}) + ln(ExpBase_{ijt}),$$

where $Premium_{ijt}$ is the premium paid by client i on line j at time t (monthly), $Price_{ijt}$ is the price per unit of exposure, and $ExpBase_{ijt}$ is the exposure base. Constructing price indices from

[6] In reality, finer distinctions are made between lines of coverage than presented here. I have exercised some discretion to arrive at these categories. For example, inland marine has been included with property policies, and excess liability with standard liability policies. Also, these definitions overlap somewhat. Commercial auto coverage generally includes both property and liability coverage, for example.

[7] Ideally, price indices would be constructed at a finer level of detail, perhaps for each line-SIC code pair, but the data upon which the various indices would be based in rather sparse when looking at this level of disaggregation.

[8] What insurers define as a unit of exposure will depend on the coverage. A property policy might be priced by the square foot and the premium arrived at by multiplying this price by the building's square footage. In contrast, workers' compensation is priced per employee and liability insurance often per sales dollar.

the data in the sample involves identifying systematic changes in $ln(Price_{ijt})$ from the premia paid by clients over time. The immediate difficulty lies in distinguishing between systematic variation in prices and systematic variation in exposure bases.[9] The different sets of assumptions employed in generating the alternative price indices identify systematic price changes off different variation in the data.

The first set of price indices assumes that there is no systematic variation in exposure bases. If exposure bases evolve independently over time, all systematic variation across premia can be attributed to variation in pricing. Consider the following specification,

$$ln(Premium_{ijt}) = \psi_{jt} + \xi_{ij} + \epsilon_{ijt}, \tag{3.3}$$

where ψ_{jt} is a line-time fixed effect, ξ_{ij} a client-line (exposure) fixed effect, and ϵ_{ijt} is an error term. Fitting this model to the data yields a series of estimated $\hat{\psi}_{jt}$ that capture line-specific variation in pricing over time. To prevent over-fitting the data, estimation constrains the $\hat{\psi}_{jt}$ to follow a piecewise linear trend with annual kinks. Because the specification includes a client-line fixed effect, identification of the price indices is robust to changes in the composition of the sample. A large policy entering the sample is simply absorbed by the appropriate client-line fixed effect. Identification is instead driven by systematic *changes* in quoted premia by line of coverage.

The second set of price indices potentially improves upon the first by acknowledging the natural correlation in the evolution of exposure bases across a client's lines of coverage. As a client's sales increase, it leases new properties, hires new workers, and expands its fleet of autos. All occur roughly in unison. Thus, if all a client's premia increase 10%, such variation might be more realistically attributed to changes in the client's exposure bases. This suggests a variation on the previous specification,

$$ln(Premium_{ijt}) = \psi_{jt} + \delta_{it} + \xi_{ij} + \epsilon_{ijt}, \tag{3.4}$$

in which a client-time fixed effect, δ_{it}, is now included. The $\hat{\psi}_{jt}$ are now identified off all systematic changes in quoted premia that are not absorbed by the client-time fixed effects. This is a very substantive change in the specification, for the $\hat{\psi}_{jt}$ can no longer be thought of as price indices. If

[9]One means of addressing this issue would be to include measures that might proxy for systematic variation in exposure bases. To this end, I collected monthly employment data and annual gross state product data for Arizona from the Bureau of Labor Statistics and the Bureau of Economic Analysis, respectively. Regressing $ln(Premium_{ijt})$ on a client-line fixed effect and these series, their joint significance can be rejected at the 20% confidence level. This is a sensible result if firms in this sample are not representative of those driving these state-level series or if most systematic growth occurs at the interfirm, as opposed to the intrafirm, margin. This type of growth would simply be absorbed by the set of client-line fixed effects.

