

Economics of Brokerage: An Overview

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Abstract

The purpose of this paper is to provide an economic analysis of the brokerage institution and an overview of the literature on this issue. In addition to the brokerage issues that have already been examined by the literature, the paper also discusses a number of issues as potential avenues for future research.

1. Introduction

It is well known that a market allocation is efficient if it has a Walrasian auctioneer (that is, if there is perfect competition) where traders can sell or buy any amount they desire at a given market price. A critical assumption behind this argument is that players have perfect information about the market. This is an unrealistic assumption for housing markets as well as for most other markets. Players have *imperfect information* about the locations, reservation prices, and the preferences of their potential trading partners.

This imperfect information about the locations of trading partners implies that traders have to expend search efforts in order to find each other. Search, however, involves two sources of inefficiency. The first source is the uncertainty about finding a *good* match. This uncertainty has two components: (1) there is uncertainty about finding a trading partner, and (2) given that a trading partner is found, there is uncertainty about actually trading with that partner (that is, whether the buyer's valuation exceeds the seller's valuation and whether the bargaining between the buyer and the seller results in an agreement). The second source of inefficiency associated with search is due to the externalities involved. An increase in a seller's search efforts (or, similarly, an increase in the number of sellers) might increase buyers' gains from search and therefore resulting in positive externalities. Meanwhile, it might reduce other sellers' gains from search and therefore resulting in negative externalities. Given that a trader chooses a search intensity based on his¹ gains from search (that is, he does not take into consideration the effect of his search intensity on the other traders' gains from search), there will be too little or too much search, depending on the magnitudes of these opposing externalities.

There is yet another possible source of inefficiency for search markets. As pointed out in Diamond's (1982) famous coconut model, search economies might exhibit multiple equilibria, and these equilibria can sometimes be Pareto ranked. Consider, for instance, a market where a player searches hard if he expects everybody else to search hard, and he searches little if he expects everybody else to search little.² In such an economy, expectations will be self-fulfilling, and there will be two equilibria: one where everybody searches hard (high-search equilib-

rium), and the other where everybody searches little (low-search equilibrium). It is possible that these equilibria are Pareto rankable. For instance, each player might prefer the high-search equilibrium to the low-search equilibrium. This creates a new source of inefficiency for the search markets with multiple equilibria. Even though each player prefers the Pareto superior equilibrium, the players have to choose their strategies noncooperatively. This may cause the economy to get stuck at one of the Pareto-dominated equilibria. When this happens a *coordination failure* is said to occur.³

The existence of these inefficiencies implies that there may be gains to third parties who resolve these inefficiencies by reducing the uncertainty about forming a match, by internalizing some or all of the externalities, and by eliminating some or all of the Pareto-dominated equilibria. This is the main explanation for the presence of brokers in housing markets and of middlemen in many other search markets—such as travel agents, specialists and brokers in stock markets, employment agencies, independent insurance agents, and match-makers in marriage/dating markets. A brief review of the economics and finance literatures on these other types of intermediation can be found in the appendix to this paper.

Due to the complex nature of housing markets, brokers perform certain other functions. Each property is unique, and there are various factors (such as zoning, land use regulations, tax laws, and financing terms) that affect the value of a property. Most traders do not have all the information about the characteristics of a property affecting its value. Since most traders get involved in a transaction very infrequently, and since real estate markets are constantly changing, it is very costly for an individual trader to gather all the relevant information. Given the fact that once information is accumulated it can be disseminated at a very low cost (there are economies of scale in collection and dissemination of information), there are mutual gains from having one person (the broker) collect the information and disseminate it to the traders. As a result, brokers can also provide assistance to the players in the listing, pricing, bargaining, contracting, financing, and insurance stages, in addition to providing a better matching technology.

The purpose of this paper is to provide an economic analysis of the brokerage institution and an overview of the literature on this issue. The next section discusses brokerage issues that have already been examined by the literature. Section 3 points out a number of issues as potential avenues for future research, and Section 4 provides some concluding remarks.

2. Issues and models: Theory and evidence

This section of the paper looks at the issues studied by the brokerage literature.

2.1. Resource allocation and brokerage

Economic significance of an institution can be evaluated by assessing the effect of that institution on the allocation of resources in the economy. The significance of the housing sector in the economy and that of brokerage in the housing sector is clear. Housing makes up approximately 38 percent of the nation's wealth (residential and nonresidential capital stock, and consumer durable goods) (Smith,

Rosen, and Fallis, 1988), and brokerage accounts for the sale of 81 percent of single-family dwellings in the housing market (Federal Trade Commission, 1983).

There are two allocation issues with respect to brokerage. One is the amount of resources allocated to brokerage services. The other is the effect of brokerage on the level of resources expended by the buyers and sellers to search for a trading partner. The first question received attention in Owen (1977), Crockett (1982), and Knoll (1988), and a formal model was provided in Yinger (1981). The common belief is that too many resources are devoted to brokerage services. This belief is based on the argument that the Multiple Listing Service (MLS) leads to a collusive commission rate (to be discussed below). Consequently, brokerage firms are said to become involved in nonprice competition, which in turn results in more emphasis on quality and quantity of services and more personnel hirings.

The emphasis in Yavaş (1992b) is on the second question; the effect of brokerage on the search behavior of players (buyers and sellers). In order to study this issue, players are allowed to choose a level of search effort; in previous studies, a fixed level of search effort by the players was assumed. It is concluded that introduction of brokerage into a housing market reduces the amount of resources spent on search by buyers and sellers.

Another effect of brokerage on resource allocation is linked to its influence on demand for housing. Jud and Frew (1986) find that buyers who search for a house with the help of a broker have a higher demand for housing than buyers who search for a house on their own. They argue that the influence of brokerage on demand for housing is similar to that of advertising on demand for other goods and services.

In addition to allocation of resources, brokerage can also affect housing prices, which in turn can influence the level of welfare in the market and its distribution among the players. The following section examines this aspect of brokerage institution.

2.2. Effect of brokerage on housing prices

In order to understand the effect of brokerage on housing prices, we need to analyze the factors that influence the seller's reservation price.⁴ Although the transaction price will be determined by a bargaining process between the buyer and the seller, we assume that the transaction price is positively related to the seller's reservation price. Given this, an increase in the seller's reservation price has the following effects: (1) a higher price, conditional on a sale, (2) lower probability of a sale (it is harder to find a buyer who is willing to pay a higher price for the same property), (3) a higher commission for the broker, conditional on a sale, and (4) a lower probability for the broker of earning the commission. Given that these effects influence the price in opposing directions, it is not surprising that the results obtained in the literature concerning the broker's effect on the price have been mixed. On the theoretical front, Salant (1991) studies the first two effects above and proves that listing a house with a broker can result in a decrease as well as an increase in the listing price. Colwell and Yavaş (1992) incorporates the third and fourth effects and shows that Salant's result still holds. Yavaş (1992b) argues that since the transaction price is determined by a bargaining at the end of the search process, the search costs incurred up to that point are sunk and irrelevant.

What matters is the way brokerage affects the outcome of the bargaining process. He claims that the outcome will be an increase in the price (but less than the commission fee), reflecting the fact that the commission fee will be shouldered by both parties. The share of the commission fee paid by a party, hence the resulting transaction price, will depend on the bargaining power of the two parties.⁵ In the special case in which the buyer and the seller have equal bargaining powers (in Yavaş (1992b), this bargaining solution corresponds to two of the most popular bargaining outcomes in economic theory (namely, Nash, 1950 and Kalai and Smorodinsky, 1975), each party pays half of the commission fee.

