Can Free Entry Be Inefficient? Fixed Commissions and Social Waste in the Real Estate Industry

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Real estate agents typically charge a 6 percent commission, regardless of the price of the house sold. As a consequence, the commission fee from selling a house will differ dramatically across cities depending on the average price of housing, although the effort necessary to match buyers and sellers may not be that different. We use a simple economic model to show that if barriers to entry are low, the entry of real estate agents in cities with high housing prices is socially inefficient. Consistent with our model, we find that when the average price of *land* in a city increases, (1) the fraction of real estate brokers in a city increases, (2) the productivity of an average real estate agent (houses sold per hour worked) falls, and (3) the real wage of a typical real estate agent remains unchanged. We cannot completely rule out the alternative explanation that these results reflect unmeasured differences in the quality of broker services. However, we present evidence that as the average price of housing in a city increases, there is only a small increase in the amount of time a buyer spends searching

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for a house, and the average time a house for sale stays on the market *falls*.

I. Introduction

There is a widespread view that barriers to entry of new businesses are harmful and that society would benefit from the removal of such barriers. Yet it has also long been known that under certain conditions, free entry may actually be socially wasteful (see Spence 1976*a*, 1976*b;* Dixit and Stiglitz 1977; Mankiw and Whinston 1986). The basic idea is that while the competition due to new entrants may lower prices, entrants also steal business from existing firms, and this latter effect could result in a socially inefficient overspreading of output. The net gain from market entry thus depends on whether the price competition effect outweighs the business-stealing effect.

Yet, despite the possibility that market entry may be socially inefficient, there is little empirical work that measures the net social gains from market entry.[1] In this paper, we fill this gap by measuring the effect of entry in the U.S. residential real estate brokerage market. Two characteristics of the real estate industry make it particularly interesting. First, there appear to be few barriers to entry in the industry. Second, in the period under consideration in this paper, the brokerage commission paid to the real estate agents handling the sale of a house is almost always stated as a fixed 6 percent of the selling price of the house. What is particularly surprising about the apparent uniformity of the commission rate is that it implies that a real estate agent's commission from selling a house will differ dramatically depending on the price of the house, although the effort necessary to sell an expensive house may not be much different from that required to sell a cheaper home.

The main argument of this paper is that if in fact commission rates are fixed, then the absence of barriers to entry results in socially wasteful entry by real estate agents in cities with high housing costs. Consider, for example, two cities—Boston and Minneapolis—that are similar in most dimensions except in the cost of housing. In 1990, the price of a typical house in Boston was roughly twice that in Minneapolis.[2] With a fixed commission rate, the brokerage fee from selling a typical house in Boston was therefore twice that of a similar transaction in Minne-

[1] The only work that we are aware of is Berry and Waldfogel's (1999) work on radio stations in the United States. There is a literature on the effect of entry on firm size and pricing behavior (see, e.g., Bresnahan and Reiss 1991), but this literature does not focus on the potential losses due to the business-stealing effect.

[2] According to the 1990 census, the average price of residential housing was $216,231 in Boston and $100,504 in Minneapolis.

apolis. If this is all there is to the story, real estate agents in Boston would simply earn twice as much as their counterparts in Minneapolis. Real estate commissions would simply be a transfer from home sellers and home buyers to real estate agents, and the deadweight loss from the fixed commission in Boston would probably be small, especially if the demand for real estate transactions is relatively price-inelastic.

However, because there is relatively free entry into the real estate business, an average real estate agent in Boston does not earn twice as much as an agent in Minneapolis. Because the commission from selling a typical house is twice as high in Boston as it is in Minneapolis, there are more real estate agents in Boston seeking these high commissions, although the total number of homes sold each year is actually larger in Minneapolis. Consequently, the average real estate agent in Minneapolis is much more productive than a typical agent in Boston, selling 6.6 houses each year in Minneapolis as compared to an average 3.3 houses a year in Boston.[3]

One could still argue that there is something fundamentally different between Boston and Minneapolis, that the effort necessary to sell a house in Boston is simply twice the effort necessary in Minneapolis. Perhaps the dense urban structure or the older age of dwellings in Boston makes it harder for brokers to sell houses, or perhaps descendants of Irish Catholics are more finicky about their housing than descendants of Germans and Scandinavians. However, it has not always taken twice as many real estate agents to sell a house in Boston as in Minneapolis. Although the productivity of real estate agents in Minneapolis was twice that in Boston in 1990, the difference was much smaller in 1980. In 1980, a typical real estate agent in Boston sold six houses, whereas her counterpart in Minneapolis sold seven homes.

What accounts for this change? From 1980 to 1990, housing prices doubled in Boston, whereas the average price of housing in Minneapolis remained unchanged. Since the commission rate is fixed, the commission from selling a house in Boston increased from 1980 to 1990 and thus attracted many people into the real estate business in Boston seeking to earn these fees. By 1990, the number of real estate agents in Boston had roughly doubled. And since the number of houses sold in Boston in 1990 had roughly remained unchanged, the productivity of an average real estate agent in Boston in 1990 had fallen to almost half of what it was in 1980.

The tragedy of this outcome is that despite the fact that home sellers in Boston pay twice as much to real estate agents as in Minneapolis, real estate agents in Boston are no better off than in Minneapolis, nor

[3] We see a similar productivity gap when we measure productivity as houses sold *per hour worked:* 0.0018 in Boston and 0.0036 in Minneapolis.

FIG. 1.—1980–90 changes in the productivity of real estate agents (houses sold in the city/hours worked) and changes in the cost of housing. Each bubble represents a metropolitan area. The size of the bubble is proportional to the metropolitan area population. There are 282 metropolitan areas. Data are taken from the 1980 and 1990 Census of Population and Housing.

are they better off than their counterparts in 1980. The higher commissions in Boston are simply dissipated, wasted through the entry of real estate agents seeking to earn these higher commissions, agents who could be profitably engaged in other activities.

In short, this comparison of Boston and Minneapolis suggests that we look for the following three pieces of indirect evidence of socially wasteful entry by real estate agents. Specifically, if commission rates are fixed and if real estate agents dissipate higher commissions in cities with high housing costs through entry, in cities with high housing prices, we should see (1) more real estate agents (relative to the city's labor force), (2) lower productivity (sales per agent or sales per hour worked), and (3) real wages of real estate agents that are no higher than in cities with low housing costs.

In this paper, we find strong support for all three conjectures, in a cross section of 282 cities and also when considering changes across these cities from 1980 to 1990. These results also hold true when we account for part-time real estate agents. As a preview of our empirical evidence, consider the scatter plot of the change in the log productivity of an average real estate agent in a city from 1980 to 1990 against the change in the average log price of housing (fig. 1). This figure suggests that a 1 percent increase in average housing prices in a city results in a 0.7 percent decline in brokers' productivity, which we interpret as indicating that 70 percent of the higher commissions in high–housing cost cities translate into social waste. However, an alternative explanation is that the higher commission in high–housing cost cities may reflect the possibility that a broker has to spend more time matching buyers and sellers in such cities. For example, expensive houses may have idiosyncratic features. And even when differences in housing prices are entirely due to the price of land (rather than housing quality), home buyers in expensive cities may take more time searching and visit more houses before making a decision. Therefore, the correlation between housing prices and the productivity of realtors may reflect differences in the quality of the service provided by realtors.

Although we cannot completely rule out this interpretation, bear in mind that the evidence presented in figure 1 considers changes over time, which abstract from permanent characteristics of cities that might also reflect the difficulty of matching buyers and sellers in a given city. In addition, we also provide four pieces of evidence that are inconsistent with this interpretation. First, we condition on measures of changes in the quality of housing such as changes in size, age, and dwelling structure. Second, we use two indices of housing prices that are based on repeated sales of the same property as instruments for changes in the price of housing in a city. These instrumental variable estimates are largely driven by changes in the price of *land* and are therefore robust to changes in unobservable characteristics of housing.[4] Our results do not change when we introduce these two modifications. Third, we use data on vacancies to show that increases in housing prices in a city are associated with *decreases* in the average time houses for sale remain on the market. This suggests that when housing prices increase, realtors find it *easier,* not harder, to match buyers and sellers.[5] Finally, we show that although the average number of houses visited by home buyers and the amount of time a home buyer spends searching for a house rise with housing prices, this correlation is small and can explain only less than a fifth of the documented correlation between productivity and housing prices.

We want to make clear that our argument is based on the assumption that commission rates are relatively fixed across cities. While our empirical evidence suggests that this was the case in the years we examine in this paper (1980 and 1990), there is some anecdotal evidence that in recent years the Internet may have made it possible for discount brokers to emerge. In turn, this may be putting downward pressure on

[4] One limitation of indexes of repeated sales is that they may pick up the value of renovations made by home owners between sales.

[5] The extreme example of this phenomenon is the housing market in Silicon Valley in the late 1990s, where houses were sold only hours after they were listed.

commission rates. Clearly, if commission rates are in fact lower in high–housing cost cities today, our hypothesis is that we would not observe the correlation between the productivity of real estate brokers and the price of housing in 1980 and 1990 that we document in this paper.[6]

The paper proceeds as follows. Section II presents evidence that suggests that commission rates are invariant to the price of housing. Section III presents anecdotal evidence on what real estate agents do and uses a simple theoretical framework to analyze the extent to which higher commission rates in high–housing cost cities are dissipated by market entry. In Section IV, we present the empirical evidence. Section V uses our empirical estimates to quantify the social losses from free entry. Section VI presents a conclusion.

II. The Real Estate Brokerage Industry

There are two striking empirical facts about the real estate brokerage industry. First, an important aspect of the market for real estate brokers is the absence of significant barriers to entry. The exam to obtain a license is the only barrier, and the requirements to pass the exam are limited.[7] Moreover, at any point in time there is a large number of licensed but inactive brokers who are presumably ready to become active when it is profitable for them to do so. Appendix table B1 presents the number of active and inactive licensed brokers in each state. As can be seen, an average 20 percent of licensed brokers are inactive.

A second striking empirical fact about real estate brokerage services in the 1980s is that most commission rates appear to be fixed at 6 or 7 percent, regardless of whether the house sells for half a million dollars or for a hundred thousand dollars, or whether a house is more or less easy to sell. The uniformity of commission rates is well established in the real estate literature.[8] In fact, this lack of variation in commission rates was a major factor behind the Federal Trade Commission's (FTC)

[6] We use the terms "broker" and "agent" interchangeably in most of the paper. However, the broker is the supervisor (and often the owner of the real estate firm), and the agent is the broker's employee. Most states require a separate license for brokers, and brokers typically need to have some experience as an agent to qualify as a broker. For most of the analysis, we shall disregard this distinction, but in Sec. IV*B*, we provide some evidence that the distinction between brokers and agents does not matter empirically.

[7] The annual issues of the *Digest of Real Estate License Laws* provide detailed data on the licensing requirements in each state.

[8] Examples of papers dealing with uniform commission rates include, but are by no means limited to, Owen (1977), Carney (1981), Crockett (1982), Wachter (1987), Goolsby and Childs (1988), Arnold (1992), Miceli (1992), Turnbull (1996), and Williams (1998). Different conclusions on the uniformity of commission rates are found in Sirmans and Turnbull (1997).

decision to investigate the real estate brokerage industry for possible antitrust law violations in the early 1980s.