all prices increase, the resulting systematic change in premia is absorbed by the set of client-time fixed effects. Thus, this specification yields only relative price indices. Identification is achieved by asking how the premia paid on the client's lines evolve in relation to each other. If a particular line begins to assume a greater proportion of the insurance bill systematically across clients, the specification attributes this to an increase in the price of that line relative to the others' prices. To generate a second set of price indices from these *relative* price indices, note that the first price index can be decomposed into an equally-weighted mean of the index across lines and a line-specific deviation from that mean: $Index^1_{jt} = BaseIndex_t + RelativeIndex^1_{jt}$, where $BaseIndex_t = \frac{1}{J}\sum_j Index^1_{jt}$. The second set of price indices is constructed by adding $BaseIndex_t$, derived from the first set of price indices, to the mean-zero relative price indices of equation 3.4, such that: $Index^2_{jt} = BaseIndex_t + RelativeIndex^2_{jt}$. Thus, all that varies between the two sets of price indices are the line-specific deviations of the indices from the mean price index. In the first case, these deviations are derived using all variation in written premia over time. In the second, they are derived solely from changes in relative premia within client.

Both price indices are estimated using the 8705 premium observations in the sample from 1994 to 1999. The methodologies are fairly exacting in light of the data. For the first index, the set of client-line fixed effects fits the data perfectly for 1586 premium observations. This often results from a client having a line insured at the broker only once over the sample period.[10] The second index presents even greater difficulties. While in theory an improvement over the first index, the inclusion of client-time fixed effects results in significant data loss. Many clients purchase only package coverage through the broker. Such clients' policies are absorbed by the client-time fixed effects in equation 3.4 and do not contribute to identification of the price indices. The second index is thus estimated off a sample of 3818 premium observations, a sample 46% smaller than the 7120 observations used to estimate the first. The joint significance of the first set of line-specific price indices cannot be rejected at the 1% confidence level. A similar test for the set of relative price indices derived from the second specification cannot be rejected at the 5% confidence level. Figure 3-1 displays the estimated price series by line. Commercial auto and umbrella coverage grow more expensive over the sample period, while property and liability coverage grow less expensive. Clear patterns are less evident for the remaining lines.[11]

[10]It can also be very difficult to follow individual exposures in the data, and individual policies might be issued in particular years and joint policies in other years. This generates some spurious creation of exposures.

[11]These estimated indices are somewhat consistent with price trends over this period as described by agents. The findings that umbrella coverage grows more expensive and that property grows less expensive (in Arizona) accord with their statements. However, agents do not recall the price of commercial auto coverage increasing and claim that

3.5 Results

The analysis now turns to the question of whether changes in systematic pricing appear to induce turnover consistent with the moral hazard hypothesis. The discussion above suggested that heightened search by brokers in response to positive systematic price shocks should result in increased switching among insurers. How business is expected to flow between brokers is unclear. The moral hazard induces clients to search more frequently when facing high quotes. However, with brokers searching more in anticipation of this activity, clients will face high quotes less often. It is impossible to sign the aggregate effect. The following subsections address in turn: switching among insurers at the broker, departures from the broker, and arrivals of new business at the broker.

3.5.1 Switching among Insurers

To test whether variation in systematic pricing induces increased flows among coverage that remains at the broker, I run a probit specification on the sample of 4606 standard renewals from 1994 through 1999.[12] The dependent variable, $Switch_{ijt}$, takes the value one if client i changes its insurer on line j at time t, and zero otherwise,

$$\begin{aligned} Switch^{*}_{ijt} =& \beta_0 + \beta_1 \Delta Index_{jt} + \beta_2 PolicySize_{ijt} + \beta_3 InsurerDuration_{ijt} \\ &+ \beta_4 BrokerDuration_{ijt} + \beta_5 Trend_t + \delta_j + \phi_a + \xi_c + \epsilon_{ijt}, \\ Switch_{ijt} =& \begin{cases} 1 & \text{if } Switch^{*}_{ijt} > 0 \\ 0 & \text{otherwise.} \end{cases} \end{aligned} \tag{3.5}$$

If moral hazard is prevalent, the coefficient on the change in the price index, $\Delta Index$, will be positive and significant. The change is measured from the last time the coverage was renewed. Because only standard renewals are included, the lag will typically be one year, with a few exceptions for three year policies. *PolicySize* is the lagged natural logarithm of the premium on the client's line. Its inclusion controls for the tendency of agents to take better care of their larger clients, searching more actively for competing quotes. Alternatively, it might capture differences in bidding conditions for larger coverage or accommodate a fixed component to the cost of search. The expectation is

liability actually becomes more expensive (contrary to these findings).