These seemingly conflicting results in the theoretical literature have also been supported by some empirical studies. Doiron, Shilling, and Sirmans (1985), Jud and Frew (1986), and Frew and Jud (1987) conclude that the seller passes a *portion* (approximately one-half) of the commission fee to the buyer in the form of a higher price. On the other hand, Jud (1983), Kamath and Yantek (1982), and Colwell and Yavaş (1992) find that brokers do not seem to have a significant influence on the selling prices of houses in their samples.

There is a potential problem with the existing empirical studies on this issue. The sellers have the option of selling the property themselves or listing it with a broker. It is possible that there exists a separating equilibrium where the sellers with a higher expected price (such as sellers with a higher bargaining power) choose to employ a broker while the sellers with a lower expected price choose to use FSBO (for sale by owner) or vice versa. This naturally leads to the following question: Does the expected price of a property determine the seller's choice of whether to employ a broker or not, or is it the seller's choice of whether or not to employ a broker that causes changes in the price of a house? The above empirical studies use regression models that are based on the assumption that the price is the dependent variable, and the seller's choice of whether to employ a broker or not is the independent variable.⁶

The effect of brokerage on housing prices and on the allocation of resources can also depend on the way the listing contract between the broker and the seller determines the broker's commission. Further, the commission structure adopted in the contract affects the principal-agent relationship between the seller and the broker, and the welfare of all the parties involved in the sale transaction. The following section investigates these issues.

2.3. Brokerage commission structures

The broker's commission can be one (or a combination) of three things: (1) a percentage of the sale price, (2) a flat fee per house sold, or (3) sales price minus the price required by the seller (this is known as *net listing*). A recent article by Geltner, Kluger, and Miller (1992) looks at two alternative "incentive commission" structures. One is a time-incentive contract that pays the broker a larger commission percentage the faster the house sells. The other is a price-incentive contract that pays the broker a larger (smaller) percentage of any positive (negative) difference between the sale price and a prespecified incentive price. As with any principal-agent problem, there exists a *moral hazard* problem resulting from the inability of the seller to completely observe all of his agent's actions. The moral hazard problem can result in actions by the agent that are not completely

in line with the interests of the seller. This section examines how these three commission structures affect the principle-agent relationship between the seller and the broker. Then, we will examine how they affect transaction prices and the welfare gains of sellers and buyers.

In a principal-agent framework, each of these commission structures provides different risk sharing and different incentives for broker's search efforts. Under (1), the price risk is shared between the seller and the broker; if the house is sold at a higher (lower) price, both gain more (less). So both the broker and the seller want to sell the property at as high a price and as fast as possible. However, even though the broker's and the seller's interests are in the same direction, their magnitudes can differ. In order to secure the commission (that is, avoid the risk of failing to find another buyer and the risk of another broker selling the property), the broker may attempt to influence the seller to seek an immediate sale to the buyer at a price below the seller's price. Also, as pointed out by Zorn and Larsen (1986), since the broker and the seller receive significantly different portions of the sale price (5 to 7 percent versus 93 to 95 percent), percentage commission structure does not give the incentive to the broker to search as much as if her interests were perfectly aligned with those of the seller.⁷ Further, since the commission rate is uniform across houses and since the cost of selling a house is not a linear function of the price⁸ (that is, selling a \$3X house does not cost three times as much as selling a \$X house), one or both of the following two things will happen: (1) sellers of low-price houses will get too little search efforts from the broker, or (2) sellers of expensive houses will be paying too much for the broker's search efforts.

The second type of commission structure, a flat-fee commission, assigns the price risk to the seller because the broker's commission is independent of the sale price.⁹ This is not an optimal risk-sharing mechanism unless the seller is risk neutral and the broker is either risk neutral or risk averse (Anglin and Arnott, 1991). Since the brokers can diversify risk by pooling houses, it is more reasonable to assume risk neutrality for brokers rather than for sellers. In that case, flat-fee commission creates a moral hazard problem; the broker's objective is to sell the property as quickly as possible regardless of what the price is, while the seller's interest is to sell it as quickly as possible *and* at a price as high as possible.

Net listing, on the other hand, assigns the price risk to the broker because the contract ensures the seller a price, P_n , net of the commission. This creates a different conflict of interest. The seller wants the property to be sold to the first buyer who offers any price above P_n . Meanwhile, the broker wants to secure a high price for the property. As a result, some buyers who would be acceptable to the seller will be turned down by the broker.

A more important question is how these different commission structures affect the welfare of the buyers and sellers. Let P_b be the reservation price of the buyer and P_s be the reservation price of the seller. The buyer and the seller will trade if there are gains from trade (if $P_b \geq P_s$). The transaction price, P , will be determined by a bargaining process between the buyer and the seller. The value of P will depend on the bargaining power of the two parties, but we know that it will be in the interval $[P_s, P_b]$. The welfare of the buyer (buyer's surplus) from trade is equal to $P_b - P$, while that of the seller is given by $P - P_s$. Hence, total surplus is $P_b - P_s$, plus the broker's commission (recall that P_s includes the broker's commission). Consider the following very simple economy. The broker has a pool of

buyers and sellers for a set of houses with similar characteristics in a certain location. Suppose that the broker knows (or manages to find out) the reservation prices of all the sellers and buyers in this market. These reservation prices give the demand and supply curves depicted in Figure 1. Since buyers and sellers do not know each other's location, they rely on the broker to obtain a match. The broker's objective is to match the buyers and sellers in a way to maximize her profits.

It is easy to see that under the first two commission structures, the percentage commission and the flat-fee commission, the profit-maximizing strategy for the broker is to maximize the number of matches. This amounts to the "horizontal matchings" shown on Figure 2 (buyer A with seller A', buyer B with seller B', etc.), where each seller is matched with a buyer of equal reservation price. This results in every single house being traded. Yet this is a disastrous matching because each seller (buyer) gets (pays) exactly his reservation price, hence each trader receives zero surplus/welfare. The total possible welfare, represented by the triangle W in Figure 2, is left unexploited. The only surplus in the economy is the surplus of the broker, and that could be driven to zero under competitive conditions.

What happens under net listing? The broker tries to maximize the difference between the sales price and the seller's ask (reservation) price.¹⁰ Suppose that the broker, utilizing her perfect information about the reservation prices, sells to each buyer at that buyer's reservation price. This amounts to the "vertical matchings" depicted in Figure 3. Note that a broker with a monopoly power (or a cartel of brokers) can capture all the available surplus, leaving no surplus to the traders. However, competition might force the broker to share some or all of this surplus with the traders. Leaving the equity issue aside, the net listing contract leads to maximum welfare possible.

Although this is a simple economy with perfect information about the reservation prices, it reflects the main welfare concern about the alternative commission structures.¹¹ Under percentage commission and flat-fee commission, the broker

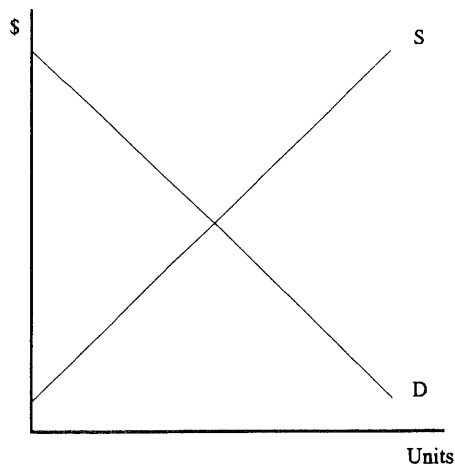


Figure 1.

