An Optimal Incentive System For Real Estate Agents

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Abstract   This article presents an alternative system for selling real estate.
                 It overcomes the well-known deficiencies of the percentage
                 commission system. In our system, the agent purchases the
                 property from the seller and simultaneously receives a put
                 option. The put option gives the agent the right to put the
                 property back to the original owner. It is shown that this system
                 has many of the desirable properties of a dealer system, while
                 avoiding some of the problems that are inherent in that system.

Introduction

The active residential broker has a significant information advantage over prospective home sellers. It is presumably due to this advantage that sellers find it advantageous to hire brokers.[1] Most commonly, agents are compensated under a fixed-percentage commission arrangement. This contract has been shown to poorly align incentives and to distort risk sharing. We propose an alternative system that, given homogeneous beliefs and time preferences, aligns the interests of sellers and brokers.[2] The alternative system also addresses the "listing-only" problem, often ignored in the literature.[3]

In our proposed system, the agent purchases the property from the seller. At the same time, the home seller sells to the agent a put option on the property. The put option gives the agent the right to convey the title back to the home seller at the original purchase price at any time during the listing period. This helps ensure the former owner's cooperation in the agent's marketing effort.[4] We show that this arrangement provides first-best incentives to the agent, while maintaining proper incentives for the seller. A discussion of the merits of this proposal relative to current institutional arrangements is also provided.

The article is organized in the following fashion. First, a brief review of the relevant literature, followed by a formal analysis of optimal effort and listing price choices under a dealer system and the fixed-percentage commission structure. Next, a proposed alternative market structure is presented. A summary and conclusions are presented last.

Literature Review

In the last twenty years, a substantial literature has developed with regard to the principal-agent problem. The familiar principal-agent framework has been used to analyze the efficiency of existing contracts as well as to guide the design of new contracts in the real property market.

Zorn and Larsen (1986) show the fixed-percentage commission contract fails to provide first-best incentive alignment. Anglin and Arnott (1991) provide an extensive analysis of the terms of the brokerage contract. They find that the fixed-percentage commission contract performs poorly by failing to allocate risk and to provide agent incentives efficiently. The two distortions with respect to the first-best solution are that the agent expends less effort and bears greater risk. In addition, they find that the optimal contract with a risk-averse principal and agent implies a marginal remuneration rate that exceeds the remuneration under the first-best contract.

Alternatively, Arnold (1992) describes certain conditions under which the standard fixed-percentage commission contract can provide first-best results.[5] Miceli (1989) and Geltner, Kluger and Miller (1991, 1992) also consider the efficiency issue. Geltner, et al. find that an optimal duration contract can help align incentives in the effort dimension. However, they also find that contract duration can further distort incentives in the informational dimension. In short, they find that effort conflicts with regard to selling intensity are virtually non-existent near contract termination, while incentive conflicts with regard to pricing advice become much more extreme.

Yavas (1995) further analyzes the current fixed-commission contract, however his important extension recognizes the seller's effort. He provides several examples of seller effort including property maintenance and flexibility to showings and open houses. If seller's effort is further defined to include occupation of the property, Larsen's (1996) finding that occupied houses sell more rapidly than those that have been vacated is important.

Because the evidence on incentive alignment under the fixed-commission contract is mixed, it is natural to question the persistent domination of this arrangement in real estate markets. Anglin and Arnott (1991) argue it favors established agents and precludes contractual diversity. Levmore (1993) notes that transaction costs can inhibit the adoption of an alternative framework. For instance, he discusses a progressive-commission structure whereby the agent's marginal return increases as the sale price increases. Unfortunately, a friction arises such that it can be difficult to negotiate the ''trigger'' prices at which the agent's marginal earnings increase.