[12] A standard renewal is a renewal that immediate follows the expiration of the preceding policy. Occasionally, the broker or insurer will opt to terminate coverage prematurely or extend it for a few months beyond its normal duration. These are dropped from the sample because a different explanatory regime likely prevails. For example, the base probability of switching to a new insurer is abnormally high when a policy terminates after seven months.

generally that this coefficient will be positively signed. *InsurerDuration* measures the years the client's line has been underwritten by the incumbent insurer at the time of renewal. This will absorb any (linear) tenure dependence, whether owing to switching costs or unobservable heterogeneity across firms. *BrokerDuration* is the number of years the client's coverage on the line has been written through the broker. This is principally intended to control for evolution in the relationship between the broker and the client. Perhaps the broker provides superior service to its loyal customers or, alternatively, it realizes it need not dedicate too much effort to searching on these accounts which are relatively captive. *Trend* is a linear trend, measured in years. In addition, the specification includes line, agent, and incumbent insurer fixed effects: δ_j, ϕ_a, and ξ_c, respectively.

Table 3.2 reports the marginal effects of this specification.[13] The dummy for package policies has been excluded. The column labeled $\overline{X}$ gives each variable's mean and, in parentheses, standard deviation in the estimation sample to aid interpretation of point estimates. Columns (1) and (2) utilize the first price index and columns (3) and (4) the second price index. In each case, the first column includes the change in the line-specific price index. The second decomposes this change into the mean change in the price index across lines and the change in the line-specific price index relative to this mean ($\Delta Index_{jt} = \Delta BaseIndex_t + \Delta RelativeIndex_{jt}$). Recall that by construction only this relative component of the price index varies between indices 1 and 2.

The results of column (1) are consistent with the moral hazard story put forward. At the 1% confidence level, systematic changes in price positively influence the probability that coverage is placed with a new insurer upon renewal. The point estimate on $\Delta Index1$ implies that a one standard deviation increase in $\Delta Index1$ (.059) results in an increase in the cumulative probability of $Switch = 1$ of .023 ($= .059 \times .396$) relative to the probability predicted at $\overline{X}$ of .12. Thus, a one standard deviation increase in $\Delta Index1$ results in an increase in the probability of switching of roughly 18% ($= .143/.12 - 1$). Turning to the second index, in column (3), this effect no longer holds. Indeed, the coefficient is statistically significant but of the opposite sign than that hypothesized. From columns (2) and (4), it becomes clear that variation in $\Delta BaseIndex$ is driving the 'moral hazard' result. In contrast, the first relative price index shows little significance and the second is significant, but of negative sign. One reading of these results is that clients care more about their entire insurance bill than the pricing on a specific line of coverage. The question is whether the moral hazard is at the level of the individual line or the account. Because brokers will generally

[13]The standard errors are corrected for correlation across lines within client at a given time. This accommodates the tendency of multiple lines of a client to be switched at the same time.

shop all a client's lines at the same time, it might be more realistic to think of the moral hazard at the level of the account, in which case this story is of some merit.

The other parameters estimated in these specifications are generally consistent with expectations. Larger policies tend to move between insurers with greater frequency, as suggested by the positive and statistically significant coefficient on *PolicySize*. The positive and significant coefficient on *InsurerDuration* suggests there is negative observed tenure dependence between the insurer and the client's coverage. With each additional year that an insurer underwrites a client's coverage, the probability of switch increases by 3.0 percentage points, or approximately 25% relative to the 12% probability of switch predicted by these specifications at the mean of the independent variables. Such an economically large result should not be surprising in this context for two reasons. First, with the broker effecting nearly all the transactions between the insurer and the client, it is more likely that switching costs arise at the broker-client level. If this is so, these switching costs will likely result in tenure dependence at the broker-client level when looking at departure rates in the next subsection. Second, the broker generally does not actively shop coverage for all but its largest clients. Instead, it solicits quotes on most coverage every two or three years. As a result, it is likely that switching of business between insurers is more likely to occur after the insurer-client relationship has aged a year or two. Finally, *BrokerDuration* is not statistically significant in any of the specifications, suggesting that search on behalf of the client neither increases nor decreases over the life of the broker-client relationship.