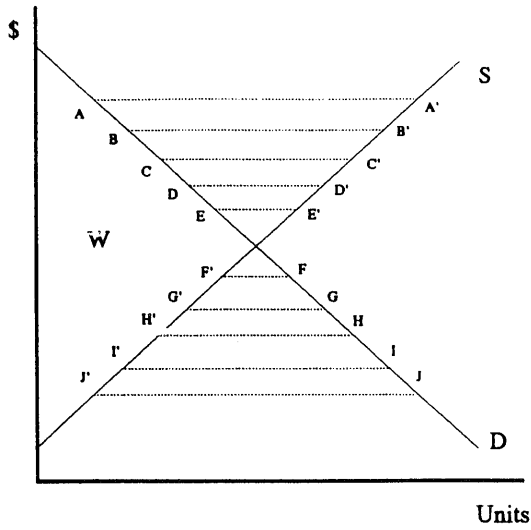


Figure 2.

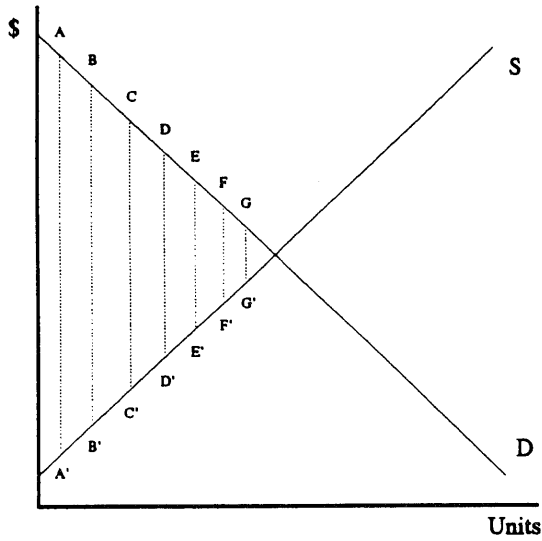


Figure 3.

maximizes the number of matches by trying to convince the sellers and the buyers to trade at their reservation prices. Under net listing, she tries to convince the seller not to ask more than his reservation price and to convince the buyers to pay their reservation prices.¹² Combining the welfare effects of these commission structures with their effect on the principal-agent relationships, it is clear that none of the commission structures lead to a perfect alignment of seller's interests with those of the broker.

Miceli (1991) highlights a different dimension of conflict of interest between the broker and the seller. He uses a search model to examine the effect of different commission splits in MLS sales on the listing and selling *brokers' search efforts*. He shows that awarding the entire commission to the selling broker maximizes the joint search efforts of the brokers and therefore maximizes the seller's interests. The reason is that this rule produces a "race" among brokers to sell the property *and* minimizes the "wasteful" use of resources by brokers to obtain listings (these resources are wasteful because they do not reduce the expected time to sell the property). However, maximizing the joint *profits of the brokers* requires awarding both the listing and the selling broker a positive share of the commission, because it reduces the "race" among them. Therefore, Miceli (1991) concludes that while the current practice where the commission is split between the listing broker and the selling broker maximizes the joint profits of brokers, it is in conflict with the seller's best interests.

In addition to the alternative commission structures studied in Geltner, Kluger, and Miller (1992), Miceli (1989) studies another alternative incentive mechanism; limitation on the duration of the contract. These two studies conclude that these incentive contracts have the potential of partially improving the principal-agent relationship, but they do not completely resolve the conflict-of-interest problems prevailing under the current commission structures.¹³ Another alternative solution will be discussed later in Section 2.6. It will be argued there that opening MLSs to the public will eliminate these conflicts of interest and will maximize total welfare. Before we explore this policy issue, we first analyze the MLS system and discuss some of the benefits and problems associated with MLSs.

2.4. Multiple Listing Service

The MLS is probably the most significant feature of the brokerage industry. From a practical point, it accounts for more than 74 percent of residential houses sold in the U.S. (Federal Trade Commission, 1983). From a theoretical point, it can be considered as a mechanism that eliminates the trade frictions resulting from imperfect information, bringing the housing market closer to a perfectly competitive market. In other words, it can be considered as performing the role of a Walrasian auctioneer.

In a market where brokers operate independently from each other, each broker would have her own pool of buyers and sellers. Under MLS, the member brokers combine their pools and create a single pool—that is, they bring (almost) all the sellers and buyers together. Clearly, there are economies of scale in a matching process; the quality and the quantity of matches increase with the size of the pool. For buyers and sellers, this means the MLS produces a higher probability of a match and smaller search costs. The MLS eliminates the need for a buyer (seller) to visit several brokers in order to ensure a sufficient coverage of (exposure to) the market.¹⁴

An MLS also influences the magnitude of the following *moral hazard* problem associated with brokerage services. The broker is supposed to act in the best interest of the seller. As with any principal-agent problem, an important issue is whether the broker will shirk and spend less effort on the seller's listing than expected or implicitly agreed upon. Since it is very costly to observe the broker's efforts, the broker will shirk whenever it is in her interests to do so.¹⁵ This can be

due to the fact that when the house is sold, the seller gets the price (net of commission fee), whereas the broker gets a small fraction of the price. In order to see how the MLS affects this moral hazard problem, we need to analyze how the MLS affects the search efforts of brokers.

On one hand, a broker has to share her listing with other brokers, hence the commission is likely to be shared with other brokers. As a result, the gains from search are lower, and a broker has less incentives to search. On the other hand, due to the search efforts of other brokers, the MLS increases the probability of a sale for each listing. Further, the broker has the chance of selling the houses listed by other brokers (which implies that the seller's listing attracts search efforts from other brokers). This increases gains from search, which increases broker's incentives to search. Yinger (1981) argues that the first effect dominates the last two effects, hence the MLS reduces resources allocated to search. That is, the MLS makes the above-mentioned moral hazard problem even worse.¹⁶ This is in contrast to Wu and Colwell (1986), who claim that the last two effects dominate the first and that the MLS increases the search efforts of brokers. The reason for the conflicting results of these two studies is that they model MLS broker's profits differently. In Yinger (1981), the probability that a broker's listing may be matched with a buyer by another MLS member is a function of the listing broker's search efforts as well as the search efforts of other MLS members, while in Wu and Colwell (1986) this probability is independent of the listing broker's search efforts.

The MLS has yet another role, which has been ignored by these two studies. The pooling of information through MLS improves the matching technology, therefore increasing the probability of a match for any *given* level of search activity. This increases gains to search further and provides additional incentives for brokers to search. As a result, the MLS clearly has an effect on the degree of the moral hazard problem, but it is not obvious which direction the effect goes.

One can argue that once an MLS is formed, it is in the interest of the brokers in that area to participate in it. On one hand, joining an MLS increases the broker's chances of selling her listings and gives her an opportunity to sell other brokers' listings. On the other hand, it creates the risk of having her listings sold by other brokers, hence sharing the commission. If we assume that on average the broker's expected gains from sharing other brokers' commissions is equal to her expected losses from sharing the commission on her listings with other brokers, it must be beneficial for a broker to join the MLS. The argument is based on the fact that there are economies of scale in information dissemination. Although it is costly to search for new listings, once it is obtained it can be disseminated at a very small marginal cost. Therefore, while the additional cost of giving the information about the existing listings to an additional broker is very small, the cost savings from obtaining new listings from that additional broker can be significant.¹⁷ Consequently, as the MLS size gets bigger, the efficiency of matching buyers and sellers improves.¹⁸ In other words, MLS is a *natural monopoly*. For this reason, Yinger (1981) suggests that government should encourage MLSs by providing subsidies and technical assistance, if necessary.