Specifically, the FTC's report provides three pieces of evidence that commission rates are remarkably uniform. The first piece of evidence, shown in figure 2*a*, is taken from a nationally representative survey of 934 home sellers conducted by the FTC in 1979 and 1980.[9] A second piece of evidence, shown in figure 2*b*, comes from data compiled from the actual settlement documents of 5,000 home sales from all 50 states in 1979 (source: Federal Trade Commission 1983, table III-3).[10] Finally, figure 3 presents the distribution of commission rates from a random sample of listings from the multiple listing services (MLS) in Boston, Minneapolis, Los Angeles, and Seattle in 1978 and 1979 (source: Federal Trade Commission 1983, table III-7). All three figures indicate that the majority of real estate agents get paid a commission rate of 6 or 7 percent.

A limitation with all this evidence is that it comes from the late 1970s and early 1980s, and it is possible that commission rates are now more closely aligned with the actual time that realtors spend matching buyers and sellers.[11] As we shall discuss in detail later in the paper, our empirical analysis covers the years 1980 and 1990, and we do not have evidence comparable to that collected by the FTC on whether commission rates were still fixed at 6 percent after 1980. The only systematic evidence we have comes from the Consumer Expenditure Survey (CEX) from 1980 to 1998. From the sample of families surveyed by the CEX who report having paid a commission to a realtor, figure 4 presents a scatter plot of the commission rate and the price the house was sold at.[12] Although the commission rate we obtain from the CEX is noisy, both because respondents had imperfect recall and also because the CEX does not provide a perfect measure of commission fees from home sales, the median commission rate in our sample is 6.1 percent. More important,

[9] Note that fig. 2 reports the distribution of commission rates *actually paid* by consumers. In a small number of cases, the commission paid differed from the commission originally quoted, since home sellers were given a rebate or were made a gift by the broker. For those cases, the commission reported in the figure is adjusted to reflect the implicit commission rate (source: Federal Trade Commission 1983, p. 45).

[10] The settlement documents are known as standardized HUD-1 forms.

[11] For example, it could be the case that as a result of the FTC's investigation and numerous consent decrees signed between the U.S. Department of Justice and realtors' organizations, there is now more price competition in real estate brokerage services.

[12] Roughly two-thirds of the families who sold a house reported paying a commission.

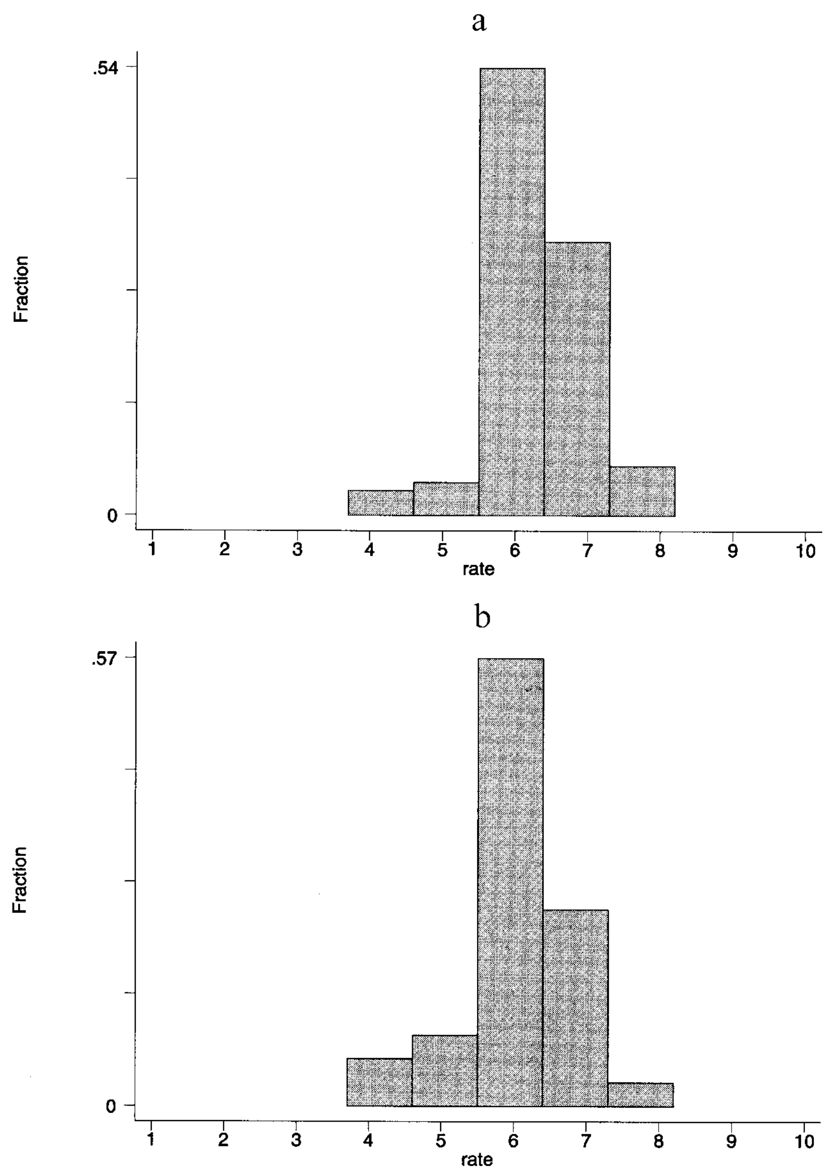

FIG. 2.—Distribution of commission rates in the United States. *a,* Distribution of commission rates paid by consumers in a nationally representative survey of 934 home sellers conducted by the FTC in 1979 and 1980. *b,* Distribution of commission rates as reported in settlement documents of 5,000 home sales in 1979. The settlement documents are standardized HUD-1 forms.

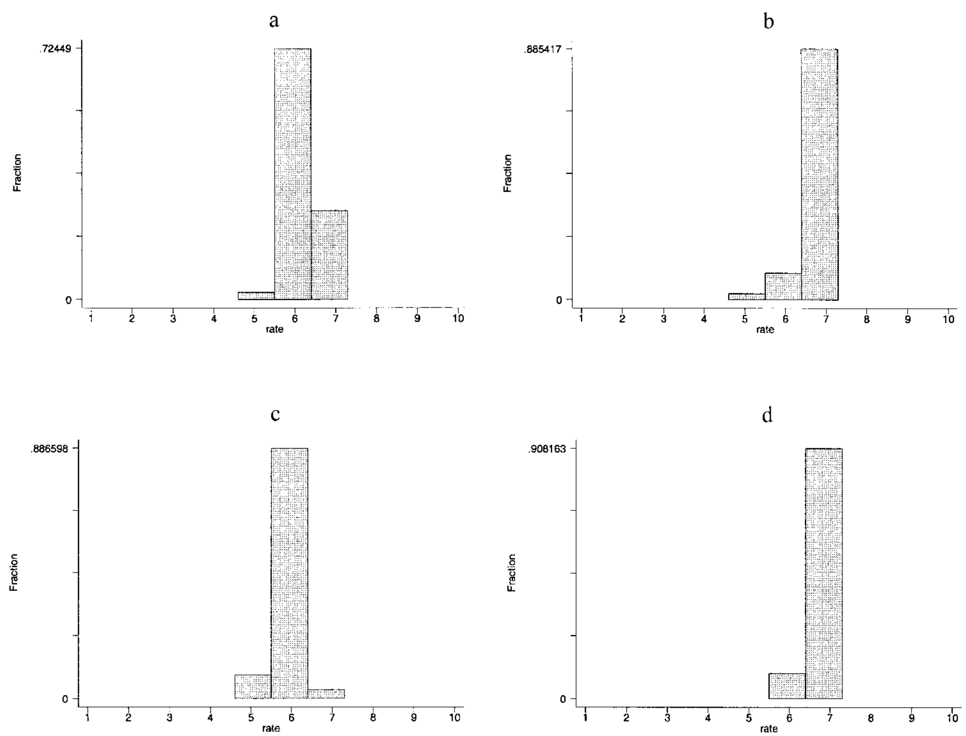

FIG. 3.—Distribution of commission rates in four cities: distribution of commission rates from a random sample of listings from the multiple listing systems in (*a*) Boston, (*b*) Minneapolis–St. Paul, (*c*) Los Angeles, and (*d*) Seattle in 1978 and 1979.

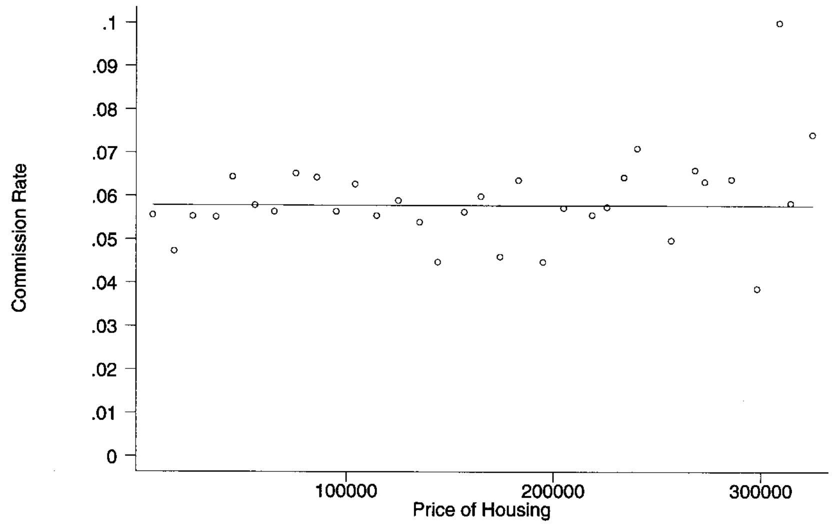

FIG. 4.—Commission rates and price of housing in the CEX. Each point in the figure is the average commission rate within intervals in housing price \$10,000 wide. The superimposed fit is taken from a household-level regression of commission rates on housing prices ($N=406$).

figure 4 suggests that there is no correlation between these two variables.[13]

What is quite remarkable is that if in fact commission rates are fixed, the commission from selling a house increases one to one with the price of the house. For example, the commission paid for the sale of a \$500,000 house is \$30,000, whereas the commission from selling a \$100,000 condo is only \$6,000. Now, one could argue that the brokers who deal with a \$500,000 house are providing a completely different service than ones dealing with \$100,000 condos. However, it does not seem likely that the differences in services are large enough to account for a \$24,000 difference in the commission fee. But even if this is the case when one is looking at houses with different prices within a given

[13] House sales includes "own home" (UCC 820101) and "vacation home" (UCC 820102). We measure commission fees as "total selling expenses" (UCC 820301 and 820302), but this clearly includes expenses other than commission fees. We estimate commission rate by dividing commission fees by the price of housing. Any measurement error will introduce attenuation bias, leading us to understate the true relationship between price and commission rates. To reduce measurement error, we drop observations with implausibly large or small estimated commission rates (less than 1 percent or more than 10 percent). We end up with 406 households that report selling their houses and have a nonmissing price and commission rate. Each point in fig. 4 is the average commission rate within intervals \$10,000 wide. The superimposed fit is taken from a household-level regression of commission rates on housing prices, which yields a slope coefficient on the log housing price of -0.005 (0.017).

market, it does not seem very plausible that there are large differences in the average quality of services provided by brokers across cities, despite sizable cross-city variation in the average price of housing. After all, differences in housing costs across cities are largely driven by differences in the price of land, and not by differences in housing quality.[14]

The apparent uniformity of commission rates presents an enormous puzzle, especially if one believes that the cost and effort necessary to sell a house do not increase one to one with the price of housing. Why do commission rates appear to be so insensitive to economic forces? We do not have an answer to this puzzle. One possibility is that it reflects collusion by real estate brokers, perhaps enforced by the fact that every realtor has to work through the local MLS, which makes price cutting easily detected.[15] In addition, real estate is unique in that a broker needs the cooperation of another agent to complete a transaction, which makes punishment for deviating particularly effective.[16] A second possibility is that the lack of variation in the commission rate (and the large variation in the price of brokerage services) may simply reflect differences in the elasticities of demand for these services. It is not implausible that the owner of a $500,000 house is willing to pay a higher commission

[14] In Sec. IV, we present evidence that although there are some small differences in the average quality of brokers' services across cities, these differences can explain no more than a fifth of the difference in average commission fees.

