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WHY ARE BUYERS REPRESENTED BY SELLER'S AGENTS WHEN BUYING A HOUSE?*

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1. Introduction.

As most homeowners know, when searching for a home, the real estate agent who assists the buyer is employed by the seller. The nature of such an employment contract is that the agent, referred to as the selling agent, must act in the best interests of the seller and not those of the buyer.[1][2] As such the buyer permits himself to be represented by an agent who not only does not represent his interests but legally represents the interests of the party from whom the buyer desires to extract some surplus. On the surface, this institution appears to be in conflict with the results in the Principal–Agent literature[3] because the contract is written between the wrong parties. This literature has emphasized the usefulness of providing one's agent with incentives to perform well through written contracts and would suggest that the buyer can do better by employing some agent directly. The advantages of doing so include: inducing the agent to provide better information about the "market" value of the houses,[4] better information about the condition of the house,[5] better information about inspectors,[6] and one could induce the agent to do a better job of screening houses so as to reduce the costs of searching for a house.

Our purpose is to provide an explanation for the existence of such contracts because this contract is uniformly used in the United States, Canada and Japan and has been for quite some time. At the same time, an institution that represents the buyer's interests has not emerged.[7] As with any long–lived, widely used institution, there is reason to believe that it serves a useful purpose which cannot be served by an alternate institution in which the buyer is represented by

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[1] Throughout this paper, we ignore the agent who lists the house. This agent, referred to as the listing agent is used under well–understood conditions—when the benefits exceed the costs.

[2] This is not equivalent to asking "Who pays the tax" because, unlike the tax problem, there are incentive effects that depend upon whom the agent is legally obligated to serve.

[3] This literature is far too extensive for us to give a complete set of references. Some important papers are Ross [1973], Holmstrom [1979], Shavell [1979], Grossman and Hart [1983], and Rogerson [1985]. A partial summary was done by Rees [1984].

[4] One would be more able to trust the agent's opinion concerning the market "price" of the house.

[5] The agent will generally have more experience at looking at houses and be better able to spot potential problem areas.

[6] The agent's suggestions on who should inspect the house or about other individuals who might give estimates about the costs of certain repairs or other changes to the house.

[7] There are some agents known as buyer's brokers and some contracts, often referred to as Finder's Fee contracts. that exist but are seldomly used.

his own agent.[8]

The essence of our explanation is that this form of contracting arises when the characteristics of the product sold cannot be communicated except by the buyer's own observation, a costly activity. Our model relies on the fact that the market functions poorly if the buyer incurs these costs. By poorly, we mean that the probability that the buyer searches at all is small and therefore the seller's expected profits are low. However, if the seller reduces these costs by employing the agent himself, the probability of selling the house and his expected profits rise.[9] We present two versions of our model, a simplified version which highlights the explanation but yields other, unacceptable implications and a more complete model that does not have these faults.

In the simplified version of our model, a home is a vector of characteristics and we assume that there is a continuum of homes each owned by a different seller. There is a continuum of potential buyers each of whom will buy at most one home. We assume that the sellers choose what price to charge for their home, but the buyers know only the distribution of prices and characteristics of the homes. However, they may learn the price and the vector of characteristics of a given home through search. Further, we assume that the house is a sufficiently complex product so that personal investigation is the only (feasible) means of learning the vector of characteristics. Lastly, we assume that the buyer either purchases a home that he has investigated, continues searching or stops searching without buying a home. The simplification referred to above, is that the buyers' have common reservation prices for each home, which are known to each seller.

We show that in the absence of selling agents, no homes are traded in equilibrium because the sellers choose prices that make the buyers' expected consumer surplus smaller than the cost of search. As a result, the buyers do not search and no houses are sold. We show that this conclusion is robust to the inclusion of agents employed by the buyer but that the introduction of a selling agent leads to the sale of all homes for which the buyers' reservation price exceeds the seller's. This is reminiscent of the well-known result of Diamond [1971] and is caused by essentially the same features. The important features are that (1) the buyer's search costs are sunk once he has

[8] Similar contracts are also found in the market for corporate executives. In this market, the executive works with a headhunter who is employed by the hiring firm.