2.5. Collusion in brokerage industry?

There has been a very controversial issue regarding MLSs. It has been argued by many that uniformity of commission rates in brokerage industry¹⁹ indicates col-

lusion among brokers, and MLSs are being used by the local board of realtors as a means of enforcing the collusion among members (a partial list includes Austin, 1973; Barasch, 1974; Owen, 1977; Bartlett, 1981; Yinger, 1981; Crockett, 1982; Wachter, 1987; Jenkins, 1989). The argument relies on the fact that the cost of selling a house is not a linear function of the price. If house A is sold at a price twice as much as house B, uniform commission rate implies that the broker receives twice as much commission from house A. However, it probably does not cost twice as much to sell house A. The reason is that certain components of marketing costs are unrelated to the sale price, such as listing the house, making trips to the house, fixed-cost components of arranging financing and insurance, and so on.²⁰ Thus, uniformity of commission rates implies price discrimination, which is inconsistent with competitive behavior.²¹ It is argued that MLSs can maintain collusive pricing behavior because members have to report the commission rates they agreed on with their clients.²² As a result, they can detect any deviations from the collusive rate. MLS members have a number of methods of penalizing cheatings, ranging from threatening with expulsions to spending less effort to sell homes listed below the fixed rate.

As pointed out earlier, Miceli (1991) shows that awarding the entire commission to the selling broker maximizes the joint efforts of the brokers and therefore maximizes the seller's interests, while maximizing the joint profits of the brokers require awarding both the listing and the selling broker a positive share of the commission. Given the fact that the latter is what we observe, he argues that this is another indication of collusion among MLS brokers.

Do above-the-competitive-level commission rates imply excess profits in brokerage industry? The answer should be no because of free entry to the industry. In order to attract more customers, the brokerage firms adhere to nonprice competition, such as increased name-brand advertising and employment of more personnel to improve services.²³ The resulting increase in costs should wipe out any economic profits.²⁴ The outcome of this nonprice competition will be too many resources vis-à-vis the efficient level being allocated to brokerage services. As proved in Miceli (1992), such nonprice competition among brokers can lead to a reduction in welfare in the housing market.

It is possible that collusive commission rates create barriers to entry. Assuming that productivity of a broker is positively related to her experience, established brokers are likely to attract more sellers, in particular the sellers of high-price houses. Since inexperienced brokers cannot offer lower rates to make their services as attractive as those of experienced brokers and since uniform rates yield higher commission returns from the sale of high-price houses, new entrants will not earn as much income as established brokers.²⁵ This implies that the expected economic profits of an entrant may be negative while the economic profits of existing firms are nonnegative. Thus, it is possible to have existing firms earning positive economic profits *and* still have no incentives for new firms to enter. Indeed, the empirical studies by Follain, Lutes, and Meier (1987) and Chinloy (1992) found a significant positive correlation between brokerage income and years of experience in the industry. Jenkins (1989) reports a considerable variation among sales figures of brokers in Canada. While the two major brokerage companies in Canada—Royal LePage and Re/Max—had an average of fifteen to thirty-seven sales per salesperson in 1986, the industry average was only about five. Significant differences among the performances of different brokerage firms have also been reported in Janssen and Jobson (1980).

Wachter (1987) claims that the role of the MLS as a means of collusion on brokerage rates can actually be beneficial to overcome some of the moral hazard problems. If a discount broker can advertise a lower commission rate for houses bought through their firm, then we would observe the following moral hazard problem: the discount broker would not offer any search and showing services; the buyer would choose a house through the services of a full-service broker and buy the house through the discount broker. Given that individuals buy a few houses over their lifetimes, full-service brokers could not know which individuals might take advantage of them. A fixed commission rate eliminates incentives for buyers to switch brokers.²⁶ She points out that the degree of this moral hazard problem is insignificant in commercial real estate markets because traders in those markets are in the market more frequently and may build up a good or bad reputation over time. According to Wachter, this difference between the two markets also explains the existence of brokerage rate diversity in commercial markets.

Carroll (1989) argues that price discrimination resulting from uniformity of commission rates can be welfare improving. This will happen if sellers of higher-priced houses place a higher value on the broker's services—that is, if those sellers have a higher opportunity cost of not being able to sell the house in a given period of time. Then we get an efficient allocation of the broker's time among different sellers because sellers who value the time more will pay more for it *and* receive more of it. If the rates were such that the broker makes the same amount of money from each house, then she would allocate equal time to each house.

As noted earlier, collusion through the MLS leads to nonprice competition, which in turn results in too many resources vis-à-vis the efficient level being allocated to brokerage services. However, this inefficiency result does not mean MLSs should be abolished. The allocation here is inefficient compared to the optimal allocation *under* the MLS. Yet it can still be more efficient than the allocation without an MLS (see the economies-of-scale arguments above). Therefore, the question is not whether or not to eliminate MLSs but rather how to eliminate inefficiencies associated with MLSs. This question will be discussed in Section 2.7.

Note that we do not observe any MLSs in markets where intermediaries provide dealership services rather than brokerage services. Therefore, before we discuss the policy implications of inefficiencies associated with MLSs it is proper to examine why we do not have dealers in real estate markets.

2.6. *Why don't we have real estate "dealers"?*

Middlemen in some markets provide a different type of intermediation service. Instead of matching two sides for a commission, they set an ask price and a bid price at which they sell and buy for their own accounts. Examples include specialists in stock markets and used car dealers. The advantage of this dealership service for the traders is that it provides the service of immediacy. The dealer carries an inventory of the commodity, and a seller (buyer) usually does not have to wait for a buyer (seller) to show up in order to get a match. They can directly trade with the dealer. It also provides each trader a sure price (the bid price for the seller, and the ask price for the buyer) at which he can immediately trade with the dealer. Assuming that the dealer is risk neutral and the traders are risk averse,

this yields an efficient risk sharing. A natural question to raise is why we do not observe dealers (with a few exceptions) in housing markets.

This question is also relevant for marriage markets and labor markets where middlemen act like brokers. Yet the answer for those two markets is trivial. The nature of the commodity in those markets makes it impossible for the middlemen to buy or sell for their own account. However, this is not a valid answer for housing markets, for middlemen can buy and sell houses for their own account. Jenkins (1989), Knoll (1988), and Anglin and Arnott (1991) provide a detailed informal discussion of this issue. One explanation, they point out, is that dealership is very risky in housing markets. The risk is due to a couple of factors. First, higher prices of houses compared to cars or securities will make a housing portfolio less diversified. Second, greater heterogeneity of houses increases the risk of making an error in estimating the price. As a result, even the competitive bid-ask spread could be larger than the risk premium that the traders are willing to pay. Further, high inventory costs combined with capital market constraints may make it very difficult to hold a large inventory of houses. Anglin and Arnott (1991) also point out to some barriers of entry for dealers. They argue, for instance, that the collusion in brokerage markets makes it difficult and unprofitable to enter as a dealer. If a dealer enters, she would face problems similar to those faced by discount brokers. The agents in the industry would steer their clients away from dealers' properties.

Yavaş (1992a) studies this question in a formal search-theoretic model. He shows that whether we have dealers or brokers in a market also depends on the efficiency and the cost of search and on the distribution of traders' reservation prices. If search is efficient and costless, then the dealership leads to higher profits and welfare than brokerage. If, on the other hand, search is relatively inefficient and sufficiently costly, then the outcome in that market will be brokerage. This finding is consonant with the stylized fact that we observe brokers in housing markets where the search for a buyer or seller of a house with the desired attributes can be very costly and inefficient, while we observe dealers in the stock market where the search for a trader of a particular stock is relatively more efficient and less costly.