[15] Historically, realtor organizations published "recommended" commission rates, which were set at 6 or 7 percent. These recommendations were enforced, in part, by the realtors' control over the local MLS, which typically refused to accept listings from brokers who had accepted a commission rate lower than that recommended in the schedule. However, this practice ended in the 1970s as a result of antitrust action by the Justice Department and numerous consent decrees signed between the Justice Department and realtor organizations. See Federal Trade Commission (1983) for details.

[16] There is evidence that discount brokers are frequently punished by other brokers. For example, the Federal Trade Commission (1983) reports that in a survey of discount brokers, more than a third of these brokers experienced refusals by newspapers to run their advertisements because of pressure by traditional brokers to boycott publications that run advertisements from discount brokers. In addition, 93 percent of discount brokers reported disparagement of their business to prospective clients by nondiscount brokers. Disparagement took the form of statements that the brokers were operating illegally, that they were unethical or unprofessional, or simply that sellers would not succeed in selling their homes through the discount brokers because no other brokers would deal with them. In addition, as any home buyer will know, many real estate agents are reluctant to inform the home buyer of homes that are being directly sold by the owners (known as FSBOs). Since most FSBOs offer to pay the standard 3 percent commission to the buyer's agent, one explanation for this phenomenon is that the buyer's agent fears possible retaliation by other agents.

A related explanation is that the fixed commission rate is a social norm among real estate brokers and that there is a cost associated with deviating from this norm. There is a growing literature that examines how social norms might be important in explaining outcomes such as education, discrimination, childbearing decisions, and crime. Most similar to the convention of fixed commissions is the prevalence of 50–50 splits in sharecropping contracts (Young and Burke 2001). However, we still do not have a good understanding of why certain norms emerge, and not others, and how these norms are sustained.

than the owner of a $100,000 house. The higher commission paid by the owner of the expensive house may therefore reflect her more inelastic demand for a realtor's service. Free entry therefore results in more entry and higher prices in markets in which the demand is more inelastic (see Mankiw and Whinston 1986).

However, none of these explanations are satisfactory. First, if the fixed commission rate is due to collusion by realtors, it is not clear why realtors collude in this manner instead of colluding to prevent new real estate agents from earning any profits. Alternatively, if the fixed commission rate simply reflects differences in the elasticity of demand for real estate services, the differences in the demand elasticity would have to be enormous to generate an equilibrium in which commissions increase one to one with the price of housing. Nonetheless, while a fruitful question for future research is how the competitive market mechanism can yield large variations in price that are seemingly unrelated to the cost of providing the service, our objective in this paper is not to explain the reasons behind this phenomenon, but to examine the *consequences* of the lack of variation in commission rates.[17]

Finally, we want to reiterate that other than the data in the CEX, we do not have evidence on whether commission rates are still fixed at 6 percent today. There is some anecdotal evidence that in recent years the emergence of new technologies, particularly the Internet, may be loosening the control of realtor organizations over information on the inventory of houses for sale. As previously stated, the empirical work in this paper focuses on 1980 and 1990, when the Internet was not available.[18] Nonetheless, as will be clear later in the paper, to the extent that our assumption of a fixed commission rate is wrong and commission rates are in fact lower in high–housing cost cities in 1980 and 1990, we shall observe little correlation between housing prices and our indirect measures of socially wasteful entry by real estate agents.

[17] An additional puzzle about real estate brokerage contracts is not only why commission rates are fixed for houses with vastly different prices, but also why they are stated as a fixed percentage of the total selling price rather than a nonlinear schedule of the selling price. For example, suppose that the price that a realtor can get for a house is given by $P = P_1 + \theta e$, where e is the effort that the realtor has to put into selling the house. To elicit the maximum effort by the realtor, the commission should be stated as a function of $P - P_1$ rather than simply as a function of P. One explanation is that the principals in this principal-agent relationship are weak, perhaps because a typical home seller sells a house only a few times in her lifetime.

[18] A recent *Wall Street Journal* article ("Home Rules," 2001) reports that a new Web-based real estate company, eReality.com, "typically charges the seller no more than 4.5 percent in commissions, which is considerably less than the usual 6 percent charged by traditional Realtors" (sec. R, p. 12). The company gains access to MLSs by hiring real estate brokers who join local realtor associations and thus qualify for access to the MLS. The company then gives its customers passwords to search through large sections of the MLS on their own. The strategy faced a legal challenge in 1999 when a board of realtors filed a lawsuit alleging that eReality.com had violated the rules of the local MLS.

III. Market Entry and Social Waste

A. Anecdotal Evidence

What do we mean by socially wasteful behavior by real estate agents? We find it useful to think about what real estate agents do as having two components. First, real estate agents have to find a client—either somebody who wants to sell her house or somebody who wants to buy a home. This is called "prospecting" by real estate agents and includes activities such as door-to-door canvasing, phoning, mailings, and calling on houses for sale by the owner. It also includes activities such as establishing a "farm," which can be a small group of people (such as members of a bridge club) or a small neighborhood in which the agent establishes a presence by, for example, handing out free pumpkins for Halloween.[19] Second, after the agent has obtained a client, she has to find a buyer for the property (if the client is a seller) or an appropriate house for the client (if the client is a buyer). While the second activity provides a valuable service to home sellers and home buyers, the resources spent in the first activity have marginal social value.

One way to see the importance of prospecting is to look at the contents of any "self-help" book for real estate agents. For example, the book *How Real Estate Agents Earn Big!* (Tayler 1997) states that "prospecting is the gasoline that fuels the real estate engine. You can't get a career started without prospecting. You can't afford to abandon the habit of prospecting for new business even after your career is zooming right

[19] This dialogue describes how a new real estate agent learned about the importance of "farming":

"Kennedy, I know it's tough not getting in on the great floor time here," my manager told me a few weeks after I started real estate, "but you can turn it to your advantage." Nell Shukes was trying to cheer me up. With nothing to show for many hard hours except a couple of unpromising FSBO situations, I needed cheer.

"Tell me how, Nell."

"Do what that kid out in Simi Valley is doing."

"What kid?"

"Tommy Hopkins."

That was the first time I'd ever heard the name. "So what's he doing?"

"Breaking records," Nell said. "I've been trying to break his record all year. I came close, but—" Nell leafed through her messages and then looked at me. "For Halloween, he rents a truck and loads it up with pumpkins. For Christmas, he throws parties for all the neighborhood kids."

"But how can that pay off? All that expense—"

"There are four or five hundred houses in his neighborhood, Danny. It's active—about 20 percent turnover—and he's getting it all."

"Then he's averaging two listings a week!"

"Right, and he sells most of them himself."

"Four transactions a week!"

She nodded. "Plus the referral business he's doing outside his farm. It does add up."

"His farm?" If I'd heard the term before it hadn't sunk it. Pumpkins, Christmas parties, farms. This is the real estate business? My mind was reeling. [Kennedy and Jamison 1999, pp. 52–53] along" (p. 208). One can also count the pages in such self-help books devoted to "prospecting" relative to providing services to buyers and sellers. Consider, for example, the contents of the book *How to Master the Art of Listing and Selling Real Estate* (Hopkins 1991). More than half of the 396-page book is devoted to chapters with titles such as "How to Acquire Listing Power," "Winning the Good Fight against For-Sale-by Owners," and "Real Estate's Royal Road to Riches Is Called Prospecting." To take another example from another self-help book, *How to List and Sell Real Estate in the 21st Century* (Kennedy and Jamison 1999), more than half of the book focuses on topics such as "How to Flip Those Fizzbos Right into Your Fold," "Sow That Farm and Reap—and Reap—and Reap," and "Danny Kennedy's Full-Year Farming Almanac."

We do not want to claim that "prospecting" and "farming" are entirely socially wasteful. Our claim is simply that society's gain from free pumpkins for Halloween and from free notepads with the realtor's picture is far less than their cost to the realtor, in terms of the direct cost of these freebies, but particularly in terms of the opportunity cost of the time the realtor puts into such activities. More important, our claim is that as long as the commission rate is fixed, the amount of time that realtors devote to prospecting and farming relative to actually selling a house or finding an appropriate house for a buyer increases as the market becomes more competitive, that is, as more realtors are chasing after the same number of customers. In other words, the cost of finding a customer increases with the number of realtors in the market, without necessarily generating additional benefits to the customer.[20]

B. Theoretical Framework

In this subsection, we develop a simple model to illustrate the factors that might determine the extent to which higher commissions in cities with expensive housing are dissipated by market entry. In every city, we shall assume that there is a continuum of identical agents distributed uniformly from zero to one.[21] If an individual decides to be a real estate agent, her earnings depend on the total amount of commissions available in the city (R_j) and the number of people seeking these commis-

[20] Our argument that entry generates social waste by increasing the marginal cost of obtaining a customer is different from the standard explanation of free entry and social waste that relies on the importance of fixed costs (see, e.g., Mankiw and Whinston 1986). However, it is possible that the amount of time a realtor has to spend prospecting is actually higher in higher–housing cost cities, regardless of the number of realtors in the market. As we shall document later in the paper, we observe more realtors (per capita) in higher–housing cost cities. Therefore, we obviously do not know how much time a realtor has to spend on prospecting and farming in a high–housing cost city in the absence of entry.

[21] We shall allow for heterogeneity between agents later.

sions (b_j).[22] In the case of the real estate industry, $R_j = c \cdot S_j \cdot P_j$, where c is the commission rate, S_j is the number of housing sales, and P_j is the price of housing in city j.[23] The key institutional fact is that the commission rate is fixed at c. On the other hand, if an agent decides not to work as a real estate agent, her wage is simply given by w_j, which represents the reservation wage of every worker in city j.

Entry and social waste: base case.—We begin with the simplest version of the model in which the number of sales in a city is exogenous, and labor is the only input in the real estate business. Since all agents are identical, we assume that each real estate agent has an equal probability of getting a sale. The expected earnings of a real estate agent are thus the ratio of the total amount of commissions available in the city to the number of people seeking these commissions, or R_j/b_j. The equilibrium number of people working as real estate agents in city j is determined by the condition that the return from being a real estate agent has to be equal to her reservation wage, or $w_j = R_j/b_j$. From this simple condition, we can derive the equilibrium number of real estate agents in city j:

$$b_j = c \cdot S_j \cdot \frac{P_j}{w_j}. \tag{1}$$

The number of real estate agents in city j is thus directly proportional to the price of housing adjusted for the reservation wage in the city.[24] This is the first testable implication of the model.

A problem with this test is that the variation in b_j could come from variation in S_j as well as from variation in P_j. To address this problem, a second testable implication of the model is the relationship between the productivity of real estate agents in a city and the size of the commissions available to real estate agents—the price of housing. Taking our equation for the equilibrium number of agents, we can define the

[22] Because the total number of agents is one, b_j is also the number of real estate agents relative to the total number of people in the city.

[23] We assume that houses are homogeneous within a city, although in the empirical part of the paper we allow for differences in size, age, and other characteristics of a house. In the version of the model with heterogeneous agents, we allow for agents with different abilities to capture different shares of the real estate market; an equivalent story would be that each agent sells the same number of houses, but agents with higher abilities sell the more expensive houses.