[9] This does not require that the real estate agent can search more efficiently than the buyer although it is reasonable to assume that he is more efficient.

investigated a house and (2) each seller is of negligible size and, as such, changes in his behavior cannot alter the buyer's search decision.[10] Given the second, the first means that the seller will always charge a price which exceeds the difference between the reservation price of the buyer and his search costs. This leads to all of the equilibria of this simplified model, without selling agents, having the property that the buyer's expected consumer surplus from buying a house is smaller than the cost of search. The important point is that if the seller employs the selling agent, then doing so facilitates search and therefore increases the probability that the house is sold. If the agent were employed by the buyer, these benefits would be lost. Unfortunately, this model has the undesirable property that no houses can be sold "by owner." This property is due to the assumption that the seller's know the buyers' reservation prices.

In section 3 we relax this assumption and show that all of the above conclusions still hold but that, even without selling agents, some houses may be sold in equilibrium. This last feature implies that a small "by owner" market can exist in the presence of selling agents.

In section 4, we apply the insights of the previous sections to other markets. The idea is to "test" our explanation by asking whether the factors that we have identified as important are present in markets with analogous institutions and not present in markets without such institutions. Examples of analogous institutions include headhunters in the market for corporate executives, independent insurance agents, travel agents, and salespeople.[11] We will argue that these markets all exhibit the factors that we believe are important in explaining the institution—sunk search costs, the need for personal inspection and the lack of a less expensive alternative means of reducing the buyer's search costs. We also consider examples of markets that do not have analogous institutions. They include most consumer products such as toothpaste, food, etc., and markets for collectibles such as rare coins or masterpieces. In these markets, we believe that at least one of the factors identified is missing. As a quick example, notice that for a product such as toothpaste, the buyer's search costs are sunk and personal inspection is necessary.[12] However, the use of selling agents

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[10] Recall that we are assuming that the buyer can only acquire information by self-investigation. Obviously, this is extreme but it is also clear that for houses, the costs of acquiring the *same* information by other methods is prohibitive.

[11] Here, we are thinking of salespeople who provide information such as in the market for stereo equipment or the traveling salespeople selling intermediate goods.

[12] It is quite difficult to employ someone to tell you if you like the toothpaste's taste.

does not appear to be the least expensive way to reduce the buyer's search costs, advertising (free samples) is.

In summary, we believe that the institution of selling agents can be explained as the only feasible means by which the seller can mitigate the buyers' search costs. If this is not done, the informational asymmetry combined with the fact that search costs are sunk means that the market functions very poorly—many feasible (Pareto superior) trades are not made. Consequently, institutions analogous to selling agents arise when the product's characteristics are most cheaply communicated by subsidizing actual investigation by the buyer. As a result, even though one can easily imagine benefits that accrue to the buyer if the agent were his employee rather than the seller's, we have provided an explanation for the continuing, widespread use of selling agents.

The paper is organized as follows. In section 2, the simplified model is analyzed and section 3 contains the analysis of the model when the buyers' reservation prices are unknown to the seller. In section 4, we discuss the robustness of our explanation and our conclusions are presented in the final section.

2. Known Reservation Values.

We begin by assuming that the set of buyers can be identified with an interval by an atomless distribution function. We assume that each of them is willing to buy at most one house and that each has the same reservation price for a specific house. A house is described by a vector of characteristics and the set of such vectors is $\Omega \in \Re^n_+$. Thus, the buyers' common reservation price for a house ω is $r(\omega)$ and is assumed to be known to the sellers. We assume that there is no means by which ω can be revealed to a buyer other than through the buyer's personal inspection, which is costly. To simplify, we assume that this cost, s, is a constant strictly greater than zero. This, together with the buyer's income constraint, limits him to searching a finite number of homes.

We assume that the set of sellers can identified with an interval by an atomless distribution function and assume that each owns one house $\omega \in \Omega$. We assume that each seller has a reservation

price $c(\omega)$ and that there is a proper subset of Ω for which $r(\omega) > c(\omega)$.[13]

We assume that the market functions as follows. Each seller chooses a price, $p(\omega)$, at which he will sell his house. The buyers know only the distribution of vectors (p,ω) available but must personally search to identify the characteristics of a particular house. We assume that the buyer must investigate a house in order to buy it and after doing so either purchases it at $p(\omega)$ or leaves.[14] The seller is assumed to choose his price to maximize profits which are

$$\pi(\omega, p) = \begin{cases} p - c(\omega) & \text{if } r(\omega) \geq p \\ 0 & \text{otherwise} \end{cases}$$

if the buyers search and zero otherwise.