3.5.2 Departures from the Broker

From the analysis of the preceding subsection, it is clear that the broker responds to positive price shocks by increasing its search intensity. According to the moral hazard story, the client should heighten search as well. Switching across brokers may or may not increase. Strictly interpreting the model, the broker's search will result in the client playing the $\overline{p}$ subgame, at which it heightens search intensity, less often. Stepping away from the model, if the broker scours the insurance markets for lower price quotes, the client's return to approaching a competitor is likely to be very low. Heightened client search should increase departure rates; fewer opportunities to search and lower returns should decrease departure rates. To see which effect dominates, a probit model is estimated on a sample of 6730 premium observations from 1994 to 1999.[14] The dependent variable,

[14]This sample is decidedly larger than that used when looking at switching between insurers, which contains only 4606 premium observations as opposed to the 6730 premium observations used in this analysis. Consider coverage that is written one time through the broker and then leaves the sample. This contributes a single departure to the

Depart, takes the value one if client i's coverage on line j leaves the sample at time t, and zero otherwise. The specification is as follows,

$$\begin{aligned} Depart^{*}_{ijt} =& \beta_0 + \beta_1 \Delta Index_{jt} + \beta_2 PolicySize_{ijt} + \beta_3 InsurerDuration_{ijt} \\ &+ \beta_4 BrokerDuration_{ijt} + \beta_5 Trend_t + \delta_j + \phi_a + \xi_c + \epsilon_{ijt}, \\ Depart_{ijt} =& \begin{cases} 1 & \text{if } Depart^{*}_{ijt} > 0 \\ 0 & \text{otherwise.} \end{cases} \end{aligned} \tag{3.6}$$

The regressors are identical to those employed in the previous subsection. The coefficient on *PolicySize* might be negatively or positively signed. On the one hand, agents dedicate particular attention to maintaining relationships with large clients by providing superior service. This might heighten switching costs and give large clients less motivation to approach competitors. On the other hand, these policies are sought after, and competing brokers will often themselves approach clients to offer quotes, which might lead to increased turnover of these accounts. If switching costs are established between the broker and the client as suggested in the preceding subsection, the coefficient on *BrokerDuration* is expected to be positively signed.

Table 3.3 reports the marginal effects of this specification.[15] The dummy for package policies is omitted. Again, columns (1) and (2) utilize the first price index, while columns (3) and (4) utilize the second index. It is clear from these specifications that the proxies for systematic price changes are of little value in explaining departure rates. None of the estimated coefficients on $\Delta Index$, $\Delta BaseIndex$, and $\Delta RelativeIndex$ is significant. The negative and statistically significant coefficient on *PolicySize* suggests that higher premium business is less likely to leave the broker. Apparently, the greater service provided by agents and the strong relationships established outweigh the heightened competition among brokers for these accounts. Alternatively, this variable might be proxying for the higher tendency of smaller policies to terminate. The predicted probability of departure from these specifications suggests a retention rate of 73%. Based on discussions with agents at the broker, the true rate of coverage retention is closer to 85% or 90%. The additional 12% to 17% of departures likely owes to bankruptcies, sales of business, and consolidations of coverage which cannot be distinguished from departures in the data. Bankruptcies and business

current estimation, but is not included in the previous analysis, as there is no switching between insurers at the broker.

[15]Standard errors are corrected for correlation in departures across lines held by a firm. A client will often move several lines, or all its lines, to a new broker at the same time.

sales, in particular, are more likely the smaller the policy. *InsurerDuration* does not appear to have an influence on departure rates, though *BrokerDuration* has a negative and statistically significant effect on departure. The point estimate of -.038 suggests an additional year with the broker decreases the probability of departure by 3.8 percentage points, or 14% relative to the predicted probability at $\overline{X}$. This is consistent with the hypothesis introduced above that the presence of the broker transfers switching costs from the insurer-client to the broker-client relationship. It is also consistent with unobservable heterogeneity: over time, the set of exposures remaining at the broker have found an increasingly good match.