[24] By adjusting the price of housing for the reservation wage in the city, we allow the opportunity cost of working outside the real estate brokerage sector to vary by city. For example, an economic boom that drives up the price of housing in a city will also increase the wage from working in the other sector of the economy.

productivity of real estate agents in city j as the number of houses sold per real estate agent:

$$\text{productivity}_j \equiv \frac{S_j}{b_j} = \frac{1}{c} \cdot \frac{1}{P_j/w_j}. \quad (2)$$

If the commission rate is fixed and if the wage of every real estate agent is equal to her opportunity cost, the productivity of real estate agents will be inversely proportional to the price of housing. This version of the model generates the most social waste. The elasticity of b_j with respect to P_j/w_j is one, and the elasticity of S_j/b_j with respect to P_j/w_j is minus one.

Entry and social waste with increasing costs.—So far, we have assumed that, other than the additional time a realtor has to spend searching for a client, the cost of working as a real estate agent does not vary across cities. However, it is plausible that brokers have to incur more monetary expenses to sell expensive homes. For example, a broker who deals with \$500,000 homes may need a more expensive office to see customers than a broker who deals with condos worth \$100,000. Local services and labor inputs also tend to be more expensive in cities with higher housing prices. In addition, prospecting may involve not only extra working hours but also monetary expenses (such as the cost of buying freebies).

The implication of allowing for higher costs in high–housing cost cities depends on whether the higher costs are due to "normal" business expenses or whether they reflect expenses that are driven by the entry of new agents. To the extent that office rents and other local inputs are more expensive in high–housing cost cities, some of the higher commissions in such cities are necessary to cover these additional expenses. If this is the case, the elasticity of productivity to the price of housing will be less than one.[25]

It is also possible that some of the higher costs in high–housing cost cities may actually reflect socially wasteful expenses rather than "normal" business costs. For example, prospecting activities could involve paid

[25] To see this, suppose that $\text{cost}(P_j) = k \cdot P_j$ is the cost of working as a real estate agent in a city. The equilibrium condition becomes

$$w_j = \frac{c \cdot S_j \cdot P_j}{b_j} - k \cdot P_j,$$

which implies that the number of real estate agents is given by

$$b_j = \frac{c \cdot S_j \cdot (P_j/w_j)}{1 + k \cdot (P_j/w_j)}.$$

It is straightforward to see that the elasticity of the number of real estate agents with respect to the adjusted price of housing is now less than one, and the elasticity of productivity with respect to the price of housing is also less than one (in absolute value).

advertising in the local press, distribution of flyers and free pumpkins, and mass mailings. Since we measure productivity by sales per hour worked, we capture only social waste that takes the form of *time* spent by brokers doing things of marginal social value. If part of the social waste is due to higher monetary costs, this would not be captured by our measure of social waste. Therefore, the elasticity of measured productivity with respect to price shocks would also be less than one if part of the higher commission were dissipated away by higher monetary costs of prospecting.

Entry and social waste in boom markets.—We next relax the assumption that the number of housing sales is invariant to the price of housing. For example, it is reasonable to expect that an economic boom that increases the price of housing will also increase the number of people looking to sell and buy houses. This may make it easier for a real estate agent to match buyers and sellers. For example, selling houses was very easy for realtors in Silicon Valley during the high-tech boom years in the late 1990s. Houses were sold hours, sometimes only minutes, after being listed.[26] This effect is likely to lead us to underestimate the amount of social waste due to entry. As previously stated, our indirect test for social waste is based on the correlation of housing price shocks and the productivity of brokers. To the extent that it is easier for brokers to sell houses in good times, the productivity of brokers should *increase,* everything else constant. Therefore, any negative impact of price shocks on productivity that we may find should be considered a lower bound of the true amount of social waste.

Entry and social waste with "star" agents.—Finally, we allow agents to differ by ability. This implies that there may be significant differences in earnings between agents, and the earnings of some agents may exceed the opportunity cost of their time. For example, in every real estate market, there are a small number of "star" agents who appear to do extremely well. In this model, an increase in the total amount of commissions available (as represented by an increase in P_j) will still result in the dissipation of the higher commissions by an increase in the number of people seeking these commissions. However, because part of the higher price of housing translates into higher earnings for *some* real estate agents, there may be less social waste than in a world in which the wage of *every* rent seeker is equal to her reservation wage. See Appendix A for details of this model.[27]

[26] There is abundant empirical evidence of a strong positive correlation between housing prices and sales volume and a negative correlation between housing prices and the amount of time a house remains on the market (see Stein 1995; Genesove and Mayer 2001).

[27] When products are differentiated, additional entry can be welfare-improving by increases in the product space. If agents are differentiated in the types of services they provide, high-price markets might yield welfare benefits to home buyers and sellers.

IV. Empirical Evidence

As a reminder to the reader, if commission rates do not vary and barriers to entry are low, our hypothesis is that there will be more market entry and more social waste in cities with higher housing prices (or cities in which housing prices have increased). In this section, we turn to cross-city evidence to test this conjecture. In our base-case model, higher commissions in high–housing cost cities are fully dissipated by market entry: the elasticity of the number of brokers with respect to price shocks is one, and the elasticity of productivity with respect to price shocks is minus one.

However, in reviewing the empirical evidence, one must bear in mind that there are a number of reasons why the elasticity may not be exactly equal to one. First, our story is based on the assumption that commission rates are fixed. However, if commission rates are actually lower in high–housing cost cities, then the elasticity of the number of brokers (and productivity) with respect to the price of housing will be less than one. In the limit, if commission rates adjusted fully to price shocks, we should observe no correlation between changes in productivity and price shocks. Even if commission rates are invariant, there are two reasons why higher commission fees in more expensive cities may not be completely dissipated by entry. First, "normal" business costs may be higher in a city with high housing prices. Second, it may be the case that star agents in high–housing cost cities have higher earnings than similar stars in low–housing cost cities, so part of the higher commissions in high-cost cities are captured by these star agents.

On the other hand, there are two reasons why our measures potentially understate the extent to which higher commissions generate socially wasteful market entry. First, socially wasteful activities may take the form of additional expenditures on things such as advertising, mailings, pumpkins, and notepads. Since we measure productivity as sales per agent or sales per hour worked, we do not capture any social waste that takes the form of additional monetary expenditures in expensive cities. Second, it is reasonable to expect that the time and effort required to match buyers and sellers will be lower in "boom" markets. Both factors suggest that the elasticity of our measures of rent seeking with respect to the price of housing potentially understates the extent to which higher commissions are dissipated by socially wasteful entry.

A. Data

Our main data source is the 5 percent sample of the Census of Population and Housing in 1980 and 1990. We define a "market" as a metropolitan statistical area (MSA).[28] In total, we have a sample of 282 MSAs for both years. We identify real estate agents as individuals who reported their occupation as "real estate sales occupation" in the census.[29] To measure the number of houses sold in a city, we use information on the date on which the household moved to the current house along with information on whether the household owns the house in which it lives.[30] The census also asks home owners about the value of their house, which we take as our measure of the price of housing. In the paper we present results based on the average price of housing in a city, although the results are virtually identical if we use the average price of houses sold in the last year.[31]

Table 1 presents the summary statistics of the sample. In an average city, we have a sample of 7,457 households and 137 realtors in 1990 and 5,288 families and 112 realtors in 1980. We define productivity in two ways: as the total number of sales in the city divided by the total number of realtors and as the total number of sales in the city divided by the total number of hours worked by realtors. In table 1, we report average productivity according to the second definition. The average real price of houses is \$94,142 in 1990 and \$85,826 in 1980 (in 1990 dollars).

Panel A of table 2 reports the cities with the highest and the lowest cost of housing, as well as the average productivity of brokers in these cities (defined as sales per hour worked) in 1990. As can be seen, the price of housing in the 10 most expensive cities is almost six times higher than the price of housing in the 10 cities with the lowest cost of housing. In turn, the productivity of brokers in the low-cost cities is about four and a half times *higher* than the productivity of real estate agents in the high-cost cities. Panel B reports cities with the largest and the smallest percentage *change* in cost of housing between 1980 and 1990, as well as the percentage *change* in productivity of brokers in these cities. Cities that experienced large increases in prices of houses also experienced

[28] Since the definition of metropolitan areas changes from 1980 to 1990, we redefine 1990 MSAs to be consistent with the 1980 definition. See Moretti (in press) for details on the match.

[29] The occupation code for "real estate sales occupation" in the census is 254 in the "sales representatives, finance and business services" category. This classification includes both real estate agents and brokers, but we disregard this distinction for most of the analysis. Results discussed below indicate that this distinction is empirically not important for our analysis.

[30] Specifically, we define an observation as a sale in 1990 if the respondent reports that she owns the house and moved into the house in 1990 or 1989. The definition for 1980 is analogous. Note that since the census takes place in April, we are identifying sales that take place during the previous 15–16 months. In table 1 we report adjusted means that reflect sales over a 12-month period. Since the value of the house is in discrete categories, we use the midpoints of each category to transform it into a continuous variable.

[31] In 1990, the correlation between the average price of the stock of houses in a city and the average price of houses sold in the last year was .99, so it makes little difference which measure is used.

TABLE 1
SUMMARY STATISTICS (Average per City)

	1990 (1)	1980 (2)
Number of households	7,457.2	5,288.7
Number of realtors	137.78	112.0
Hours worked by realtors	232,814.3	181,503.2
Number of houses sold	708.3	768.2
Productivity	.004	.005
Log reservation wage	2.33	2.31
Price of houses	94,142.3	85,826.7
Age of house	26.9	25.3
Number of bedrooms	2.56	2.50
One-family house (fraction)	.73	.73
Condominium (fraction)	.03	.02
Renters in city (fraction)	.35	.33
Months on the market (vacant homes)	7.7	5

NOTE.—Productivity is defined as the number of houses sold in a city divided by the number of hours worked by realtors. The reservation wage is a weighted average of the wages of workers in non–real estate occupations in the same city; the weights are based on how similar their observable characteristics are to those of brokers. Data are taken from the 1990 and 1980 Census of Population and Housing. There are 282 metropolitan areas. Prices are in 1990 dollars.

large decreases in the productivity of realtors, whereas the productivity of real estate brokers generally decreased less in cities in which the price of housing fell; in some cases productivity actually increased. Note that the cities with the largest (smallest) increase in the price of housing between 1980 and 1990 are not the same as those with the highest (lowest) price of housing in 1990.

As one way to assess the reliability of the census's measure of the number of real estate agents, we use data from state licensing boards on the number of people with active real estate licenses (see App. table B1). These data are not available at the city level, but only at the state level. When we aggregate our census data to the state level, the correlation between our estimate of the number of brokers by state and the number of active licensed brokers from the state licensing boards is .92. This suggests that the number of brokers estimated using self-reported occupation in the census reflects fairly accurately the actual number of licensed brokers.