The buyer's search problem is a standard one that has been studied before.[15] Under the assumptions that we have made, the optimal search strategy has the buyer choosing a critical value[16] and searching until he finds a house that yields consumer surplus of at least this critical value.[17] This critical value, v^*, satisfies[18]

$$s = \int_{v^*}^{A} [1 - \mathcal{F}(x)]\, dx,$$

where A is the largest possible amount of consumer surplus, and $\mathcal{F}$ is the induced distribution function over the buyer's consumer surplus. If the buyer is to search at all, then the expected gain from using this optimal stopping rule must exceed the expected cost of search. The buyer's expected net gain is approximately equal to[19]

$$\frac{\int_{v^*}^{A} v\, d\mathcal{F}(v) - s}{1 - \mathcal{F}(v^*)}.$$

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[13] This assumption ensures that some but not all houses should be sold but this is not necessary for the analysis that follows.

[14] We simplify here by not permitting the buyer to make offers. Doing so will have little effect so long as one is willing to specify either an explicit non–cooperative bargaining game or equivalently a particular solution to a cooperative bargaining game. The consequences of such a change on the exchange price can be inferred from Binmore, Rubinstein and Wolinsky [1986]. We note that such an extension is not possible in the next section as the literature on two–sided bargaining with incomplete information is still in its formative stage.

[15] See Lippman and McCall [1976] and Landsberger and Peled [1977].

[16] This value is often referred to as a reservation price. We do not do so in an attempt to avoid terminoligic confusion.

[17] It may seem more natural to allow the buyer to choose a critical price for each house type and then search for the lowest price but this option is not available in the next section. As a result, we solve the buyer's search problem here in the form required in the next section.

[18] See Landsberger and Peled page 23 for details.

[19] This approximation is better the smaller is the cost of search and the larger is the buyer's wealth because it approximates the feasible number of searches (the largest number of searches the buyer can afford) by infinity.

The easiest way to see this is to recognize that V, the value of choosing to search with the optimal search strategy, must equal the expected consumer surplus from finding an acceptable house ($v \geq v^*$) if the searcher were fortunate enough to find it on the first try, minus the cost of the first search, plus the value of optimally searching conditional on having failed to find an acceptable house on the first attempt. That is,

$$V \approx \int_{v^*}^{A} v d\mathcal{F}(v) - s + \mathcal{F}(v^*)V,$$

where the approximation is due to the fact that we do not take into account the possibility that the buyer may have to terminate search because of his income constraint.[20] Since we will argue that the equilibrium has the buyers choosing not to search, all that we need is a sufficient condition to ensure that the buyers do not search. The condition that we will use is that the buyer is unwilling to search using the optimal strategy if he is unwilling to search once. That is, if we let $v(\omega, p) = r(\omega) - p$, then $Ev(\omega, p) - s \leq 0$ implies no search. This can be shown readily by substituting v^* into the definition of V.

With this structure, we have our first lemma.

Lemma 1: *No houses are sold in equilibrium.*

Proof: Suppose that the sellers choices generate a distribution function F on $\Omega \times \Re_+$ such that $Ev(\omega, p) > s$ and that the buyers do search. We show that this is not an equilibrium by showing that some sellers wish to deviate from their proposed strategies. To see this, note that $Ev(\omega, p) > s$ implies that a measureable set of sellers have chosen prices such that $r(\omega) - p > s$. Since any one of these sellers can alter his price without affecting the buyer's search decision, deviating to a higher price would increase his profits. Hence, all induced distribution functions must have the property that $Ev(\omega, p) \leq s$ which means that no buyer searches and no homes are sold. ∎

To ensure that this lemma has content, we must show that there is an equilibrium in this game. This is done in the following lemma.

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[20] For additional details, see Landsberger and Peled.