2.7. Policy implications

It will be argued here that MLS information should be made available to all interested parties. Home sellers and buyers should have a direct access to the MLS as an alternative to transacting through brokers. This policy will induce a number of drastic changes in the industry.

First, opening MLSs to the public will eliminate (socially) wasteful use of resources by brokers to locate sellers. Under an open MLS, sellers can list their properties, and the buyers can have access to the listings at a minimal fee (these fees can be used to finance the operating expenses of the MLS). This will eliminate the competition by the brokers to locate the sellers. Similarly, opening MLSs to the public will eliminate (socially) wasteful use of resources by brokers to locate buyers: Under the current system, many MLS brokers search to find a buyer for the same listing, but the search efforts of only one broker will produce a match. Since the brokers cannot coordinate their search efforts to find a buyer

for the same listing, it becomes possible to have duplication of some search efforts and hence an unproductive use of some resources. Under an open MLS, on the other hand, since the buyers and sellers can directly contact each other through MLS, the matching role of the broker will essentially be eliminated. The broker will primarily be a provider of services—such as title abstracting, value assessment, surveying, financing information, proper insurance selection (title insurance as well as insurance against natural disasters), and transactional services (such as escrow)—to the traders. These services are not significantly related to the price of a house. The commission for these services should be (and under market forces will most likely be) in the form of a fixed fee. If there are significant differences between the costs of providing these services for different types of properties, the fee schedule can be adjusted accordingly (such as by setting different fees for properties in different price ranges). The fee for value assessment for each unit assessed will be paid by the requesting party regardless of whether the parties have a transaction or not. The fee for the remaining services will be payable on completion of a deal (in order to prevent any incentives for the broker to slow down the transaction process and increase number of showings to each buyer). Naturally, some traders will be more demanding and hence more costly. Neither the broker nor the trader can know exactly how much effort it will take for a transaction. A fixed fee, based on expected average costs, will require the broker to bear all the risk. Assuming risk-averse traders and risk-neutral brokers (since brokers work with a pool of buyers, they can diversify their risk), this constitutes an efficient risk-sharing scheme.

One of the controversial issues in the principal-agent relationship analysis of brokerage industry is that although the broker often represents the seller, he spends more time and forms a closer relationship with the buyer. This is because most of the services the broker provides—such as showings, assistance in financing, and information about the title, zoning conditions, land use restrictions, and insurance and financing alternatives—benefit the buyer more than the seller. It is not surprising that 71 percent of buyers surveyed in the Federal Trade Commission Report (1983) believe the (selling) broker is protecting the best interests of the buyer, rather than protecting the interests of the seller. The National Association of Realtors' Task Force found "an immediate and pressing need for a classification of agency status of the real estate broker/salesperson vis-à-vis real estate seller and real estate buyer" (Ball and Nourse, 1988). The conflict between the buyer's and the seller's interests and the fact that the broker's interests coincide more with those of the seller's have led to an increasing number of tort cases in which buyers sue brokers for misleading them.²⁷ For example, the buyer might reveal his reservation price to the selling agent, who has an incentive to convey this information to the seller in order to extract a higher transaction price.²⁸ Another common problem area is where the selling agent gives the buyer misleading information about the property—by not disclosing the defects in the property, for example. On the other hand, the current commission mechanism creates an even more serious conflict-of-interest problem if the broker represents the buyer; the broker wants to get a higher price while the buyer wants a lower price. Under the open MLS system, flat-fee commissions for a broker's services will enable the broker to represent the buyer without causing any conflict-of-interest problems inherent in the current system. Thus, the buyer's broker will be an agent of the buyer and *not* an agent of the seller's broker.

The necessity for the brokerage industry to proclaim itself to be a service industry is also evident by the recent "consumerism" trend. As Potter, Nelson, and Nelson (1991) argue, it is only a matter of time before the strict liability rule of product liability laws will be applied to real estate. Under strict liability, the seller—and therefore the broker as the seller's agent—is liable for any injuries resulting from a defect in the property.²⁹ While a broker who sells *houses* on behalf of the owners will be liable for any damages, a broker who sells her *services* to the other players in the real estate markets will be protected against product liability claims. Potter, Nelson, and Nelson (1991) gives the examples of blood banks and physicians. Blood banks are immune to product liability because they do not sell blood; they sell the service of matching blood donors and blood recipients. Similarly, physicians do not sell medication; they sell the service of matching products of pharmaceutical companies and patients. Of course, brokers who sell matching services instead of houses, as well as blood banks and doctors, will be liable for negligent behavior, but they can avoid this liability by taking due care.

It has been pointed out in Section 2.3 that none of the (existing) commission structures provide the broker any incentives to match buyers and sellers in a manner that maximizes traders' welfare. Opening up MLSs will also eliminate this problem because it will replace the matching function of the brokers with that of a Walrasian auctioneer. MLS data creates a number of housing markets in an area, with each market consisting of properties with similar physical, functional, and locational characteristics. An open MLS brings all the buyers and sellers in each market together and yields a market price determined by a double auction (that is, a Walrasian auctioneer) in each market in each period of time.³⁰ This market price is labeled P^* in Figure 4. Total welfare reaches the maximum attainable level. The buyers' share of total welfare is given by area I, and that of sellers' by area II. Note again that the broker's fee is incorporated in the seller's reservation price.

Opening the MLS also eliminates a *moral hazard* problem where a broker gives biased information to the buyer and steers him to the properties that she has listed. She does so to collect the full commission instead of splitting it with a listing broker. This is feasible because, after all, she is an agent or subagent of the seller. This creates inefficiencies in matching because there might be a better match between the buyer and those properties listed by other brokers. If the MLS is opened to the public, however, the match-making role of the broker will be basically eliminated and replaced by a Walrasian auctioneer.

It can be argued that opening up the MLS would eliminate a valuable service provided by the broker to the traders: informing the buyer about the characteristics of the property and the appropriateness of the price and ensuring the seller about the financial qualifications of the buyer.³¹ However, under an open MLS, the traders can still obtain these services from the broker at a fee. This also implies that opening up the MLS would enable a trader to unbundle the services provided by brokerage (such as matching service, title abstracting, value assessment, surveying, financing information, and transactional services) and to purchase only those services that he wants, as opposed to the current *inefficient* practice where these services are offered as a bundle in a standard package.³² Recently, a U.S. Supreme Court decision (*Thompson v. Metropolitan-List, Inc.*, October 5, 1992) ruled that local associations in Alabama, Georgia, and Florida can no longer require real estate brokers to belong to a local Association of

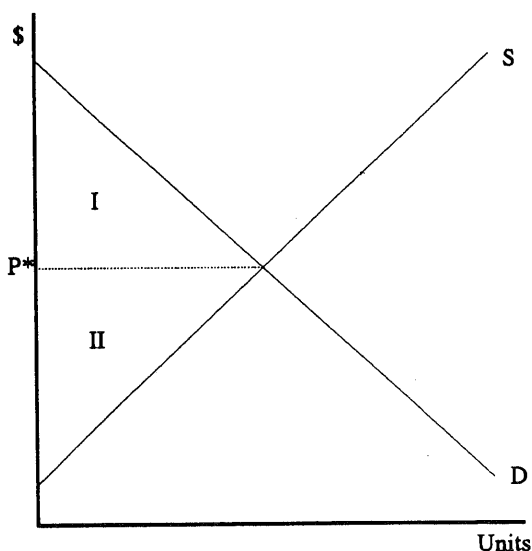


Figure 4.