The answer to the fixed-percentage commission contract's survivability may not lie solely in its impact on a single agent-seller relationship. Carroll (1989) argues that the traditional structure promotes market efficiency by equitably distributing

an agent's effort among homes the agent is attempting to sell. In a similar context, Levmore (1993) suggests that uniform commission contracts exist partially to eliminate principal (seller) competition. He asserts that if non-uniform contracts existed, agents would disproportionately devote their effort to the property promising the greatest marginal return.[6]

It has also been suggested that the lack of heterogeneity in real estate contract arrangements provides direct evidence of anti-competitive behavior among brokers. It is argued, that to perpetuate an anti-competitive environment, real estate brokers collectively maintain the fixed-percentage contract. Shroeter (1987) and Knoll (1988) point out that the standard commission structure can be consistent with competitive behavior if the opportunity cost to the seller increases with the value of the home. This argument is plausible because owners of more expensive homes typically earn larger incomes, and interest expense on home loans increases linearly with price. Although these issues are important, we focus on the contract's incentive effects between a single seller and agent.

Optimal Choice under the Fixed-Percentage Commission Structure

We first view the problem assuming that it is possible for the property owner to sell the property to a dealer who operates in a competitive environment. The dealer bids the value-maximizing amount V. This value reflects the expected time it will take to sell the property and the cost incurred. Assuming the existence of a dealer allows us to compare this ideal solution with the percentage commission system and with our suggested alternative. We assume that in each period the probability of selling the property, π, is a function of effort and other costs, c, the dealer incurs. We assume all costs are subsumed by c. The probability of sale is constant because we assume that the effort and pricing decisions are made at the initiation of the listing contract and maintained throughout. This assumption is consistent with empirical evidence. Belkin, Hempel and McLeavey (1976) find that properties in a properly priced submarket have an equal probability of sale in the next week regardless of how long they have been on the market. For simplicity, we assume that the broker is risk neutral. The most the dealer would bid is:

$$V = \pi P - c + (1 - \pi)(\pi P - c)/(1 + r)$$
$$+ (1 - \pi)^2(\pi P - c)/(1 + r)^2 + \cdots, \quad (1)$$

where r is the time discount factor.

Because the probability of a sale is always less than one, Equation (1) has an infinite number of terms. The expected time to a sale is equal to $(1 - \pi)/\pi$. Noting that $(1 - \pi)/(1 + r)$ must be less than one, Equation (1) can be simplified to the following finite form:

$$V = (\pi P - c)(1 + r)/(r + \pi). \tag{2}$$

Once the dealer has purchased the property from the seller, it is self-optimal to exert the value maximizing effort. We assume that the dealer must set a price P such that any prospective buyer may either accept or reject the property at price P. Differentiating with respect to effort, we obtain:

$$V' = (\pi'P - c')(1 + r)/(r + \pi)$$
$$- \pi'(\pi P - c)(1 + r)/(r + \pi)^2, \tag{3}$$

where π' and c' are the respective partial derivatives. Assuming the second order condition is satisfied, namely that probability of a sale is concave with respect to effort, the optimal effort level is implicit in the following relation:[7]

$$(\pi'P - c')/(\pi P - c) = \pi'/(r + \pi). \tag{4}$$

Given any effort level we can obtain the expected value maximizing asking price P by differentiating Equation (2) with respect to P. This yields:

$$\partial \pi/\partial P = -\pi(r + \pi)/(Pr + c). \tag{5}$$

By reformulating the problem from the broker's point of view, we obtain the analogous condition to that in Equation (4) for the fixed-percentage commission system. We assume that the selling price P is determined at the initial listing and the agent only has discretion with respect to effort level. The agent's problem with a fixed-percentage commission, assuming an infinite listing period, is similar to Equation (2), namely:

$$V = \pi kP - c + (1 - \pi)(\pi kP - c)/(1 + r)$$
$$+ (1 - \pi)^2(\pi kP - c)/(1 + r)^2 + \cdots. \tag{6}$$

Or simplifying:

$$V = (\pi kP - c)(1 + r)/(r + \pi). \tag{7}$$

Differentiation of this function with respect to the broker's choice of effort yields:

$$V' = (\pi'kP - c')(1 + r)/(r + \pi)$$
$$- \pi'(\pi kP - c)(1 + r)/(r + \pi)^2. \tag{8}$$

Or analogously to:

$$(\pi'kP - c')/(\pi kP - c) = \pi'/(r + \pi). \tag{9}$$

Direct comparison of the conditions is not obvious except that Equation (9) clearly differs from the dealer's solution in Equation (4). It is well known, however, that the percentage commission system is inefficient, resulting in too little effort because the broker only receives a fraction k of the sale price.