Lemma 2: *Any distribution function F such that $Ev(\omega, p) \leq s$ is an equilibrium outcome.*

Proof: To show this, we must show that no seller can unilaterally deviate to an alternate strategy and earn larger profits. Adopting his (implied) equilibrium strategy yields zero profits as no buyer searches. Choosing any other price will not alter $Ev(\omega, p)$ and hence will not induce the buyers' to search. Consequently, the sellers profits are unchanged and so the sellers have no alternate strategy that yields higher profits. ∎

We emphasize that this lemma means that every equilibrium outcome is the same, not that there is a unique equilibrium. The only constraint on F is that it make $Ev(\omega, p) \leq s$. One class of equilibria has every seller choosing a price so that $r(\omega) - p \leq s$ or $p \geq r(\omega) - s$. Since prices above, below or equal to $r(\omega)$ satisfy this inequality, some of the equilibria exhibit a price dispersion for each type of house while others do not. However, if we restrict attention to equilibria in weakly undominated strategies, then there is a unique equilibrium in which each seller charges $r(\omega)$ and no buyer searches. The basic idea is that if a buyer were to search even though it is not in his best interest, the seller would prefer to charge $r(\omega)$ rather than any other price. That is, $p = r(\omega)$ weakly dominates every other price.

These lemmas imply that without a means of communicating information to the buyers, the market will not function at all. The basic idea is that because the seller cannot influence the buyers' search decisions, each seller takes the search decision as exogenous, notes that search costs are sunk and, as a result, chooses a price that leaves the buyer with consumer surplus smaller than the cost of investigating the house. On the other hand, if the buyer is not searching, there is nothing the seller can do. This shows that the features identified in the introduction, that the seller is negligible and that the buyer's search costs are sunk once he investigates a house, are important to the conclusion that the market does not function. The next lemma shows that this result continues to hold even if the buyer employs an agent to facilitate his search. For an agent to do this, we need that this agent reduces the buyer's cost of search. However, this agent cannot reduce the buyer's costs to zero, if, for no other reason than that the buyer must pay the agent. The proof of lemma 1 can be readily modified to show the following lemma.

Lemma 3: *No houses are sold in equilibrium, even if the buyer hires an agent to facilitate his search.*

Note that if we continue to restrict attention to equilibria in weakly undominated strategies, buyer's agents have no effect. If such a restriction is not made, the set of equilibrium outcome distributions changes but the buyers still do not search. Notice that this lemma remains true even if the buyer were to employ some type of a contingent contract in which the agent was paid only in the event that the buyer purchased a house. Such contracts fail to mitigate the problem because while the agent, rather than the buyer, is now incurring the sunk search costs, the seller still has the incentive to choose a price that causes the agent's profits to be negative.

Finally, we introduce selling agents. We assume that the seller pays them a flat fee, conditional on the sale of the house, to facilitate the buyer's search.[21] We make the strong assumption that they reduce a buyer's search costs to zero.[22] Since it is now costless for the buyer to learn about every house and since the buyer knows the equilibrium distribution, F, he will search until he finds the house for which his realized consumer surplus is maximized (so long as this maximum is non–negative). Note that if the induced distribution of consumer surplus is degenerate, then we assume that the buyer purchases the first house he investigates (if his consumer surplus is non–negative). As a result, the buyer purchases if the price of some house of type ω is not larger than his reservation value for that house. Since the sellers know this, they set the price equal to $r(\omega)$. This means that the selling agent takes the buyer to exactly one house and if the agent's cost of doing so is s_a, then the fee that the seller will pay will be set equal to s_a.[23] Therefore, the seller's profits are $r(\omega) - c(\omega) - s_a$ which are greater than zero so long an the agent's search costs do not exceed the surplus from selling the house. Since the seller makes zero profits without selling agents, this analysis shows that the sellers prefer to employ selling agents as a means of communicating the

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[21] We realize that this may not be the optimal contract between the seller and the selling agent. In fact, it is not even the contract that is used: the selling agent receives a fraction of the sale price. This could be preferred to a flat fee contract by the seller but we use the flat fee contract to simplify the analysis so that we may focus on why selling agents exist. Incorporating an analysis of the optimal contract would lead us far afield (especially in the next section) because we would have to study how the interactions between the selling agent and the buyer change as the contract between the seller and the selling agent changes.

[22] This assumption is relaxed in the next section and a discussion of the consequences of relaxing it in this simple framework is postponed until the end of this section.

[23] As is standard in the Principal–Agent literature, we assume that the principal chooses the contract to maximize his payoff and the agent either signs or does not sign the contract. Hence, the agent is paid the value of his next best alternative, s_a.

information the buyer desires. Hence, we have proven the following proposition.