REALTORS to have access to the association's MLS. The New Jersey Superior Court found the requirement that only members can share the MLS information as a restraint of trade and, thus, illegal, and prohibited the MLS operations until all nonmembers of the realty board were allowed to participate in the MLS (Miller and Shedd, 1979). The requirement was also outlawed in California by a state court decision in 1978. A group of discount brokers in State College area in Pennsylvania have recently published the first issue of *Homes FSBO*, a publication in which the sellers can advertise their homes for a fee. This magazine serves as an alternative to the local MLS book and is open to all sellers and buyers. We believe that these are the steps in the right direction and that we will see more of them in the future.

3. Future work

Housing markets consist of various players acting strategically to maximize their benefits. Further, the strategy choice of a player affects, and is affected, by the strategies chosen by other players. How much Player A (a seller) searches depends on his conjectures about how much the other players (his agent and the potential buyers) will search, and the search intensity of the other players will depend on how much they expect Player A will search. Similar interaction applies to other elements of the strategy set, such as pricing, bargaining, choice of listing contract, and choice of commission structure. One potential area of future research would be to develop game theoretical models of housing markets in order to capture these strategic interactions.³³

The bargaining stage of real estate marketing is especially critical. This is the stage where the transaction price is determined. Unfortunately, the existing

models have paid little or no attention to modeling the strategies of the buyer, the seller, or the broker in bargaining. There are two bargaining models that are of particular interest to us; Rubinstein and Wolinsky (1985) and Chatterjee and Samuelson (1983). These two models capture two important features of bargaining in real estate markets. Rubinstein and Wolinsky (1985) develops an "alternating offers" bargaining game with discounting, where one party (A) makes a price offer and the other party (B) either accepts or rejects. If B accepts A's offer, the game is over. If he rejects, then he either gets matched with a new player or stays with A and makes a counteroffer. Now, A can either accept B's offer or reject, and so on. The game continues for a player until he reaches an agreement with another player. Rubinstein and Wolinsky (1985) find that, under the assumption of complete information about the reservation prices of each side, equilibrium is characterized by an agreement on the first offer made (assuming there are gains from trade for each side). The reason is that each side can use *backward induction* to figure out the acceptable price to the other side at each stage. Since there is discounting, each party prefers an agreement earlier rather than later in the game. Thus, in equilibrium the party making the first offer proposes a price that leaves the other party slightly better off with accepting than rejecting. Chatterjee and Samuelson (1983), on the other hand, uses a single-shot game with *incomplete information*. The fact that the players now bargain without knowing each other's reservation price creates the possibility that the optimal bargaining strategies of the agents *may* result in the breakdown of negotiations altogether, despite the fact that there are mutual benefits from trade.

A bargaining model for the housing market should be a combination of these two models where the players make *alternating offers* under *incomplete information*. Further, a bargaining model of real estate markets should include a third player—the broker. As pointed out earlier, brokers have an influence on the outcome of the bargaining process. Although it is a difficult problem, developing such a bargaining model will provide a skeleton for the future models of real estate markets.

Related to the bargaining state of the game is the issue of how the seller determines his listing price. The evidence from the Federal Trade Commission (1983) survey indicates that 16.9 percent of buyers use the seller's listing price as the single most influential source of information to help determine their first price offer. Given the correlation between the seller's reservation price and his listing price, and given the effect of seller's listing price on the buyer's "offer" strategies, the problem becomes one of a *signaling game* where the listing price is strategically chosen by the seller to send some signals to the buyer about the seller's reservation price. Although recent studies by Horowitz (1992) and Yang and Yavas (1993) examine the relationship between the listing price and the seller's reservation price, they fail to provide a formal model of the signaling role of the listing price. It will be interesting to develop a signaling model where the buyers infer information from the listing price about the seller's reservation price, and determine their optimal offer strategies accordingly. An example of signaling games can be found in Spence (1974) and Milgrom and Roberts (1982).

There has been an increase in the number of buyer's brokers (see Section 2.7 for possible explanations). However, the current commission structure creates a serious conflict of interest problem if the broker represents the buyer; the broker

wants to get a higher price while the buyer wants a lower price. A significant contribution to this field would be to design a commission structure that aligns the interests of the buyer's broker with those of the buyer and aligns the interests of the seller broker with those of the seller.

One of the major problems in empirical studies in real estate is that sometimes the data do not contain enough information. Suppose, for instance, that one wants to test the effect of the time-on-the-market (length of time that the seller has been trying to sell the house) on the bargaining outcome between the buyer and the seller. Conventional procedure would be to get the data from an MLS, which will reveal the dates the property has been listed and sold, the listing price, and the sale price. The difference between the listing price and the sale price can be used as a measure of the seller's (and buyer's) bargaining power. Yet the difference between the listing and sale dates does not necessarily reflect the time on the market because the sellers often try to sell the house themselves for a period of time. Only if they fail, then they go to a broker. The MLS data, however, does not contain any information on how long the seller tried to sell the house himself. One way to get this information is to contact every seller and survey them, but this can be a very costly solution. A more efficient alternative would be to derive the data through *laboratory experiments*, where a number of subjects (mostly students) are asked to play the roles of different players in the market. The experiments are set in such a way that they represent the market under consideration, and the subjects are given incentives to act in a utility-maximizing manner by being rewarded (mostly monetarily) based on their performance in the experiments. This method has been widely used in economics, finance, psychology, accounting, marketing, and other social sciences. This is an area that needs to be explored for future research in real estate. An analysis of experimental studies in economics can be found in Roth (1988) and Binmore (1987).

Theoretical models of brokerage start with the assumption that some players in the economy have been *exogenously* assigned the role of providing brokerage services. It will be interesting to develop a model to examine which type of players will *endogenously* emerge as brokers (Bhattacharya and Yavaş, 1992, attempts to answer this question for dealers). The motivation for this question is that emergence of different players as brokers will yield different welfare effects, and there could be some mechanisms that the planner could use so that the "right" players will arise as brokers. This could be one reason why many intermediation institutions are regulated (such as licensing requirements for brokers³⁴ and appointment of specialists by the stock exchange board). A potential extension of this question is to examine the long-run effect of regulation of the brokerage industry on the quantity and quality of brokerage services.

It has been argued in Section 2.6 that one of the reasons why we do not observe real estate "dealers" is that dealership in housing markets can be very risky. Higher prices for houses compared to securities make it difficult to have a diversified portfolio. A potential research project would be to design investment instruments (such as Housing Equity Investment Trust units) that would allow long-term possession without home ownership risk and to examine risk implications of such instruments for home owners and real estate brokers.

When a match is obtained through an MLS, the resulting commission fee is divided between the listing broker, the selling broker, and their salespersons. Dif-

ferent divisions of the fee among these parties result in different levels of search efforts by each party (see Miceli, 1991). They may even lead to variations in the way a broker influences the bargaining outcome and hence the price of the property. Therefore, it is important to build a model that incorporates this aspect of the problem and to study the efficient division of the commission fee among the listing broker, selling broker, and the salespersons. Special attention should be given to the effects of REMAX-type brokerage firms on the industry, where the salespersons retain 100 percent of their commission earnings and pay a flat fee to their brokers. REMAX-type commission structure is particularly attractive to more successful salespersons and risky to less successful salespersons. As a result, the industry has observed a transfer of some of the more productive salespersons to REMAX brokerage firms. Does this mean that in the long run all the productive salespersons will move to REMAX type brokerage firms and that this will force the other firms to adopt a REMAX-type commission structure in order to be able to survive? The answer to this question should also consider the fact that there could be nonincome factors that affect salespersons' choice of brokerage firm (I was told by some brokers in Urbana, Illinois, that the working environment in REMAX-type firms is too competitive and that many successful salespersons would rather have a friendly working environment at the expense of a lower income). A related project would be to provide an empirical test of the effect of REMAX-type brokerage on housing markets and brokerage services.