Finally, in interpreting the results we present below, one must bear in mind that although the census provides an accurate measure of housing sales in a city, we cannot assume that all these transactions are conducted through brokers. Clearly, some home sellers choose to avoid paying the brokerage fees by selling their homes by themselves. The

TABLE 2

Expensive and Affordable Cities

A. Cost of Housing

Rank	City	Average Cost	Log Productivity
	Ten Least Expensive		
1	McAllen-Edinburg-Mission, Texas	43,191.7	−4.75
2	Odessa, Texas	45,884.3	−5.40
3	Steubenville-Weirton, Ohio-W.Va.	46,205.1	−4.50
4	Laredo, Texas	46,856.2	−4.30
5	Brownsville-Harlingen, Texas	47,037.1	−5.85
6	Pine Bluff, Ark.	47,099.4	−4.35
7	Johnstown, Pa.	47,401.3	−5.23
8	Wheeling, W.Va.-Ohio	48,102.8	−4.89
9	Huntington-Ashland, W.Va.-Ky.-Ohio	48,110.2	−4.76
10	Beaumont–Port Arthur, Texas	48,154.0	−4.62
	Ten Most Expensive		
273	Los Angeles–Long Beach, Calif.	250,836.0	−6.37
274	Santa Barbara–Santa Maria, Calif.	253,086.7	−6.28
275	Santa Cruz, Calif.	254,757.5	−6.07
276	Oxnard-Ventura, Calif.	255,392.3	−6.15
277	Anaheim–Santa Ana, Calif.	257,170.8	−6.40
278	San Francisco, Calif.	275,669.8	−6.24
279	Honolulu, Hawaii	282,350.8	−6.43
280	San Jose, Calif.	293,341.2	−6.05
281	Norwalk, Conn.	314,269.5	−6.80
282	Stamford, Conn.	359,127.6	−6.75

B. Change in Cost of Housing

Rank	City	Change in Log Average Cost	Change in Log Productivity
	Ten Smallest Changes		
1	Lafayette, La.	−.37	−.80
2	Richland-Kennewick-Pasco, Wash.	−.35	.66
3	Waterloo–Cedar Falls, Iowa	−.34	.24
4	Decatur, Ill.	−.32	−.39
5	Billings, Mont.	−.32	−.39
6	Davenport–Rock Island, Iowa-Ill.	−.30	−.13
7	Peoria, Ill.	−.30	.04
8	Eugene-Springfield, Ore.	−.30	.08
9	Provo-Orem, Utah	−.29	1.32
10	Charleston, W.Va.	−.29	−.09
	Ten Largest Changes		
272	New York, N.Y.	.84	−.66
273	Poughkeepsie, N.Y.	.95	−.66
274	Lowell, Mass.-N.H.	.99	−.66
275	Springfield, Mass.	1.02	−.37
276	Fall River, Mass.-R.I.	1.02	−1.58
277	Worcester, Mass.	1.06	−1.08
278	Boston, Mass.	1.13	−.72
279	New Bedford, Mass.	1.14	−.74
280	Jersey City, N.J.	1.19	−1.35
281	Nassau-Suffolk, N.Y.	1.20	−.77
282	Lawrence-Haverhill, Mass.-N.H.	1.39	−.81

Note.—Prices are in 1990 dollars. Productivity is the number of sales per hour worked. Average cost is the average price of houses in 1989. Change in average cost is the change in the average price of houses between 1979 and 1989.

resulting bias depends on the extent to which the fraction of houses directly sold by the owner is correlated with the price of houses.[32]

B. Housing Prices, Market Entry, and Social Waste across Cities

We now turn to the three testable implications of our story that a fixed commission rate generates socially wasteful market entry, using both the cross-sectional variation and 1980–90 changes in housing prices across cities. First, the fraction of realtors in a city (relative to the population) should be increasing in the price of housing (eq. [1]). Second, the productivity of an average realtor should be lower in a city with higher housing prices (eq. [2]). Third, in equilibrium, brokers should be indifferent across cities: their *real* wage should be uncorrelated with the price of housing.

Relative number of real estate agents.—We begin with two scatter plots. Figure 5 presents the cross-sectional relationship between the fraction of real estate agents in a city and the unadjusted average price of housing in the city. Figure 6 plots the *changes* in the fraction of real estate agents from 1980 to 1990 against changes in the price of housing. There are 282 cities in our sample. As can be seen, two facts are clear from these figures. First, there are more real estate agents (relative to the total labor force in the city) in cities with higher housing prices. Second, this relationship also holds true when we consider changes over time.[33]

We then turn to estimates of equation (1), which relates the number of brokers to normalized housing prices. Specifically, we regress the (log) ratio of number of brokers in the city to the total number of workers in the city on the (log) average price of houses in the city normalized by the city-specific reservation wage of brokers.[34] The estimates of the city-specific reservation wage of real estate agents are obtained as a weighted average of the wages of workers in all other occupations in the same city. We assign weights to individuals in the sample who are not brokers on the basis of how similar their observable char-

[32] Our evidence from the CEX suggests that the fraction of houses directly sold by the owner falls with the price of the house. An ordinary least squares (OLS) regression of a dummy equal to one if the house is sold by the owner on log price and year dummies yields a coefficient on log price equal to -0.13 (0.015).

[33] The OLS coefficients on housing prices are, respectively, 0.462 (0.045), 0.845 (0.086), and 0.702 (0.060). All models are weighted by city population.

[34] The regression differs from those in figs. 5 and 6 because the independent variable is now normalized housing prices, not housing prices. The regression therefore accounts for the fact that the reservation wages of brokers differ across cities.

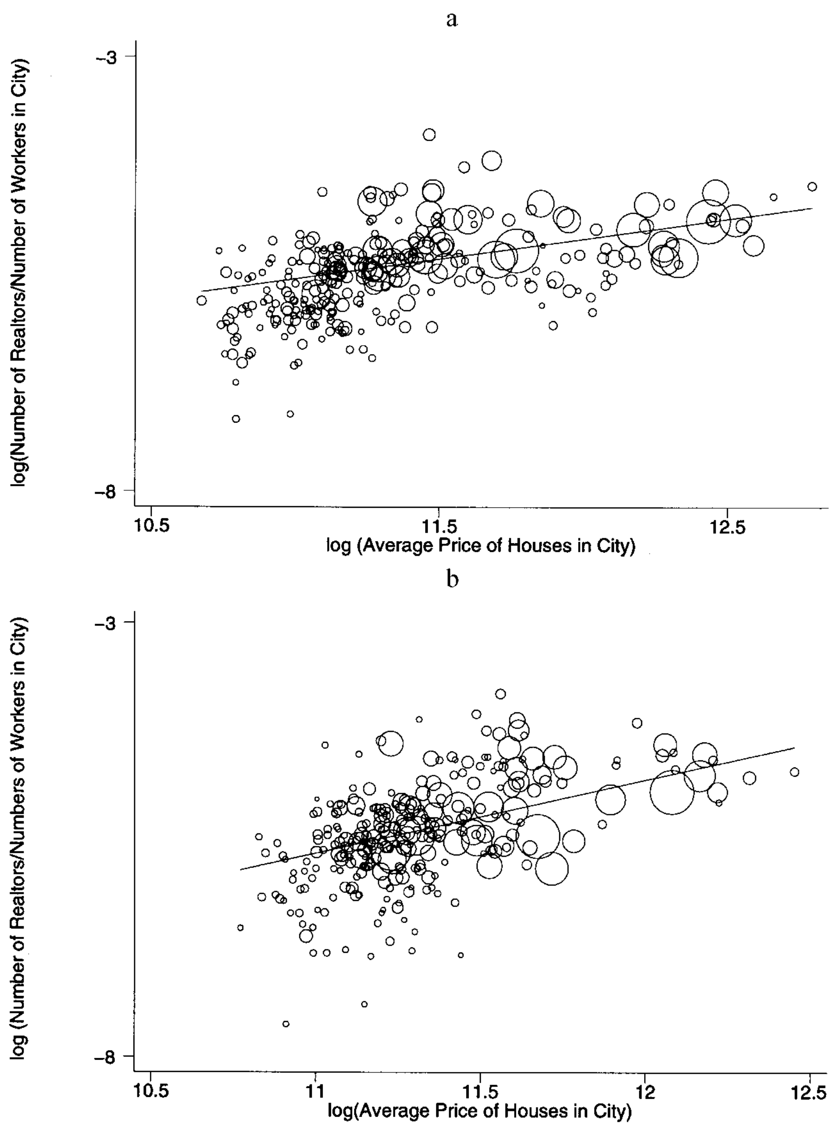

FIG. 5.—Percentage of real estate agents in the labor force and the average cost of housing: *a,* 1990; *b,* 1980. Each bubble represents a metropolitan area. The size of the bubble is proportional to the metropolitan area population. There are 282 metropolitan areas. Data are taken from the Census of Population and Housing.

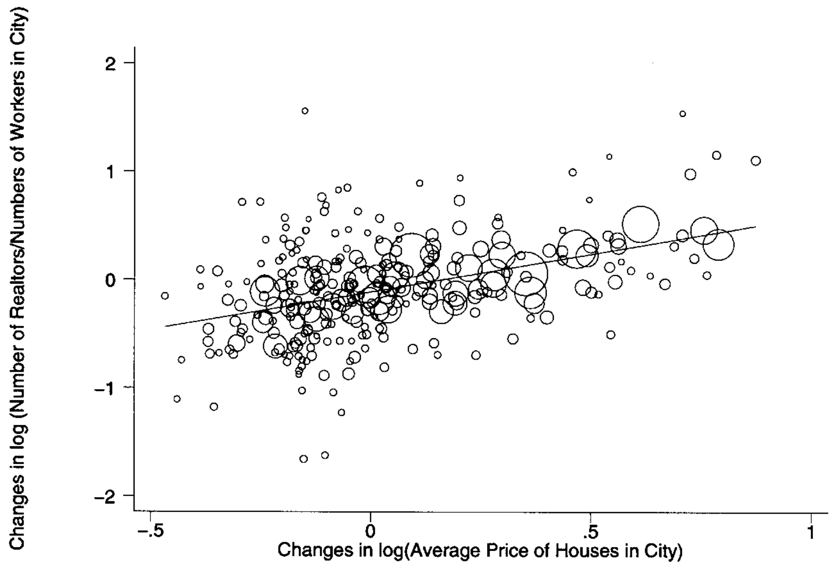

FIG. 6.—1980–90 changes in the percentage of real estate agents in the labor force and changes in the average cost of housing. Each bubble represents a metropolitan area. The size of the bubble is proportional to the metropolitan area population. There are 282 metropolitan areas. Data are taken from the 1980 and 1990 Census of Population and Housing.

acteristics are to the observable characteristics of brokers.[35] The cross-sectional coefficients are both positive and significant. For the 1990 cross section, the coefficient is 0.623 (0.058). The corresponding coefficient for 1980 is slightly larger: 1.142 (0.097).[36]

To abstract from some of the factors that can potentially introduce spurious correlation between the share of brokers and the price of housing in the cross section of cities, we also look at how *changes* over time in the normalized price of housing affect *changes* in the number of real estate agents. The estimated coefficient is 0.917 (0.078), indicating that a 1 percent increase in the average cost of housing in a city results in a 0.9 percent increase in the number of real estate agents. To help interpret the magnitude of the estimated effect, consider cities such as Seattle, Raleigh-Durham, and San Diego, which are around the

[35] In particular, we obtain the weights from a probit model in which the dependent variable is a dummy equal to one for brokers, and the independent variables include gender, race, schooling, a quadratic in experience, and the interaction of gender with race, schooling, and a quadratic in experience. We have experimented with different definitions of the reservation wage and have found that our results are not sensitive to these alternatives. For example, when we use the average wage in the city or average white-collar wage in the city, the results are virtually unchanged.

[36] All the models are weighted by city population. The R^2's are .28 and .32, respectively.

seventy-fifth percentile in the distribution of changes in housing prices from 1980 to 1990. In these three cities, the value of houses sold in 1990 was 16–19 percent higher (in real dollars) than in 1980. The point estimate of the coefficient implies that in these cities, the number of real estate agents increased by 15–18 percent over 10 years (when population is held constant).