Proposition 1: *If the institution of selling agents exists, then the seller uses this institution, increases his profits and every house for which* $r(\omega) \geq c(\omega) + s_a$ *is sold.*

Our analysis has provided an explanation for the use of selling agents as the means of reducing the buyers' search costs.[24] In this section, the sellers were assumed to know the buyers' common reservation prices and selling agents were assumed to reduce a buyer's search costs to zero.

The first assumption led to a complete failure of the market in the event that the seller did not completely eliminate the buyers' search costs and this led to the need to assume that a selling agent reduced these costs to zero. Had we not assumed this, there would have been no role for the selling agent. On the other hand, the first assumption is clearly much too strong. In the next section we relax this assumption which permits us to show that analogous results to those of this section follow even when the selling agent only reduces but does not eliminate the buyer's search costs. Another reason for relaxing the first assumption is that under it, there are no houses sold "by owner." "By owner" sales are houses that are sold without the use of any agents and are observed in the housing market. It is true that the fraction of houses sold "by owner" is small but it is not zero. For this and the other reasons cited we undertake the analysis in the next section.

[24] One might have thought that the seller could eliminate the problem by precommitting to sell the house at a price that ensures that the buyer receives non-negative consumer surplus. Clearly, if the buyers' search costs are not all the same, there is a severe moral hazard problem. Further, the seller's ability to precommit is questionable. He might try to do this within the listing contract by precommitting to sell at the list price. Unfortunately, this is not a legally binding restriction. That is, the seller cannot be held to sell at the listing price under US law. Alternatively, this precommittment may be a part of the solution to the principal-agent problem between the seller and the listing agent. It has been suggested that the listing agent might force an implicit agreement to sell at a price by threatening to provide inferior services if the seller refused to sell at that price. Such a scheme cannot be the solution because the "threat" made by the listing agent is not credible.

3. Unknown Reservation Prices.

The most serious problem created by dropping the assumption that the sellers know the buyers' common reservation prices is that the seller's profits become random.[25] We will assume that the seller chooses a price that maximizes his expected profits. The seller's profits if the house is purchased are simply $p - c(\omega)$ and so his expected profits are his profits times the probability that the house is sold, which is the probability that the reservation price of one of the buyers who searches the seller's house is larger than the price the seller has set. We let the probability that no buyer's reservation price is larger than some number x be[26] $G(x;\omega)$, and write the seller's expected profits as[27] $(p - c(\omega))(1 - G(p;\omega))$. We should note that proceeding in this manner is acceptable under either of the following interpretations: (1) the buyers no longer have the same reservation prices and the seller does not know the buyers' reservation prices or (2) the buyers have the same reservation prices but the sellers do not know this. We will use the first interpretation in our discussion of this model.

The seller chooses the price p^* that satisfies

$$0 = 1 - G(p^*;\omega) - (p^* - c(\omega))g(p^*;\omega).$$

Rewriting ,

$$p^* - c(\omega) = \frac{1 - G(p^*;\omega)}{g(p^*;\omega)} \equiv \frac{1}{\lambda(p^*)},$$

where $\lambda(r)$ is the hazard or failure rate of the distribution G. The intuition for this is that if the seller raises the price by a dollar, his profits rise by that dollar with probability $1 - G(p^*;\omega)$. The

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[25] Whether the buyer knows the sellers' reservation prices is of little importance. If they do, this information only causes minor adjustments when computing the buyer's search strategy.

[26] It should be noted that G depends on the equilibrium outcome distribution F but, because we have assumed that the set of sellers is atomless, we suppress the functional relationship.

[27] The derivation of $G(p;\omega)$ from the seller's beliefs about an arbitrary buyer is conceptually straightforward but computationally messy. If the seller believes that an arbitrary buyer's willingness to pay for the seller's home is given by the distribution function $K(r;\omega)$, then if n buyers investigate the seller's home, the distribution function for the largest of their reservation prices is given by $[K(r;\omega)]^n$. By Bayes' rule, the joint density $g(r,n;\omega) = n[K(r;\omega)]^{n-1}k(r;\omega)h(n)$ where $h(n)$ is the density function for the number of buyers who investigate the house and where the lower case letter refers to the density function associated to the relevant distribution function (and where we assume that these exist). The density function h comes from the optimal search decisions of the buyers and the assumption that if a buyer chooses to search, each house is equally likely to be the one investigated. By standard techniques, one can derive the marginal distribution function $G(p;\omega)$ as long as the associated sums (integrals) are defined. They are well defined if $H(n)$ is such that for some 'appropriate' $N < \infty$, $1 - H(N) < \epsilon$.

second term, $g(p^*;\omega)$, is the measure of the likelihood that he loses the sale. That is, he gains a dollar except if the buyer's reservation price had been exactly equal to the price he had been charging. The second order condition essentially requires that the derivative of the density function not be too positive. This means that the hazard function can be declining at the solution but that not all declining hazard functions will satisfy the second order conditions.