An Alternative Market Structure

In this section, an alternative system that provides first-best incentives to the agent is proposed. Under this option, the seller immediately sells the property to the agent while remaining in residence.[8] At the same time, the original seller sells (for a nominal amount) to the agent a put option on the property. Once the property is sold, the put option expires. This provides the agent with incentives identical to that discussed in the dealer arrangement. The absence of real estate dealers is often cited as puzzling (*e.g.*, Anglin and Arnott, 1991; and Yavas, 1994). A problem with the dealer system, overcome by our proposal, is that the dealer system eliminates the original property owner's incentive to maintain the property. Under any marketing system seller/occupants often play a very important role in selling a home. Both Anglin and Arnott (1991) and Yavas (1995a) recognize this in their discussions of the double-moral hazard problem. An important advantage of our proposed system is that it continues to provide the seller with appropriate incentives to maintain an attractive home.

The incentive effects of the proposal are fairly straightforward. Suppose the original seller receives V^* from the agent. V^* is the amount that the dealer in the previous section would pay the seller under the dealer system. The agent could then sell the property keeping all of the net proceeds. She also receives a put option such that at the end of each period she can put the property back to the

original owner at V^*. Assuming that doing this is not entirely costless the agent will have the appropriate incentives. Let us initially assume that the original seller acts optimally (*i.e.*, the property is maintained such that it remains attractive to buyers). Letting V_a represent the value of the contract to the agent if she attempts to sell the property in the first period and exercises the put option in the second period we have:

$$V_a = \pi P - c + (1 - \pi)put/(1 + r). \tag{10}$$

The put exercise price is set equal to V^*. It is important to note that V^* only enters Equation (10) if the property is not sold in the first period. That is Equation (10) becomes:

$$V_a = \pi P - c + (1 - \pi)V^*/(1 + r). \tag{11}$$

The amount originally paid to the seller is also V^*, but this is a sunk cost once both parties agree to the contract. If the original homeowner acts optimally, the agent does not have an incentive to exercise the put. The logic of this is straightforward, if it was worth accepting the contract in the first period then assuming that the original owner acts optimally the problem is exactly the same in the second period, the third and so on. In other words, the maximization problem facing the agent is identical with the dealer problem as represented by Equations (1) or (2). It might appear that if $V^* = V_a$, then there is no benefit to the agent of entering into this contract. This ignores that c compensates the agent for effort in the opportunity cost sense (*i.e.*, an amount that is just sufficient to bid this resource from alternative uses).

It is in the interest of the original homeowner to act optimally. Assuming that there is some possibly very minor cost for the homeowner to enter into this contract, the original homeowner has the same incentives to maintain the home as the agent. If the homeowner does not act optimally, the agent will put the home back to the original seller. If each party has rational expectations they each understand that this is their optimal choice given that the other party acts optimally. There is therefore a Nash equilibrium such that both the original homeowner and the agent have optimal incentives.[9]

Qualifications and Comparisons

It cannot be entirely costless to place a house on the market and simply buy another one when it sells. The owner continues to derive utility from inhabiting the house while the agent attempts to sell it. We assume he must pay rent. Conversely, for the agent there must be some possibly minor cost such that it does

not pay to list a house for a period without incurring any cost and then put it back to the seller. The possibility of costlessly entering into such a contract is unlikely. Even merely listing a property is not costless.