Finally, to allow for the fact that many real estate agents work part-time, we reestimate all the models using the log ratio of *hours* worked by real estate agents over the total *hours* worked by all workers in the city as an alternative measure of labor supply. The resulting estimates of the elasticity of the labor supply of brokers to the price of housing are virtually identical to those using the number of brokers in a city as the dependent variable.[37]

Productivity of real estate agents.—We have shown that the number of hours worked by real estate agents in a city (relative to the total hours worked in a city) increases when the price of housing increases. This is consistent with a story in which positive price shocks result in market entry by brokers (eq. [1]). However, an alternative explanation is that cities in which housing prices have increased also experience a higher demand for brokerage services. To discriminate between these two explanations, we turn to our main piece of empirical evidence: the relationship between productivity and housing prices. If the fixed commission rate results in socially wasteful entry, then we should see that an increase in housing prices lowers the productivity of real estate brokers. On the other hand, if the positive correlation between hours worked and housing prices simply reflects a shift in demand, there should be no effect on productivity.

The ideal data set to test our model would be a longitudinal data set in which the same house is sold multiple times, both in expansion years and in recession years. If such a data set were available, we could regress the change between expansions and recessions on the amount of time that it takes for brokers to sell the same house on the change in the price of the house. By looking at the same house, we would be able to completely abstract from changes in the quality of housing that might affect the amount of time required by brokers to sell the house. We do not have such longitudinal data, but below we provide evidence indicating that our results are robust to observed and unobserved housing characteristics.

As before, we start with a scatter plot of the correlation between the unadjusted price of housing and the productivity of realtors. We define productivity as the ratio of the total number of sales in a city over the

[37] The estimates are 0.667 (0.060), 1.228 (0.099), and 0.838 (0.081) for the 1990 cross section, for the 1980 cross section, and for 1980–90 changes, respectively.

total number of hours worked by brokers in the city, although the results are virtually identical if we define productivity as sales per broker. Figure 7 shows that in both 1980 and 1990, the cross-sectional relationship between productivity and housing prices is consistent with our prediction: the productivity of brokers is lower in cities with high housing prices than in cities with low housing prices. The same is true when we look at changes over time from 1980 to 1990 (fig. 1).[38]

We then turn to estimates of equation (2). We regress the (log) average productivity of brokers in the city on the (log) average cost of housing normalized by the city-specific reservation wage of brokers.[39] A regression based on the 1990 cross section yields a coefficient of −0.929 (0.059), suggesting that a 1 percent increase in the cost of housing in a city is associated with a 0.92 percent decrease in the number of houses sold per hour worked. A similar estimate for the 1980 cross section yields a larger coefficient (in absolute value) than that for the 1990 cross section: −1.098 (0.049).[40] In other words, the estimated cross-sectional elasticities suggest that higher commissions in higher-cost cities are almost completely dissipated by entry.

The estimated elasticity of productivity to housing prices using 1980–90 changes is −0.646 (0.069) and is highly significant. This estimate, which abstracts from any fixed city-specific factors that might affect the work necessary to match buyers and sellers, suggests that part of the cross-sectional correlation with housing prices is due to permanent unobserved characteristics of cities such as density and unobserved quality of the stock of housing. Nonetheless, once we control for such city-specific factors, it is still the case that roughly two-thirds of the higher commissions due to high housing prices are dissipated through entry.[41]

A legitimate concern is that markets that experience increases in housing prices will have not only more brokers but also a different distribution of the brokers' abilities. Changes in the ability distribution of brokers could lead us to overestimate or underestimate the coefficient on housing prices, depending on whether high housing prices are associated with high or low average ability of brokers. For example, one might think that brokers in expensive cities such as New York or San Francisco have higher ability than brokers in less expensive cities. On the other hand, if established, high-ability agents cannot easily migrate across cities, it is possible that the new brokers who enter the market

[38] The OLS coefficients on housing prices are, respectively, −0.725 (0.029), −0.953 (0.040), and −0.512 (0.052).

[39] Once again, the difference between the regression and the figures is that in the regression, the price of housing is normalized by the reservation wage.

[40] The R^2's for 1990 and 1980 are .65 and .63, respectively.

[41] In subsection *C* below, we show that this estimate does not change when we control for observable and unobservable housing characteristics.

a

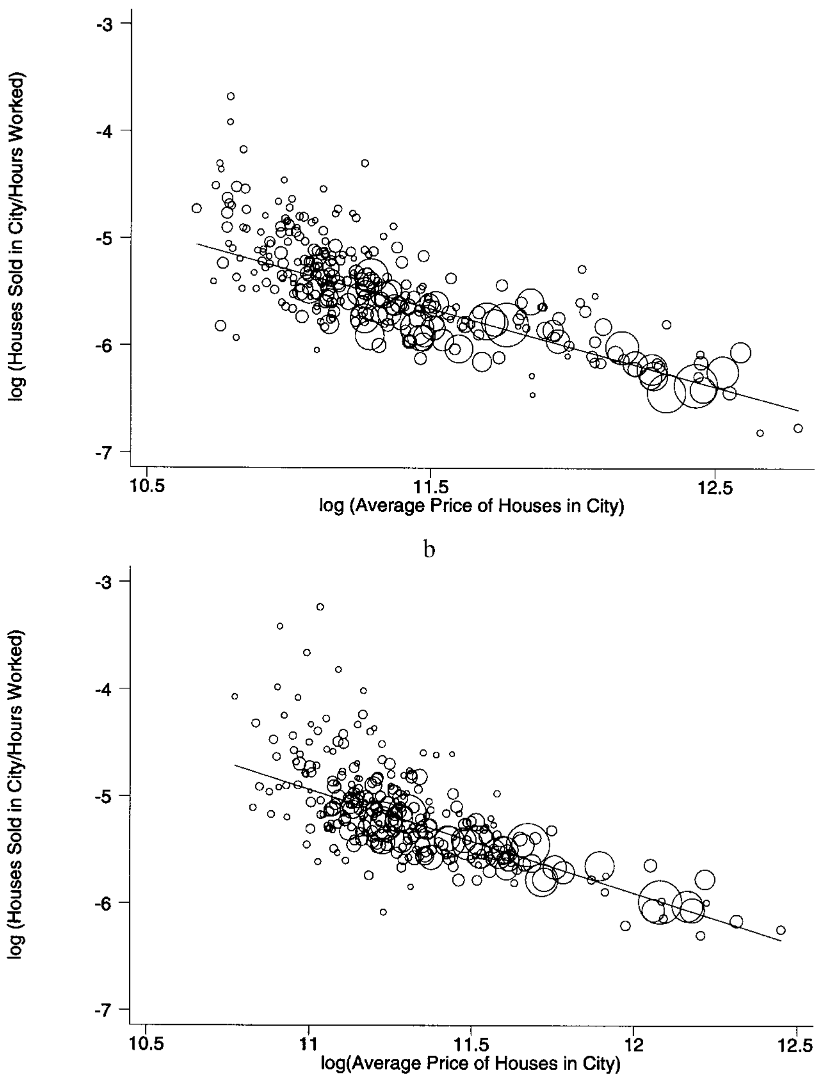

FIG. 7.—Productivity of real estate agents (houses sold in the city/hours worked) and cost of housing: *a,* 1990; *b,* 1980. Each bubble represents a metropolitan area. The size of the bubble is proportional to the metropolitan area population. There are 282 metropolitan areas. Data are taken from the Census of Population and Housing.

TABLE 3
CORRELATION BETWEEN HOUSING PRICES AND OBSERVABLE CHARACTERISTICS OF BROKERS

	Mean in 1990 (1)	1990 (2)	1980 (3)	Changes 1980–90 (4)
College or some college	.78	.06	.15	.00
		(.01)	(.01)	(.02)
Years of schooling	14.2	.49	.70	.21
		(.05)	(.08)	(.10)
Part-time	.14	−.03	−.06	−.00
		(.01)	(.01)	(.01)
Female	.53	−.02	−.06	−.01
		(.01)	(.01)	(.02)
Black	.03	.01	.01	.00
		(.00)	(.00)	(.00)
Age	44.7	−1.51	.30	−3.40
		(.30)	(.42)	(.62)

NOTE.—Standard errors are in parentheses. Entries in col. 1 are 1990 averages. Entries in cols. 2–4 are the OLS coefficients on log housing prices. The sample includes only real estate brokers. College or some college is a dummy equal to one if years of schooling is 13 or more. Part-time is a dummy equal to one if the broker works less than 30 hours a week. All models are weighted by city population. The number of observations is 282.

following an increase in housing prices are of lower quality. Our estimates account for differences in brokers' observable characteristics across cities, because our measure of housing prices is adjusted for the brokers' reservation wage, which is imputed on the basis of the brokers' observable characteristics. But it is still possible that unobservable heterogeneity in broker quality biases our estimates.

While we cannot directly assess the magnitude of the resulting bias, we examine how observable characteristics of brokers vary depending on housing prices. If observable characteristics of brokers are correlated with housing prices, it is likely that unobservable characteristics are correlated with housing prices as well (see Altonji, Elder, and Taber 2002). The first row of table 3 indicates that brokers in cities with higher housing prices are more likely to have a college or community college education in 1990 and 1980 (cols. 2 and 3). When we introduce city fixed effects (col. 4), the coefficient drops to zero. A similar pattern emerges when we look at years of schooling (row 2), fraction of realtors who work part-time (less than 30 hours a week; row 3), and fraction of realtors who are females (row 4). For completeness, in the last two rows, we report estimates for race and age. Overall, the evidence suggests that in a cross section of cities, brokers appear to be slightly more skilled in markets with higher housing prices. However, when we absorb city fixed effects, we find little evidence of a correlation between housing prices and broker observable quality.

Housing prices and brokers' earnings.—We now turn to the third implication of our story of socially wasteful market entry: in equilibrium,

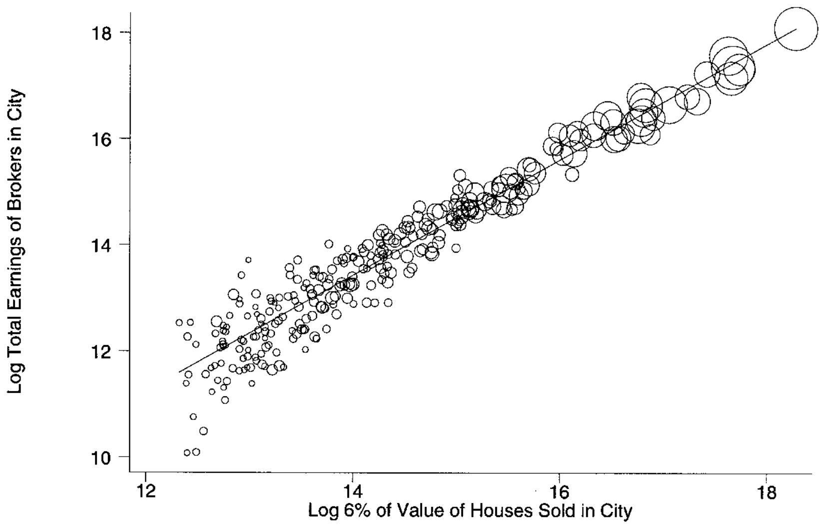

FIG. 8.—Relationship between total earnings of brokers and 6 percent of the total value of homes sold in 282 cities in 1990. Each bubble represents a metropolitan area. The size of the bubble is proportional to the metropolitan area population. There are 282 metropolitan areas. The *x*-axis is the expected revenue of real estate agents, calculated as 6 percent of the total value of homes sold in a city. The *y*-axis is the *total* value of brokers' earnings in the city (i.e., the sum of the earnings of all brokers in the city). If the commission rate for all transactions is 6 percent and brokers' earnings come exclusively from sales of residential homes, then the sum of earnings reported by all brokers in a city should be exactly equal to 6 percent of the sum of the value of all home sales in the city. The solid line is the OLS fit, with an estimated slope equal to 1.08 (0.01). Data are taken from the 1990 Census of Population and Housing.

brokers should be indifferent among cities. Specifically, we test whether the average real earnings for brokers are the same in high–housing cost cities as in cities with lower housing costs.