What the above means is that the seller wishes to charge a particular price for his home, $p^*(\omega)$. Given the induced distribution F, the buyers choose whether or not to search. If a buyer chooses to search, he employs an optimal stopping rule as described in the previous section. However, unlike in the previous section, there is a possibility that houses are sold without selling agents. The reason for this is that the seller, not knowing the maximum buyer's reservation price for his house, chooses to set his price below the largest value he believes that this maximum reservation price can be, $\bar{r}(\omega)$. As a result, there is a positive probability that the maximum buyer's reservation price exceeds the price set, $p^*(\omega)$. Since there is a positive probability that the buyers who investigate the seller's house are willing to pay $p^*(\omega)$, there is a positive probability (equal to $1 - G(p^*(\omega);\omega)$) that the house is sold. As a result, we have Lemma 4.

Lemma 4: *When the sellers do not know the buyers' reservation prices, then even without agents, some houses are sold in equilibrium.*

To understand the effect that selling agents have, we must explain their effect on the probability of selling the house. Recall that $1 - G(p^*(\omega);\omega)$ is derived from the probability that n buyers investigate the seller's home. The introduction of selling agents reduces the buyer's search costs and hence increases the probability that at least n buyers investigate the house, *ceteris paribus*. As is readily apparent, there is an extremely complicated relationship between changes in the buyers' costs of investigation and the seller's chosen price. In order to make this problem tractable, we make the extreme assumption that the use of a selling agent lowers the buyer's search costs to zero. In this event, every buyer searches. It will be clear that weakening this assumption does not affect the qualitative nature of our results and since we are interested in explaining why the selling agent is employed by the seller there is little reason to get involved in these complexities. However, it is important to realize that, for the results that follow, this extreme assumption is for mathematical simplicity and not, as it was in the previous section, important for the qualitative conclusions.

Since every buyer searches, the seller can now set his price equal to the maximum reservation price for his home. If this latter value is $\bar{r}(\omega)$, the seller's expected profits become $\bar{r}(\omega) - c(\omega) - \Delta$ where Δ is the cost of employing the selling agent. Again, as in the previous section, we limit our attention to flat fee contracts, contingent on the sale of the house, between the seller and the selling agent. As before, this may not be the profit maximizing contract for the seller (a fee which depends on the price of the house might dominate it). However, it is sufficient for our purpose.

As in the previous section, we assume that the seller writes the contract with the agent and can and does cause the selling agent's expected profits to be zero. The reason is that the seller can set the fee so that the agent is indifferent between this and his next best alternative. Any increase in the fee is a transfer of wealth from the seller to the selling agent and, as a result, is not in the seller's best interest. Thus, Δ, the cost of employing the selling agent, is equal to s_a times the number of searches the agent expects to do with a given buyer. The expected number of searches will depend on the information the selling agent has about the buyer's reservation prices. To simplify the analysis we assume that the buyer's reservation prices are revealed to the selling agent and, because he is the seller's employee, to the seller.[28] Hence, the expected number of searches is one and the seller pays the selling agent s_a, $\Delta = s_a$.

The above analysis showed that, without the use of selling agents, the probability that a house is sold is $1 - G(p^*(\omega);\omega)$ but that with selling agents, the house is sold whenever the maximum reservation price, $\bar{r}(\omega) > c(\omega) + s_a$.[29] In other words, the selling agent increases the probability of selling the house and allows the house to be sold at a higher price ($\bar{r}(\omega) > p^*(\omega)$).[30] The idea is that with selling agents, the seller can charge the largest reservation price any buyer has for the house rather than $p^*(\omega)$. When selling agents do not exist, the latter is strictly less than the largest reservation price of any buyer that is searching because the seller faces a trade–off when

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[28] Given the selling agent's contract, the buyer has no incentive not to reveal this information to the selling agent. If the seller were to pay a fraction of the sale price, the buyer would have an incentive to not reveal this information. If this information is not revealed, one cannot compute the expected number of searches without first solving for the information transmission equilibrium between the buyer and the selling agent. Since such an analysis would take us far afield, we have adopted the simplifying assumption in the text. For additional details, see the discussion at the end of this section.