As noted, an undesirable aspect of the dealer solution is that it eliminates beneficial seller incentives. In a dealer market, once the homeowner has sold the property, there is no incentive to stay. Larsen (1996) has shown that unoccupied homes take longer to sell.[10] This finding may partially be due to the popular notion that homes do not ''show as well'' when they are unfurnished and unoccupied. We also argue that an uninhabited home serves as a signal of a motivated seller, thereby reducing the eventual transaction price. An owner living in a house can more credibly signal a willingness to wait and negotiate a better price than an otherwise equal owner of an empty home. In our system, the seller receives payment from the agent once the contract is signed. Because of the put option, it is clearly in the best interest of the seller to remain in the residence, maintain its appearance and be amenable to showings and open houses until a buyer is found. The amount V_a that the agent is willing to pay for the property to the homeowner could be greater than would a dealer. The reason is that with the put option system, the seller remains in the home with optimal incentives to assist the broker with the sale.[11]

We have assumed that the optimal price remains constant over time. The possibility that there may be an unanticipated decrease in demand may explain why a dealer arrangement is relatively uncommon. Although relocation companies do function as dealers, sharing costs with employers, for a special segment of the market. Dealers would be required to maintain large inventories that would probably require high levels of debt. Besides the undesirable incentive effects of debt, there is the risk that this places on dealers. Under our system, the agent has the option to put the property back to the original owner. Earlier we assumed that the agent was risk neutral. It is reasonable, we believe, to assume that brokers are more risk tolerant than owners are because they have opportunities to diversify. This is particularly true of large brokerages. To the extent that agents are risk averse, the optimal amount V^* would have to be scaled down to reflect the risk aversion.

It is possible to include a call option in our system to allow the original homeowner to capture the benefits of an unanticipated increase in housing demand. The call option, with a strike price set at a negotiated amount above the original P, entitles the original owner to buy the property back from the agent in the event that the agent locates a buyer willing to pay more for the property than the call option strike price. This option not only allows the original owner to capture unforeseen increases in the value of the property, but also protects agents from charges that they are taking advantage of less well-informed sellers.

Seller guarantee programs offered by some brokerage franchises are similar to our system. Zorn and Larsen (1991) have shown that first-best incentive alignment is possible for risk-neutral agents based on this concept.[12] While in practice such

arrangements provide sellers with guaranteed prices and substantial liquidity, it is apparent that most of these contracts have been skewed to the better informed broker.[13] In addition, an informal survey found that brokers typically only became involved in such arrangements when the seller was extremely motivated.[14] Hot markets also seem to encourage these transactions because brokers have increased confidence that they can rapidly sell homes in their inventory. It seems clear that conflict in the information dimension is very important in this market structure. We can think of the effects of an extremely low guaranteed price. Because the agent must buy the home if unable to sell it, the agent will obviously seek the lowest guaranteed price possible. If the price is low enough, the agent will actually prefer not to sell because it is more profitable to exercise the guarantee and then sell it. On the other hand, if the guaranteed price is too high, the seller will be insufficiently motivated to maintain the property to attract the maximum sales price.

A question that arises is why we do not observe our system in practice. One problem is that the contract is relatively complex. Differences in time preferences or differences in opinion concerning property value may act as impediments towards both the guarantee price and our system. If the owner is willing to wait a long time to find a buyer or is far more optimistic than the agent, it may be impossible to agree on an amount V^*. If sellers tend to be overly optimistic, a dealer arrangement will suffer from the same problem.

Institutional and regulatory barriers are also likely to be impediments to the implementation of this system. Financial options have only recently become commonplace and the novelty of our system is likely to be met with skepticism. At the very least, a consideration of these issues is likely to shed some light on current institutions.

Conclusion

The percentage commission structure currently dominates other compensation systems in real estate brokerage. This situation persists despite compelling evidence that it sub-optimally aligns the incentives of the broker and the seller. We have presented a contractual system involving a simple put option that optimally aligns incentives. The put option ensures that the seller has the appropriate incentives to aid in the selling effort. A number of possible reasons including institutional and regulatory impediments were put forward as to why such a contract does not exist. Further investigation into these issues will advance our understanding of this market.