3.5.3 Arrivals at the Broker

While these results provide no evidence that departures respond to systematic price shocks, it is worth considering whether arrivals of new business also manifest little sensitivity to variation in prices. When looking at new business arrivals, it is impossible to condition on lagged policy characteristics, for coverage was previously written elsewhere. Instead, I estimate a negative binomial regression on the number of arrivals per month by line, where the conditional mean and variance are modeled respectively as,

$$\begin{aligned} E(Arrive_{jt}|X_{jt}) &= \lambda_{jt} = \beta_0 + \beta_1 \Delta Index_{jt} + \beta_2 SalesForce_{jt} + \beta_3 Trend_t + \delta_j, \\ Var(Arrive_{jt}|X_{jt}) &= \lambda_{jt}(1 + (1/\theta)\lambda_{jt}). \end{aligned} \tag{3.7}$$

$Arrive_{jt}$ is the number of new policies written at the broker on line j at time t. The negative binomial regression accommodates the discrete nature and multiple zeros of this series. It is more flexible than a Poisson regression in that it allows for overdispersion relative to the Poisson distribution by permitting $E(Arrive_{jt}|X_{jt})$ to differ from $Var(Arrive_{jt}|X_{jt})$. Because the date since the arriving client last sampled from the market is unobservable, $\Delta Index$ is simply the change in the price index from its value 12 months prior. If the expectation is that results will be symmetric with the findings of the preceding subsection, changes in these price indices should have little explanatory power in explaining the series of arrivals. *SalesForce* is the number of agents at the broker who have written a policy on line j in the preceding three months. This proxies for the broker's marketing activity on the line. *Trend* allows for linear trending in market conditions. A line fixed effect, δ_j, is also included to control for the possibility that different lines naturally move

between brokers at different rates.[16] The parameter θ is an overdispersion parameter estimated in the model. Rejecting its equality from zero is equivalent to rejecting the Poisson assumption.

Table 3.4 presents the results of these specifications on a sample of 360 observations.[17] Columns (1) and (2) again utilize the first index and columns (3) and (4) the second. The coefficient for $\Delta Index2$ in column (3) is negative and statistically significant at the 10% confidence level. Upon inspection of column (4), it becomes clear that this result is being driven by variation in $\Delta BaseIndex$. Increases in the base index appear to result in decreased arrival rates. However, with no symmetric (negative) response to $\Delta BaseIndex$ when looking at departure rates in table 3.3, it is difficult to make the claim that this result is economically meaningful. The coefficient on $SalesForce$ is positive and significant at the 5% confidence level in columns (1) and (3). This is a reasonable result, with arrival rates responding to increased marketing activity on the line.

3.6 Conclusion

The results of this chapter suggest that moral hazard distorts the broker-client relationship as suggested. The moral hazard manifests itself through heightened switching among insurers, ostensibly the result of the broker's increased search intensity. Interestingly, search and switching seem to be initiated by price changes in the client's total insurance bill as opposed to pricing on an individual line. Turning to the client's search behavior, it is difficult to say whether client search responds to systematic price shocks. What can be said is that systematic price variation does not appear to influence switching among brokers.

Insurance markets are characterized by periodic moves between hard and soft markets. Hard markets are known for high prices and high profitability, and soft markets for low prices and low profitability. Interestingly, the patterns of search activity suggested by the model and corroborated by the empirical analysis of this study might mitigate the severity of these cycles. As the market begins to harden, prices rise. In turn, the moral hazard problem between the broker and the client—more fundamentally, the client's information problem—induces heightened search by clients and brokers. Such search works against the increasing profitability of the hard market, applying

[16] One reason to expect switching rates to differ across lines is that different lines require varying degrees of interaction between the client and the broker. It is less likely that significant switching costs will arise when interaction is minimal, and thus switching between competing brokers is relatively more likely for these lines.

[17] The sample does not include activity through June of 1994 because the broker is actively acquiring competing agencies, and it is nearly impossible to distinguish such acquired business from that naturally arriving from competing brokers owing to marketing activity. Also, one sense in which this broker grows is through acquisition of insurance agents and their portfolios of business. When this occurs, agents' transferred business is identified and excluded from the set of arrivals.

downward pressure on markups.

The chapter has also been useful in helping to establish a better understanding of where switching costs are borne in the presence of an intermediary. The results of the analysis suggest that the broker, by reducing direct contact between the insurer and the client, prevents significant switching costs from arising at the client-insurer level. This itself is of value to the client, for it is effectively insulated from *ex post* holdup by the insurer.