[29] The difference between these probabilities may be large. The simplest way to see this is to observe that there are symmetric distributions for which $p^*(\omega)$ is larger that the expected value of the maximum reservation price (examples include the uniform and normal distributions). In this case, the probability of selling a house for which $\bar{r}(\omega) > c(\omega) + s_a$, without a selling agent is less than 50% but, with selling agents, it is 100%.

[30] This assumes that $p^*(\omega)$ is an interior solution to the sellers maximization problem.

choosing his price. As he raises his price, his profits rise if he still sells the house but he lowers the probability of sale. These results are summarized in Proposition 2.

Proposition 2: *If $\bar{r}(\omega) > c(\omega)+s_a$, then the use of selling agents increases both the probability that the house is sold and the price at which it is sold. Further, so long as $\bar{r}(\omega)-c(\omega)-s_a \geq (p^*(\omega) - c(\omega)(1 - G(p^*(\omega);\omega))$, the seller wishes to employ an agent to reduce the buyer's search costs.*

Thus, in this more complicated model, the basic intuition presented in the previous section still holds. By employing selling agents, the seller can reduce the buyer's cost of search and thereby charge a higher price for his house. The reason is that by reducing the search costs, the seller causes an increase in the number of buyers who search. In section 2, this increase was from none to all while, in this section, the increase is from some to all, and permits the seller to charge a higher price.[31] The advantage of the more complicated model is that it may permit "by owner" sales to coexist with the use of selling agents.

To see this, notice that the use of selling agents also imposes a cost on the seller, Δ. If the sellers differ in their willingness to absorb these costs, some would choose to sell their house "by owner" while others would choose to employ selling agents. In the model as presented, the sellers do not differ in their willingness to absorb these costs but one can think of many reasons why they might differ. For example, the cost of search may not be independent of the type of house one owns, or the sellers may differ in their opportunity costs from delay in selling their houses. To be more specific, if the characteristics of the seller's house are relatively standardized, then the cost of investigating the house may be smaller than it would be if the house were "one-of-a-kind." Also, the sellers' opportunity costs may differ either because their discount rates or their willingness to bear the risk of a long delay may be different. The basic idea here is that the seller could choose to sell the house "by owner" and gamble that it can be sold without incurring the cost of employing a selling agent. If the sellers do differ, then the sellers for whom $[p^*(\omega) - c(\omega)](1 - G(p^*(\omega);\omega)) > \bar{r}(\omega) - c(\omega) - \Delta$ would choose to sell their houses "by owner."

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[31] Again, if we had not assumed that the buyer's costs went to zero with the use of a selling agent, the result would be that the probability of selling the house rises and the price the seller charges increases with the use of selling agents and the question of the profitability of their use depends on the relationship between these benefits and the costs of employing the selling agent.

Before concluding, we need to discuss the effects of assuming that the seller employs the selling agent under a flat fee contract. In our simple model, this is the optimal contract because the buyers have no incentive to withhold their reservation prices from the selling agent and the agent has every incentive to limit the actual search that is done. This result is basically an artifact of our assumption that the seller chooses a price and the buyer decides whether or not to buy at that price. If the buyer and seller bargained over the price of the house, the seller would be better off with a contract that paid more the higher was the selling price because the selling agent would have some influence over the buyer in the negotiations.

Our model has a number of implications for the housing market. In particular, it suggests that, for a house with given characteristics, the sale price will be lower if it is sold "by owner" than if it is sold with a selling agent. An additional difference is that the average length of time the house is on the market will be longer in the "by owner" case than in the other. Further, the analysis suggests that in the "by owner" market, the fraction of houses sold (per some small time period) should be smaller than the corresponding fraction in the market with selling agents. Another way to say this is: if the fraction of sellers choosing to sell "by owner" is not larger than $\frac{1}{2}$, then the fraction of all houses sold that are sold "by owner" should be smaller than $\frac{1}{2}$.

4. Other Similar Markets.

There are basically two methods for evaluating the reasonableness of our explanation for the existence of seller's agents in the housing market. The first is to evaluate the factors that drive the result and make a judgement about their importance. The second is to take the explanation and see if the factors that it relies on are present in other markets with analogous institutions and not present in markets without these institutions. In this section, we will briefly consider a number of other markets.