Another interesting project would be to develop an equilibrium model of an MLS formation. We hardly observe more than one MLS in an area, and we observe some brokers who choose not to participate in the local MLS. Is having a single MLS in an area an equilibrium outcome, or is it merely a collusive outcome resulting from the power of the local board of realtors? What is the optimal MLS size? Can we sustain a long-run equilibrium in which some brokers still remain independent of the local MLS?

There are some notable differences among the brokerage services provided in the United States and other countries. In many European countries, MLSs do not exist. Instead, these countries have open listings as the most common type of listing. In some countries, such as Germany and Turkey, the broker charges both the buyer and the seller a percentage of the price as commission (since there is no MLS, the listing broker is also the selling broker). Are these variations across countries due to differences in housing markets or due to differences in brokerage markets? Understanding the causes and the implications of these different practices across countries will also enable us to have a better understanding of the brokerage industry in the United States.

A very significant portion of real estate sales in Australia and England (up to 30 to 40 percent) are carried through auctions. Although real estate auctions in the United States bore the stigma of distressed property, there has been an increase in the use of auctions to market real estate. The total value of properties sold at auctions in the United States increased from \$106.5 million in 1989 to \$796 million in 1991 (O'Connor, 1992). Auction theory is a very rich and interesting area (there are more than 500 published articles on auctions), and the real estate field can make a significant contribution to this theory by examining existing auction designs or developing new auction designs for real estate properties. Examples of studies on real estate auctions include Vanderporten (1992), Lusht (1992), and Colwell and Yavas (1994).

4. Concluding remarks

Real estate brokerage is not only a significant industry in the economy, it is also an economic institution with a rich arena of interesting and exciting issues for researchers. The long list of current literature has so far answered only a small fraction of critical questions. This paper has attempted to highlight the significance of the brokerage institution, to review the issues that have already been investigated by the literature, to offer policy recommendations to eliminate some of the existing inefficiencies in the industry, and to point to some of the avenues of future research.

Acknowledgments

I would like to thank Peter Colwell, Austin Jaffe, Ken Lusht, and two anonymous referees for their comments, and the Office of Real Estate Research at the University of Illinois for financial support.

Notes

1. For the purpose of clarifying the presentation of the paper, the buyers and sellers will be portrayed as males, and the brokers as females.
2. An analogy would be a potluck dinner; you might participate if you expect a lot of people to show up (which implies a rich variety of food) but not if you expect few people to show up.
3. See Cooper and John (1988) for an excellent discussion of coordination failure models, and Yavaş (1992c) for a study of broker's role in a housing market with coordination failures.
4. Reservation price for the seller (buyer) is the lowest (highest) price at which he is willing to sell (buy) the house. It reflects how much he values the house, and what his alternative gains are if no trade takes place. For instance, the seller can rent or continue to live in the property, and the buyer can rent a property instead of buying one. Note that the seller's reservation price also includes the commission he has to pay to the broker. Note also that seller's reservation price is not necessarily equal to his listing price.
5. The bargaining power of the parties can depend on factors such as the demand and supply conditions in the market, the liquidity needs of the two parties, and the seller's future plans with regard to moving outside the market area.
6. One potential solution, as proposed by Colwell and Yavaş (1992), is to use a probit model. A probit model is used to determine the choice of whether to employ a broker or use FSBO independent of the seller's expected price, and then the effect of this choice on the price is determined in a different regression equation.
7. This reasoning is in contrast to the empirical findings of Larsen and Park (1989), where the probability that a property will sell at any point in time is *inversely* related to the commission rate. Arnold's (1992) theoretical model extends Zorn and Larsen's analysis by incorporating the seller's costs and benefits of owning a house while attempting to sell it and shows that percentage commission structure can align the broker's incentives with the seller's. However, in Arnold's model this happens for a *unique* commission rate given by $q = c/(c + N)$, where c is the seller's cost of contacting a buyer, and N is the seller's net cost (costs minus benefits) of holding the house while attempting to sell it.
8. These issues will be discussed in more detail in Section 2.4.
9. However, this does not mean that the broker bears no risk. The broker does not receive a commission until she finds a ready and willing buyer. Therefore, she runs the risk of not getting compensated for her search efforts.
10. Let us assume that the broker uses her informational advantage to convince the seller not to ask more than his reservation price.

11. A more rigorous treatment of the efficiency of alternative commission structures can be found in Yavaş (1993a). It has been shown in Yavaş (1991a, 1994) that if we have *incomplete information* about the players' reservation prices (even if we assume vertical matchings), the welfare effect of brokers and other types of middlemen in the economy can still be negative.
12. The Federal Trade Commission (1983) survey reports that 20.9 percent of buyers and 30.5 percent of sellers use the agent's advice as the single most influential source of information to determine their first price offers and listing prices, respectively.
13. In a related study, Geltner, Kluger, and Miller (1991) develops an excellent dynamic model to study the effect of a *finite* duration listing contract on the two dimensions of potential conflict of interest—the level of search effort by the broker and the choice of the price for the property (assuming that the broker can influence the seller's reservation price). They show that under a finite-duration contract the broker's search efforts will increase over time. Thus, while the conflict-of-interest problem regarding the broker's search efforts is significant at the beginning of the contract, it becomes insignificant towards the end of the contract. On the other hand, the conflict of interest concerning the price becomes more critical toward the end of the contract.
14. It is interesting to note that MLSs are uncommon (almost nonexistent) in many European countries. Instead, these countries have open listings as the most common type of listing contract. As Miceli (1988) argues, open listings can serve a similar function for sellers as an MLS does. As with an MLS, open listing allows a seller to list the house with each broker and hence to reach all the buyers in the market. However, it is less costly for a seller (a buyer) to list with (go to) only a single MLS broker and still get a sufficient exposure to the market through the MLS system.
15. Broker's choice-of-effort level is also affected by the fact that the players are involved in a *repeated game*; the seller can reenter the market in the future. This gives an incentive to the broker to put more effort into the seller's property in order to build a good reputation with the seller.
16. It should be noted here though that in Yinger's (1981) model there are too many resources allocated to brokerage without the MLS. Thus, the MLS improves the efficiency of resource allocation by reducing the amount of resources allocated to brokerage.
17. Frew (1987) compares expected gains of an MLS member from having a higher probability of selling her listings with the expected loss from sharing the commission with other members. He shows that net gains decrease as the broker's size increases. Therefore he concludes that bigger MLS members have more incentives to cheat and withhold their listings from the MLS. This argument, however, is rejected by the empirical findings of Sirmans, Turnbull, and Benjamin (1991). One possible explanation is that Frew's model does not consider the additional gains of the MLS to a broker resulting from the opportunity of selling other brokers' listings.
18. The empirical study by Sirmans, Turnbull, and Benjamin (1991) shows that the economies-of-scale argument holds even with respect to the firm sizes of MLS members; larger brokerage firms sell houses faster than their smaller rivals.
19. The study by Federal Trade Commission (1983, p. 13) indicates that in eleven out of sixteen cities surveyed, more than 80 percent of the commission rates were either 6 or 7 percent. Owen (1977) reports that approximately 75 percent of all residential real estate transactions in California involve a commission rate of exactly 6 percent. A history of MLSs and brokerage fee schedules can be found in Federal Trade Commission (1983, pp. 84–88, 107–116, 195–198).
20. This has been verified to me by some anonymous brokers. They indicate that sometimes it can even be less costly to sell a high-price house than a low-price house. Their reason is that buyers of high-price houses usually have some experience of buying a house before, as opposed to buyers of low-price houses who are usually first-time buyers. This, they argue, make it easier and less costly to deal with buyers of high-price houses. The empirical result of Cubbins (1974) also asserts that "a given house could be sold faster the higher the price put on it."
21. One exception to this line of literature is the empirical study by Goolsby and Childs (1988), who found competition in the rate of commission charged by brokerage firms in the Knoxville, Tennessee, area. Another empirical study by Carney (1982) shows that the commission rate is inversely related to the price and age of the house and that the commission rate from sales involving a listing and a selling broker is higher than that from those involving the listing broker only.