Table 3.1: DESCRIPTION OF VARIABLES

Variable	Description
Switch	Takes the value one if the exposure is switched to a new insurer and zero otherwise
Depart	Takes the value one if the exposure leaves the insurance broker, zero otherwise
Δ*Index1*	Change in the first price index since coverage for the exposure was last written
Δ*Index2*	Change in the second price index since coverage for the exposure was last written
Δ*BaseIndex*	Change in the mean of the first price index (equally-weighted across lines) since the exposure was last written
Δ*RelativeIndex1*	Change in the deviation of the first price index from *BaseIndex* since coverage for the exposure was last written
Δ*RelativeIndex2*	Change in the deviation of the second price index from *BaseIndex* since coverage for the exposure was last written
PolicySize	Natural logarithm of the premium at which the coverage was last written
InsurerDuration	Years that coverage has been written by the incumbent insurer
BrokerDuration	Years that coverage has been serviced by the insurance broker
Trend	Linear time trend
Auto	Takes the value one for commercial auto policies, zero otherwise
Liability	Takes the value one for liability policies, zero otherwise
Property	Takes the value one for property policies, zero otherwise
Umbrella	Takes the value one for umbrella policies, zero otherwise
WorkComp	Takes the value one for workers' compensation policies, zero otherwise
Arrivals	Number of new exposures written at the insurance broker by month and line of coverage.
SalesForce	Number of agents who have written coverage on the line in the last three months

Table 3.2: SWITCHING AMONG INSURERS WITHIN BROKER

		Index 1		*Index 2*	
	$\overline{X}$	(1)	(2)	(3)	(4)
Δ*Index1*	.007	.396**			
	(.059)	(.112)			
Δ*Index2*	.003			−.256**	
	(.076)			(.071)	
Δ*BaseIndex*	−.004		1.262**		.997**
	(.029)		(.232)		(.240)
Δ*RelativeIndex1*	.011		.093		
	(.052)		(.116)		
Δ*RelativeIndex2*	.007				−.250**
	(.077)				(.068)
PolicySize	8.154	.012**	.012**	.012**	.012**
	(1.611)	(.004)	(.004)	(.004)	(.004)
InsurerDuration	.881	.030**	.030**	.030**	.031**
	(1.084)	(.010)	(.009)	(.010)	(.009)
BrokerDuration	1.155	−.005	−.005	−.006	−.006
	(1.216)	(.010)	(.009)	(.010)	(.009)
Trend	27.686	.0005	.0011*	−.00004	.0007
	(16.891)	(.0006)	(.0006)	(.0006)	(.0006)
Line Dummies:					
Auto	.072	−.029	−.023	−.021	−.018
	(.258)	(.018)	(.018)	(.018)	(.018)
Liability	.134	−.012	−.025	−.045**	−.040**
	(.340)	(.018)	(.018)	(.018)	(.017)
Property	.084	−.0001	−.0001	−.030	−.022
	(.278)	(.021)	(.021)	(.022)	(.021)
Umbrella	.141	.001	.003	−.0001	.003
	(.348)	(.013)	(.013)	(.013)	(.013)
WorkComp	.083	.027	−.003	−.026	−.019
	(.276)	(.026)	(.026)	(.024)	(.024)
Agent Dummies		YES	YES	YES	YES
Insurer Dummies		YES	YES	YES	YES
Predicted Pr. at $\overline{X}$		.12	.11	.11	.11
Pseudo R^2		.16	.17	.16	.17
Observations		4606	4606	4606	4606

NOTE.—Results are from probit specifications on the sample of renewal business with the dependent variable, *Switch*, taking the value one if the policy is moved to a new insurer upon renewal and zero otherwise. Marginal effects of independent variables are reported. Estimated standard errors, corrected for correlation across lines within a client's portfolio, are in parentheses. * denotes significance at the 10% confidence level, ** at the 5% confidence level.