To begin, we show the relationship between the expected revenue of real estate agents, computed as 6 percent of the total value of homes sold in a city, and the actual total value of brokers' earnings in the city, as reported by brokers in the census. Under the following assumptions—(1) the commission rate for all transactions is 6 percent, (2) brokers' earnings come exclusively from sales of residential homes, and (3) brokers report their revenues from commissions as their earnings—the sum of earnings reported by all brokers in a city should be exactly equal to 6 percent of the sum of the value of all home sales in the city. Figure 8 plots the log of actual brokers' earnings against the log of expected brokers' earnings for 282 cities. If the three assumptions above are true, then we should observe a slope equal to one. The coefficient in a regression of log expected brokers' earnings on log actual earnings is 1.08 (0.01).

TABLE 4
EFFECT OF AVERAGE PRICE OF HOUSES ON RELATIVE WAGE OF BROKERS

	1990 (1)	1980 (2)	Changes 1980–90 (3)
Cost of houses	.079	.163	.064
	(.019)	(.027)	(.041)
R^2	.05	.10	.01

NOTE.—Standard errors are in parentheses. The dependent variable is the log difference between the average earnings of brokers and brokers' reservation wage. The reservation wage is a weighted average of the wages of workers in non–real estate occupations in the same city; the weights are based on how similar their observable characteristics are to those of brokers. The number of observations is 282.

Having shown evidence suggesting that reported brokers' earnings in the census appear to closely reflect revenues from housing sales, we now assess whether brokers in high-cost cities have higher earnings (relative to their opportunity cost) than brokers in low-cost cities. As can be seen in columns 1 and 2 of table 4, the relative wage of brokers appears to be higher in expensive cities when one looks at the cross section of cities.[42] The point estimate for the 1990 cross section indicates that the relative wages of brokers are 0.8 percent higher in a city in which housing prices are 10 percent higher. However, when we turn to the evidence based on 1980–90 changes (col. 3 in table 4 and fig. 9), there is little evidence that relative wages of brokers increase by more in cities in which housing prices have increased by more.

We speculate that the difference between cross-sectional estimates and city fixed-effects estimates in table 4 may in part reflect differences in brokers' unobservable skills across cities. Specifically, it is possible that higher-ability brokers are found in cities with higher property values and that average ability gets differenced out in models based on 1980–90 changes. This hypothesis is consistent with the finding that brokers' *observable* characteristics are correlated with housing prices in the 1980 and 1990 cross sections, but not in models based on 1980–90 changes (see table 3). In other words, when we look at a cross section of cities, it is the case not only that the brokers in expensive cities appear to be of higher quality on the basis of their observable characteristics, but that their unobservable quality appears to be higher as well. However, there is no evidence of this relationship when we look at changes over time.

In addition to mean earnings, it is also useful to look at the effect of price increases on the dispersion of earnings. We first look at the cor-

[42] Remember that the reservation wage is defined as a city-specific weighted average of earnings of workers outside real estate, with higher weights given to workers who have characteristics similar to those of brokers.

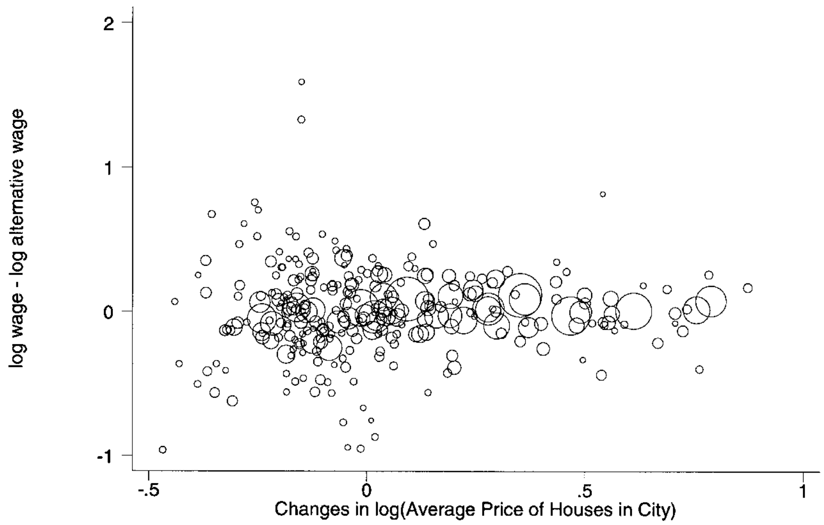

FIG. 9.—Average earnings of real estate agents and average price of housing in 282 cities in 1990. Each bubble represents a metropolitan area. The size of the bubble is proportional to the metropolitan area population. There are 282 metropolitan areas. The *y*-axis is the log difference between average earnings in a city and brokers' reservation wage. The reservation wage of real estate agents is a weighted average of the wages of workers in all other occupations in the same city. We assign weights to individuals in the sample who are not brokers on the basis of how similar their observable characteristics are to the observable characteristics of brokers.

relation between the interquartile range of agents' earnings in a city and the price of housing.[43] We find that price increases are associated with statistically significant increases in the interquartile range, both in the cross section and in 1980–90 changes.[44] We find similar results when we look at the *conditional* interquartile range of earnings.[45]

Another potential source of earnings dispersion is the difference between brokers and agents. Until now, we have not distinguished between brokers and real estate agents, but it is possible that brokers in high–housing cost cities may profit from the fixed commission fee.[46]

[43] Unlike the variance, the interquartile range is robust to outliers.

[44] The cross-sectional coefficients for 1990 and 1980, are respectively, 2.078 (0.147) and 2.10 (0.174). The specification in changes yields 1.415 (0.309).

[45] The cross-sectional coefficients for 1990 and 1980 are, respectively, 1.74 (0.12) and 2.02 (0.14). The specification in changes yields 1.48 (0.23). The conditional interquartile range is obtained by conditioning on schooling, gender, race, and a quadratic in potential experience.

[46] As previously mentioned, every agent has to work for a broker. Most brokers are themselves also sales agents (or former agents) and are typically the owners of the real estate company. A recent survey by the National Association of Realtors indicates that in 59 percent of cases, agents split commission fees with their broker; in 32 percent of cases, agents get the full commission (and pay a fixed fee to the broker); and in 4 percent of

However, we find that the relative number and the relative earnings of brokers compared to the number and earnings of agents in a city are not correlated with housing prices, which suggests that the distinction between brokers and agents is not important empirically in our analysis.[47]

C. *Does Heterogeneity of Housing Matter?*

An important limitation of the evidence we have presented so far is that the average quality of housing may differ according to the average price of housing in the city and that differences in housing quality may affect the quality of real estate brokerage services. For example, it is possible that selling older and larger houses takes more time than selling newer and smaller houses. If this is the case, some of the correlation uncovered in figures 1 and 7 could reflect heterogeneity in housing quality. In this subsection we report estimates designed to probe the robustness of our results to potential heterogeneity in the housing stock.

By looking at changes over time in the same city, we have made a first step to control for characteristics of the housing stock that are correlated with prices and may affect productivity. It is likely that many unobserved characteristics that may affect brokers' productivity in a city are fairly permanent and can be absorbed in specifications that control for city fixed effects. However, the sample of houses in 1990 does not need to be exactly the same as the sample in 1980 since new homes have been built between 1980 and 1990. In column 2 of table 5 we

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cases, they receive a fixed salary (source: Realtors Compensation Study, described in *Realtor Magazine,* August 1, 2001).

[47] Specifically, we find no relationship, both in a cross section of MSAs and over time, between the ratio of earnings of brokers over the sum of earnings of agents and brokers and housing prices. In the census, we use information on the "class of worker" to identify whether an individual involved in the "real estate sales occupations" is a broker or an agent. Specifically, we classify the individual as a broker if she is "self-employed in own not incorporated business, professional practice, or farm" or "self-employed in own incorporated business, professional practice, or farm." We classify her as an agent if she is an "employee of a private for profit company or business or of an individual, for wages, salary, or commissions." Second, we find no correlation between the ratio of the number of brokers to the sum of the number of brokers and agents and housing prices. This is true both when using the census data to look across MSAs and when using data from state licensing boards to look across states. The data from state licensing boards are collected by the National Association of Real Estate License Law Officials (NARELLO). This organization reports separately the number of licensed brokers and the number of agents in each state (but not by MSA). The NARELLO data are likely to be more precise than the census data but are available only at the state level. When aggregated at the state level, the number of brokers and salespersons estimated with census data is highly correlated with the numbers provided by NARELLO (the correlation is around .8). In a cross-sectional regression of number of brokers divided by brokers plus salespersons on (log) housing prices, both data sets yield statistically insignificant coefficients. When we look at the 1980–90 changes, the census data yield a marginally significant negative coefficient of $-.0497$ (.0226).

TABLE 5
Effect of Average Price of Houses on the Productivity of Brokers When Housing Quality Is Controlled For

	Ordinary Least Squares Changes 1980–90		Instrumental Variable Changes 1980–90	
	(1)	(2)	(3)	(4)
Cost of houses	−.646	−.714	−.706	−.694
	(.069)	(.080)	(.091)	(.089)
Average age		.011	.007	.011
		(.007)	(.008)	(.007)
Average number of bedrooms		.405	.261	.405
		(.175)	(.213)	(.175)
Percentage one-family homes		.875	1.428	.856
		(.328)	(.398)	(.330)
Percentage condominiums		−.271	−.207	−.308
		(.330)	(.374)	(.336)
Percentage with plumbing		−1.150	−3.085	−1.172
		(2.766)	(4.266)	(2.766)
Percentage with a kitchen		3.335	1.341	3.374
		(2.696)	(3.641)	(2.696)
R^2	.23	.30		
First stage:				
Repeated sales price index			.783	
			(.031)	
Census price index				.608
				(.018)
Observations	282	282	119	282

Note.—Standard errors are in parentheses. The dependent variable is the log of the total number of houses sold over the total number of hours worked by real estate agents. The instrumental variable in col. 3 is the OFHEO price index based on repeated sales. The instrumental variable in col. 4 is a price index based on changes in prices of houses that existed both in 1980 and in 1990. See the text for details. All models are weighted by city population.

report the estimates from a specification that controls for the changes in housing characteristics. Specifically, we include the change in the average age of housing, average number of bedrooms, percentage of one-family houses, percentage of houses that are condominiums, and percentage of houses with kitchens and plumbing. The quantitative impact of controlling for observable characteristics of houses is quite limited. The coefficient in column 2 is −0.71, slightly more negative than the corresponding coefficient from the model that does not include controls (col. 1).[48]

[48] Since it is possible that the extra controls are endogenous, we have to be careful in interpreting the results of this regression. The sign of the coefficient estimates on the added controls is consistent with the endogeneity of some of the added variables. For example, when we control for housing prices, the age of housing has a positive effect on productivity. Since we expect older houses to be more difficult to sell, this estimate makes little sense if age of housing is in fact controlling for changes in the difficulty of selling that are correlated with housing prices. Instead a more reasonable interpretation is that economic booms that increase housing prices also translate into building booms that lower the average age of housing.

However, we are concerned that these controls absorb only some of the potential heterogeneity and that there may be changes in unobserved characteristics of the housing stock that affect brokers' productivity and are correlated with housing prices. One way to partially address this problem is to isolate the component of changes in housing prices that are driven by changes in the price of *land* rather than by changes in housing quality. The idea is that changes in land prices do not directly affect brokers' productivity, but if our model is correct, they affect it indirectly through their effect on entry by new brokers. While so far we have looked at the total effect of prices on productivity, we now use two instrumental variables to isolate the effect of changes in land prices on productivity.