Endnotes

[1] For expository simplicity the broker is a female and the seller a male throughout this article. We will also use agent interchangeably with broker.

[2] Our system resembles the ERA Sellers Security Plan. This plan is supported by the national ERA organization, but is offered at the discretion of the local broker. ERA provides a purchase guarantee if your home does not sell during the listing period and immediately frees up a portion of your equity to be applied toward a down payment and closing costs of a new home. The seller must pay certain fees to enter into this arrangement. In addition, the ERA ''guaranteed purchase price'' is a function of two independant appraisals and an ERA-determined appraisal reserve.

[3] The problem is that some agents apparently concentrate exclusively on obtaining listings while devoting minimal effort to selling homes. It is probably at least partially the result of the popular multiple listing services (MLSs) available. Many models avoid the complexities MLS services present, thus the ''listing-only'' problem does not arise. Others have more specifically looked at incentive effects as well as the social efficiency effects of the MLS (*e.g.*, Yinger, 1981; Crockett, 1982; Knoll; 1988; Mantrala and Zabel, 1995; and Yavas and Colwell 1996).

[4] It is possible to add a call option to the contract, which enables the seller to capture unanticipated price increases. This is discussed later.

[5] The conditions to achieve first-best require the seller to have substantial costs if he cannot sell the house. Moreover, Arnold assumes search costs are fixed throughout the contract.

[6] This argument can be equally as strong against the current implementation of the fixed-percentage commission structure. Parameters such as duration of the contract and time to expiration are different thus affecting agent incentives with respect to other properties. Moreover, it is the agent's expected marginal compensation that the agent is concerned about versus cost of effort. Consider two homes with different list prices and identical commission rates. Even if it is assumed that the agent devotes an equal level of effort to both home sales, the expected marginal compensation may differ. For example, assume house A's list price is $100,000, house B's list price is $150,000 and the agent receives a 6% commission. If the agent believes house A has a 50% chance of bringing list price and a 50% chance of no sale, the expected commission is $3000. In addition, if the agent believes the second home has a 25% chance of bringing the list price and a 75% chance of no sale, the expected commission is $2250. The expected marginal remuneration rate on A is 3% and only 1.5% on B. If effort was assumed to enhance the probability of sale for the properties equally, standard agency theory clearly predicts the agent would devote greater resources to house A.

[7] We assume that the usual concavity conditions are satisfied to ensure an interior solution.

[8] The assumption that the seller remains in residence is not necessary, but a desirable feature of the system, because it makes it identical, from an incentive perspective, to the seller selling their own property.

[9] The amount that the original owner receives is less than the agent receives when the property is sold. Such a difference always exists when there are market makers.

[10] Larsen's (1996) results were inconclusive with regard to the transaction prices of occupied and unoccupied homes.

[11] The homeowner would have to pay rent either explicity or implicitly to the agent for the time he occupies the home after entering into the contract. This along with a cost of entering into the contract ensures that the original seller cannot live rent free and thus continually buy and sell homes under this system. The rent can be held in escrow until the final sale.

[12] Perhaps motivated by the realization that agents have an incentive to shirk when provided with anything less than a 100% marginal remuneration rate, Levmore (1993) provides schemes related to this discussion. The most closely related idea essentially suggests auctioning a call option on the property to prospective agents. Such a mechanism provides a 100% marginal commission and allows for risk sharing. Unfortunately, several difficulties in implementing such a market are found. The difficulties include a need for substantial participation in an initial auction, problems with agent effort allocation across properties and bilateral agency problems. See also Anglin and Arnott (1991) or Zorn and Larsen (1991) for a discussion of these issues.

[13] Though they may not actually consummate the deal until the end of a listing period, the assurance of a sale could allow the seller additional flexibility in pursuing a new home.

[14] It appears that brokers often become involved in these arrangements with owners having very little equity in their home. In addition, it is frequently the case that the seller is either in the process of relocating out of the area or of purchasing another home.

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