Table 3.3: DEPARTURES FROM THE BROKER

		Index 1		*Index 2*	
	$\overline{X}$	(1)	(2)	(3)	(4)
Δ*Index1*	.005	.091			
	(.058)	(.131)			
Δ*Index2*	.0004			−.014	
	(.075)			(.081)	
Δ*BaseIndex*	−.004		.442		.422
	(.027)		(.327)		(.331)
Δ*RelativeIndex1*	.009		−.015		
	(.052)		(.135)		
Δ*RelativeIndex2*	.004				−.034
	(.075)				(.081)
PolicySize	8.093	−.026**	−.026**	−.026**	−.026**
	(1.662)	(.005)	(.005)	(.005)	(.005)
InsurerDuration	.833	.013	.013	.012	.013
	(1.079)	(.011)	(.011)	(.011)	(.011)
BrokerDuration	1.105	−.046**	−.046**	−.046**	−.046**
	(1.219)	(.010)	(.010)	(.010)	(.010)
Trend	28.783	.005**	.005**	.005**	.005**
	(16.892)	(.001)	(.001)	(.001)	(.001)
Line Dummies:					
Auto	.087	.162**	.164**	.164**	.164**
	(.282)	(.021)	(.020)	(.020)	(.020)
Liability	.149	.082**	.078**	.077**	.077**
	(.356)	(.021)	(.021)	(.021)	(.021)
Property	.101	.132**	.130**	.129**	.129**
	(.302)	(.023)	(.023)	(.023)	(.023)
Umbrella	.140	.045**	.045**	.044**	.044**
	(.347)	(.016)	(.016)	(.016)	(.016)
WorkComp	.081	.070**	.060**	.060**	.061**
	(.273)	(.030)	(.030)	(.026)	(.026)
Agent Dummies		YES	YES	YES	YES
Insurer Dummies		YES	YES	YES	YES
Predicted Pr. at $\overline{X}$		.27	.27	.27	.27
Pseudo R^2		.11	.11	.11	.11
Observations		6730	6730	6730	6730

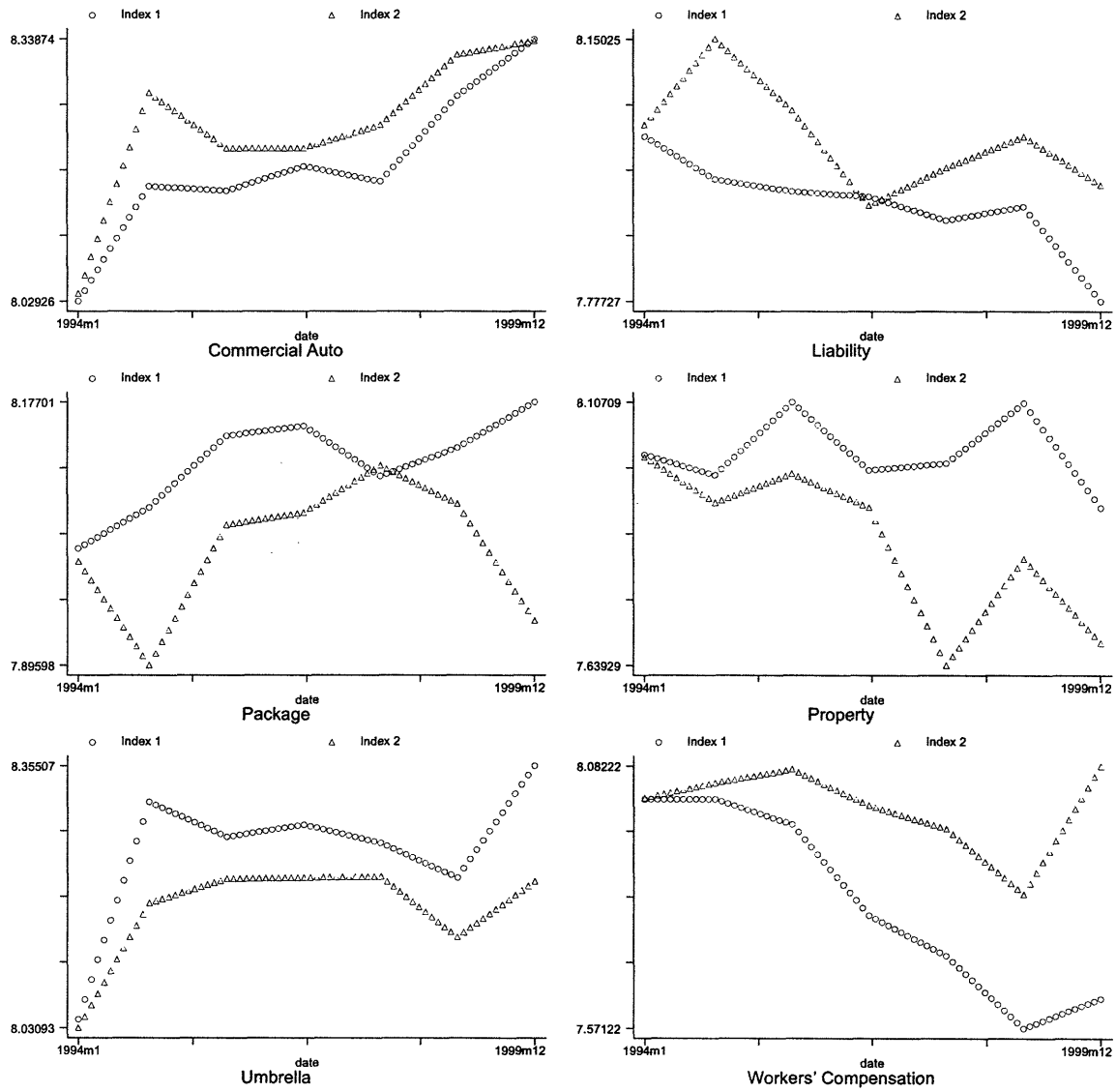
NOTE.—Results are from probit specifications on the sample of renewal business with the dependent variable, *Depart*, taking the value one if the policy is moved to another broker upon renewal (disappearing from the sample) and zero otherwise. Marginal effects of independent variables are reported. Estimated standard errors, corrected for correlation across lines within a client's portfolio, are in parentheses. * denotes significance at the 10% confidence level, ** at the 5% confidence level.