Examples of analogous institutions include head-hunters in the market for corporate executives, independent insurance agents in insurance markets, and travel agents that assist in the planning of one's vacation. Other examples include salespersons who provide customers with

information about the product. Such products could be consumer goods such as a stereo, or intermediate goods like those sold by the seller's travelling sales agent. We believe that the features that we have identified as important for our explanation are present in each of these cases.

Each of these markets is characterized by the buyer's need to personally investigate the "product," and by the fact that the search costs are sunk. In each of these markets, the use of the "seller's agent" appears to reduce the buyer's search costs. In the market for corporate executives, the need to personally investigate the job is obvious as is the fact that the buyer's search costs are sunk. The head–hunter reduces the executive's search costs at least in part because of the job–seeker's general unwillingness to have his current employer know that he is seeking another job. Independent insurance agents are essentially identical to the selling agent in the real estate market in that they reduce the buyer's search costs by allowing him to learn the cost of insuring through a variety of different companies. Travel agents reduce the buyer's search costs by reducing the cost of acquiring the information about the different plans as well as information about the different locals. Salespeople that provide information (including, for example, allowing the buyer to listen to the stereo equipment) reduce the costs of search for the buyer. In every one of these cases, the buyer must "self–investigate" in the sense that the information desired is generally not the same for every buyer. Peoples preferences about vacation spots, quality of sound or their insurance needs differ sufficiently to make communicating this information by some means other than personal investigation prohibitively expensive.[32]

Another example is the used car market. In this market, used cars are either sold by dealers or privately. The dealers provide a single location, the car lot, where a buyer can inspect a number of cars and employ salespeople who provide information concerning the used cars. Thus, this is analogous to having houses sold with selling agents and "by owner."[33]

However, most markets do not have an institution analogous to selling agents. Examples include many consumer goods such as toothpaste, food, etc., and the market for rare coins or

[32] While it is true that most of these examples are examples of products that are repeatedly purchased, this has only minor affects on our analysis. The biggest change is that it makes computing the buyer's optimal search strategy more difficult and gives the seller more alternative means of reducing the buyer's search costs.

[33] In the previous section, we suggested that prices would be higher when seller's agents are used than they selling "by owner." Based on his recent casual observations, Naveen believes that the used car market provides support for this conjecture.

masterpieces. Each fails to have at least one of the features that we have identified as important for the presence of such an institution. For most consumer products, self-investigation is important to determine some of the product's characterisitics, for example, the taste of toothpaste or food. However, it appears that the sellers choose a less expensive means of reducing the buyer's search costs. That is, they provide free samples either in the mail or at the grocery store. Unlike these examples, rare coins, masterpieces and other similar items which are predominantly desired for investment purposes do not appear to require self-investigation.

Hence, this brief, casual examination of some examples seems to support our explanation for the existence of an institution like selling agents in real estate markets. When the features that we identified—the need for costly self-investigation whose costs are sunk and the lack of less expensive means for reducing the buyer's search costs—are present, such institutions are present. When at least one of the features is missing, so is the institution.

5. Conclusions.

In this paper, we explain why buyers use an agent employed by the seller in the housing market. Our explanation is that the selling agent, by reducing the buyers' search costs, increase the expected profits of the sellers. They do this by increasing both the probability that the house is sold and the price at which it is sold. So long as the cost of providing this service is smaller than the gain, the seller has an incentive to employ a selling agent. We identify two important characteristics of a market that lead to the use of selling agents. They are that the description of the house can (feasibly) be communicated to the buyer only through self-investigation and that the cost of this activity is non trivial and sunk. Further, we showed that it is possible to have some houses sold "by owner" and that those that are have a lower probability of selling the house and sell it for a lower price.

We also asked whether the factors that we had identified as important were present in markets with analogous institutions and absent in markets without an analogous institution. We considered a number of examples including the headhunters in the market for corporate executives, indepen-

dent insurance agents, travel agents, salepeople, and argued that the factors were present in each of these markets. We also considered examples of markets wihtout such institutions such as markets for consumer goods, and markets for collectables. In each of these, at least one of the factors was not present. These considerations lead us to believe that we have identified some of the important factors that result in the formation of institutions like seller's agents.

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