The theoretical studies by Schroeter (1987), Knoll (1988), and Carroll (1989) caution that uniformity of commission rates is not necessarily an evidence of noncompetitive behavior in

- the industry. Their main argument is that the seller's opportunity cost of a delay in selling the house increases with the price of the house; thus the owner of an expensive house is willing to pay more for the services of a broker who lists fewer houses, hence offers a faster sale. Note, however, that in order for this argument to be compatible with competition, we again need the broker's search costs (including the costs associated with the *number* of houses the broker lists) to be a linear function of the price.
22. Since the commission will be divided between the listing and selling broker, it is necessary to report what the selling broker's share would be. There is no need, however, to report the listing broker's commission rate. It was included as a requirement in the recent NAR regulations on MLS listings (published in the 1980 issue of the *Executive Officer*) that the total commission on a listing is not to be reported.
 23. Residential deed recordings in Los Angeles County in 1974 indicate that an "active" real estate agent sold an average of only three homes per year (Owen, 1977). The industry average in Canada is five sales per agent (Jenkins, 1989, p. 55). A referee pointed out that 2 to 3 percent fees charged in other developed countries result in many more homes per agent (forty to fifty a year in England), hence in fewer agents. A reduction in fees in the United States would also increase the number of home sales per agent and reduce or eliminate the "excess supply" of agents.
 24. Zumpano and Hooks (1988) claim that there is no evidence of "supernormal" profits in brokerage (they report a median income of \$30,000 for brokers and \$18,000 for salespersons in 1983). Jenkins (1989), on the other hand, argues that average profit rates of corporate brokers in Canada are well above those of other industries.
 25. Sellers and buyers have imperfect information about "quality" of a broker's services. One can interpret experience of a broker as a signal of quality of her services. As argued in Frew and Jud (1986), buyers and sellers also use franchise affiliation of a brokerage firm as another signal of quality. Their study reports that franchise affiliation has a significant contribution to the sales of a brokerage firm.
 26. It should be noted that MLSs have an internal control mechanism for this type of problems. If a buyer switches to a discount broker after utilizing the services of a full-service broker, the full-service broker can claim a part of the discount broker's commission by appealing to the MLS board.
 27. In fact, a few courts have considered the reasonable beliefs of the buyer and held that the selling broker is the agent of the buyer and not the seller (Marsh and Zumpano, 1988).
 28. A survey of Georgia licensees by Ball and Nourse (1988) indicates that 54 percent of buyers reveal their reservation prices to the selling agents, 50 percent of these selling agents convey this information to the listing agents, and 56 percent of these listing agents pass this information on to the sellers. Similarly, 56 percent of sellers reveal their reservation prices to the listing agents, 35 percent of these listing agents convey this information to the selling agents, and 48 percent of these selling agents pass this information on to the buyers.
 29. Recently, the California appellate court ruled that brokers have to inspect their listings and inform potential buyers of any critical defects (Marsh and Zumpano, 1988).
 30. Various experiments by economists prove that double auctions yield the competitive equilibrium price even with a very few number of buyers and sellers.
 31. It has been theoretically proved in Biglaiser and Friedman (1992) that goods and services sold through middlemen have a higher quality than those sold directly by the seller.
 32. Wachter (1987) proposes an alternative reform where buyers' brokers are allowed to present their clients' offers directly to the sellers. The sellers would consult their brokers to choose among alternative offers they receive. This reform is similar to opening up the MLS, with the exception that it involves the buyer and the seller employing a broker. The reform suggested here allows the buyer and the seller to choose whether to employ a broker or not and what kind of brokerage services to purchase.
 33. See Jaffe, Miles, and Reichert (1990) for a game theoretic study of the incentives provided for the players' search efforts under different listing contracts.
 34. Theoretically, licensing requirements have two different effects on the quality of brokerage. One is that it sets minimum standards for each agent. The other is that it reduces the incentives to exceed the standards set by the licensing. This has been theoretically proven by Colwell and Yavas (1992), who studied the effect of building codes on the level of quality and safety of buildings. The empirical studies of the effect of licensing on complaints against real estate agents by Johnson and Loucks (1986), Shilling and Sirmans (1988), and Guntermann and Smith

(1988) indicate that minimal quality standards of licensing improve the quality of brokerage services, albeit at the expense of a welfare loss due to anticompetitive side effects.

Appendix: Economic and finance literature on intermediation

Intermediation is also an important institution for economists and finance scholars. Unemployment agencies account for up to 35 percent of hirings in some labor markets, while more than half of the trade in the New York Stock Exchange goes through specialists. Note that intermediaries in some markets (such as specialists in stock markets and used car dealers) buy and sell for their own accounts, while intermediaries in some other markets do not trade but simply match two sides for a commission fee (real estate brokers, unemployment agencies, match-makers in marriage markets, and travel agents, for example). We will refer to the former type as *dealers* and the latter type as *brokers*.

There is an extensive economic literature on the theory of search. These search models have been used to explain a number of economic issues, including the efficient search behavior of the players, existence of price dispersion for seemingly identical commodities, involuntary unemployment, and coordination failures. A review of this literature can be found in Mortensen (1986) and Rothschild (1973). Common features of these models is that each player has a reservation price (or wage) and that he will search in a sequential manner until he receives an offer better than his reservation price. This reservation price is the price that maximizes the player's expected present value of the future earning stream, and it equates the marginal cost of search with the expected marginal gains from search. Until recently, however, economists have largely ignored the significant role played by intermediaries in most search markets. The main reason was that bilateral search models where both buyers and sellers can choose their optimal search effort levels were already complicated. Adding a third party whose actions affect (and are affected by) the search behavior of the buyers and sellers would make the analysis even more complicated. The recent models of intermediation have handled this problem by introducing some simplifying assumptions. They either fixed the search intensity levels of some or all of the parties (Rubinstein and Wolinsky, 1987; Garella, 1989; Gehrig, 1990; Wooders, 1990; Moresi, 1990; Biglaiser and Friedman, 1992), or they allowed the search intensity to be variable but worked with static models (Garella, 1989; Yavaş, 1991a, 1992a, 1994). The emphasis in these studies is on how the intermediaries affect the search and trading behavior of the traders, the equilibrium price and quality, and the welfare in the economy. All of these studies are theoretical, mainly due to the fact that it is very difficult to get data to test the questions raised in these models.

The finance literature concentrates on the specialists (and to some degree on the dealers) in stock markets. Given the richness of the data, the finance literature involves many empirical as well as theoretical studies. The main concern of this literature has been to identify determinants of the bid-ask spread of the specialists in stock markets and particularly the effect of the trade volume, inventory costs, and informational asymmetries on the bid-ask spread. Examples of empirical studies include Stoll (1978) and Glosten and Harris (1985), while examples of theoretical studies include Garman (1976), Gould and Verrecchia (1985), and Glosten

and Milgrom (1985), O'Hara and Oldsfield (1986), and Bhattacharya and Yavaş (1992).

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