Table 3.4: NEW ARRIVALS AT THE BROKER

		Index 1		*Index 2*	
	$\overline{X}$	(1)	(2)	(3)	(4)
Δ*Index1*	−.004	−.604			
	(.069)	(.586)			
Δ*Index2*	−.004			−.701*	
	(.079)			(.414)	
Δ*BaseIndex*	−.004		−2.248*		−2.327*
	(.027)		(1.228)		(1.225)
Δ*RelativeIndex1*	.0000		−.197		
	(.063)		(.644)		
Δ*RelativeIndex2*	.0000				.537
	(.074)				(.429)
SalesForce	10.067	.061**	.046	.065**	.048
	(1.550)	(.029)	(.30)	(.028)	(.030)
Trend	29.500	−.004**	−.006**	−.004**	−.006**
	(17.342)	(.002)	(.003)	(.002)	(.003)
Line Dummies:					
Auto	.167	−1.023**	−1.061**	−1.013**	−1.049**
	(.373)	(.115)	(.117)	(.114)	(.117)
Liability	.167	−.547**	−.534**	−.541**	−.543**
	(.373)	(.098)	(.098)	(.093)	(.093)
Property	.167	−.744**	−.756**	−.771**	−.783**
	(.373)	(.104)	(.103)	(.105)	(.105)
Umbrella	.167	−.684**	−.706**	−.677**	−.700**
	(.373)	(.101)	(.101)	(.100)	(.101)
WorkComp	.167	−1.298**	−1.281**	−1.248**	−1.271**
	(.373)	(.139)	(.140)	(.118)	(.119)
θ		.127**	.125**	.125**	.123**
		(.023)	(.023)	(.023)	(.023)
Pseudo R^2		.10	.10	.10	.10
Observations		360	360	360	360

NOTE.—Results are from negative binomial regressions. The dependent variable, $Arrive_{lt}$, is the number of policies written at the broker on line l at time t that qualify as new business. The sample begins after the broker has completed acquiring other agencies, in July of 1994. Estimated standard errors, corrected for correlation across lines within a client's portfolio, are in parentheses. * denotes significance at the 10% confidence level, ** at the 5% confidence level.

Figure 3-1: ALTERNATIVE PRICE INDICES BY LINE



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