First, we use a price index of a panel of houses in 119 cities compiled by the Office of Federal Housing Enterprise Oversight (OFHEO). Since the OFHEO index measures the prices of the same houses over time, it allows us to isolate the component of price changes that is exclusively due to changes in land prices.[49] We use the change in OFHEO price index as an instrumental variable for the change in average housing prices. The resulting estimate, shown in column 3 of table 5, is similar to the corresponding OLS estimate in column 1.

A similar approach is to use the census to estimate the cost of housing but to restrict the sample only to houses existing in both 1980 and 1990. Specifically, we estimate the change in housing prices restricting the 1990 sample to houses that are 10 years or older, so that only houses that existed in 1980 are included in the calculation. Clearly, this is not a true panel, but it is a representative sample of the population of houses existing in both years. The price changes in this restricted sample are not driven by changes in the quality of new houses, but mainly reflect changes in the price of land. This index is similar in spirit to the OFHEO price index but has the advantage of being available for all 282 cities in the sample. In column 4, we use the change in prices calculated on the sample of houses existing in both 1980 and 1990 as an instrument for the change in the total price of housing. Again, the instrumental variable estimate is very similar to the OLS estimate.

Finally, we present additional estimates to check the robustness of our results. The top row of table 6 replicates our base-case estimates. In the second row of table 6, we estimate a model in which the depen-

[49] The OFHEO index has been compiled since January 1975 from repeat mortgage transactions on single-family homes whose mortgages have been purchased or securitized by Fannie Mae or Freddie Mac. Although the OFHEO price index is driven primarily by land prices, depreciation and renovation also will potentially affect the index. There are, however, two limitations with the OFHEO price index. First, the index is limited to sales of existing single-family homes and does not include sales of new homes and sales of non-single-family homes. Second, while the index allows us to measure changes in housing prices over time, it cannot be used for cross-sectional comparisons.

TABLE 6
Robustness Checks: Effect of Average Price of Houses on the Productivity of Brokers

	1990 (1)	1980 (2)	Changes 1980–90 (3)
Base case	−.929	−1.098	−.646
	(.059)	(.049)	(.069)
Number of bedrooms	−.992	−1.139	−.759
	(.042)	(.048)	(.071)
Control for city population	−.883	−1.089	−.745
	(.045)	(.048)	(.083)
Control for percentage renters	−.822	−.987	−.668
	(.047)	(.059)	(.086)
Median cost of houses	−.823	−1.112	−.531
	(.038)	(.056)	(.068)
Drop New York City	−.900	−1.088	−.689
	(.041)	(.049)	(.073)

Note.—Standard errors are in parentheses. In cols. 1 and 2, the dependent variable is the log of the productivity of brokers, and the independent variable is the log of the average price of houses divided by the brokers' reservation wage. In col. 3, the dependent variable is the change in the log of the productivity of brokers, and the independent variable is the change in the log of the average price of houses, divided by the change in brokers' reservation wage. Data are taken from the 1990 and 1980 Census of Population and Housing. There are 282 metropolitan areas. Prices are in 1990 dollars. All models are weighted by city population.

dent variable is the number of bedrooms in houses sold in the city for every hour worked by brokers. While we have already controlled for the size of houses by conditioning on the number of bedrooms (in table 5), this is an alternative way to make sure that our results are not driven by differences in the size of homes across cities. When we measure productivity as the number of bedrooms sold per hour, the coefficients are similar to or slightly larger than the base-case estimates.

In row 3, we control for the population in the city, and the fourth row controls for the percentage of renters in the city. We introduce the latter as a control because we are concerned that some brokers work on leases as well as sales, and the amount of time spent on leases may be correlated with housing prices. In the fifth row, we use the median price of houses instead of the mean price.[50] Finally, in row 6 we drop New York City because it is one of the few markets (and the only one among the large cities) that have no multiple listing system. As can be seen, none of these adjustments have a large impact on the estimated effect of housing prices on the productivity of real estate agents.

D. *Are More Expensive Houses More Difficult to Sell?*

In this subsection, we turn to an assessment of how much of our results can be explained by increased services to customers in cities in which

[50] Since the price of housing is top-coded in the census, the mean price is sensitive to how the top-coded values are treated, whereas the median price is not.

housing prices have increased. In our most robust specification (that based on 1980–90 changes), we find that between two-thirds and three-fourths of the higher commission in cities with high housing prices is dissipated through lower productivity of real estate agents. However, although these results are robust to differences in the characteristics of housing across cities, it could be the case that as land prices rise, it takes more time to sell a house. Alternatively, even if the time that it takes to sell a home for sale does not vary according to price, buyers in cities with high housing prices may visit more houses before making a decision. In either case, the correlation between higher prices and lower productivity shown in figures 1 and 7 could simply reflect the fact that brokers in expensive cities need to spend more time matching buyers and sellers.

While we cannot completely rule out this possibility, we present two pieces of evidence that are inconsistent with this view. First, a direct measure of the amount of time brokers spend selling a house is the duration of vacancies. Ideally, we would like to observe the amount of time that brokers spend trying to sell a house. We do not have these data, but for the sample of houses that are vacant and for sale, the census provides information on the amount of time the house has been on the market.[51] Figure 10 shows that the cross-sectional relationship between time on the market and housing prices in 1990 is negative. This negative relationship is confirmed in columns 1 and 2 of table 7, which present regressions of the average duration of vacancies in a city on the price of housing in the city in 1980 and 1990, respectively. When we control for city fixed effects in column 3, the coefficient on housing prices remains negative.

While one could argue that the time on the market is endogenous, since a higher effort from brokers could lead to a quicker sale, the negative relationship uncovered in table 7 is also consistent with the observation that it is easier to sell houses when the local economy is booming. The extreme example is the real estate market boom in the Silicon Valley in the late 1990s, when every property sold within a few days.[52] In sum, while we do not have conclusive evidence that houses in more expensive cities are easier to sell, what we can say with reasonable certainty is that it does not take more *time* to sell a house in an expensive city.

However, while this evidence suggests that brokers do not spend more

[51] The variable “time on the market” is categorical in the census. We make it continuous by taking the midpoints of each category.

[52] See Stein (1995) and Genesove and Mayer (2001). One explanation proposed for the negative relationship between time on the market and housing prices involves loss aversion. Genesove and Mayer show that during downturns, sellers facing a potential loss have higher reservation prices and therefore face a longer time on the market.

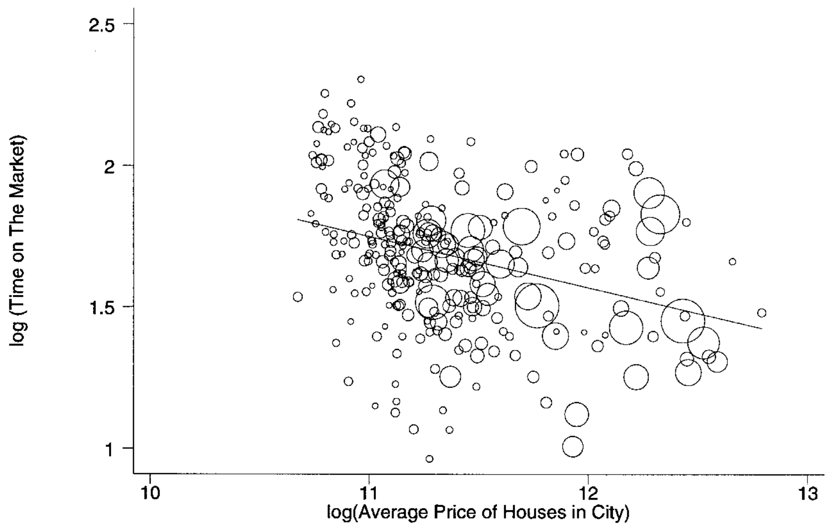

FIG. 10.—Cost of housing in 282 metropolitan areas and vacancy time. Each bubble represents a metropolitan area. The size of the bubble is proportional to the metropolitan area population. There are 282 metropolitan areas. Data are taken from the 1990 Census of Population and Housing.

time selling a house in a high–housing cost city, it is still possible that *buyers* of such houses tend to take more time searching. Therefore, if buyers' agents need to spend more time assisting home buyers, this could explain some of the correlation between productivity and housing prices. To assess this argument, we turn to two measures of the duration of the search by home buyers.

Our first proxy of the time buyers spend searching for a house is the average number of houses visited by home buyers in 20 large cities.[53] The average home buyer in these cities visited 13.3 houses before making a decision. Figure 11*a* shows the relationship between log average number of houses visited by home buyers in each city and log average housing prices. The corresponding coefficient from a regression of the logarithm of the number of houses visited on the log of the price (col.

[53] The data are taken from the 1999 Annual Survey of Recent Home Buyers, a representative survey of approximately 1,800 home buyers in 20 major cities collected annually by the Chicago Title and Trust Co. (http://www.ctt.com). The cities included in the survey are Atlanta, Boston, Chicago, Cleveland, Dallas–Fort Worth, Denver, Detroit, Houston, Los Angeles, Memphis, Miami, Minneapolis–St. Paul, New York City, Orange County (Calif.), Orlando (Fla.), Philadelphia, Phoenix, San Francisco, Seattle-Tacoma, and Washington, D.C. Although the number of cities covered by this survey is a fraction of the total number of cities for which we have data in the census, the 20 markets in the Annual Survey of Recent Home Buyers account for approximately one-third of all home sales in the United States.

TABLE 7
EFFECT OF AVERAGE PRICE OF HOUSES ON VACANCIES

	1990 (1)	1980 (2)	Changes 1980–90 (3)
Cost of houses	−.181	−.483	−.224
	(.025)	(.047)	(.058)
R^2	.14	.26	.05

NOTE.—Standard errors are in parentheses. The dependent variable is the log of the average monthly duration of vacancies in a city. The sample includes all vacant houses. The number of observations is 281.

1 of table 8) is 0.135 (0.099). This estimate suggests that the number of houses visited by home buyers increases with housing prices, but the effect is small and not statistically different from zero.

We obtain similar results when we use the number of months spent by home buyers searching for a house as an alternative measure of the amount of time a realtor spends matching buyers and sellers. Specifically, we use household-level data from a survey of 3,839 home buyers collected by the National Association of Realtors from 1984 to 2000.[54] Figure 11*b* suggests that the relationship between search duration and price is weak. The corresponding estimates in columns 2 and 3 of table 8 confirm that the effect of prices on search duration is small, and the point estimates are similar to those in the model based on the number of visits.[55]

In sum, these estimates suggest that buyers of more expensive houses seem to search longer, and in the process, they visit more houses. However, the effect is small. The point estimates in table 8 suggest that if excessive entry did not take place, the commissions of brokers in a city in which property prices are 10 percent higher should be only 1–1.3 percent higher. Instead, our estimates from table 5 suggest that commissions are 7 percent higher in such cities. Therefore, the additional amount of time home buyers spend searching for a house in high–housing cost cities can explain no more than 18 percent of the higher commissions in these cities.

V. How Large Are the Social Losses from Excessive Entry?

We now quantify the social losses from excess entry. If we assume that the demand curve for brokerage services is price-inelastic and that the

[54] In contrast to the evidence on the number of houses visited, which are city-level averages, this regression relates the actual search duration of a household to the actual price paid for the house. The data are taken from the Residential Mortgage Finance Database, collected by the National Association of Realtors.

[55] Column 2 reports estimates from a model that controls for year effects. Column 3 refers to a model that controls for year effects, as well as the age of the house and the number of bedrooms.

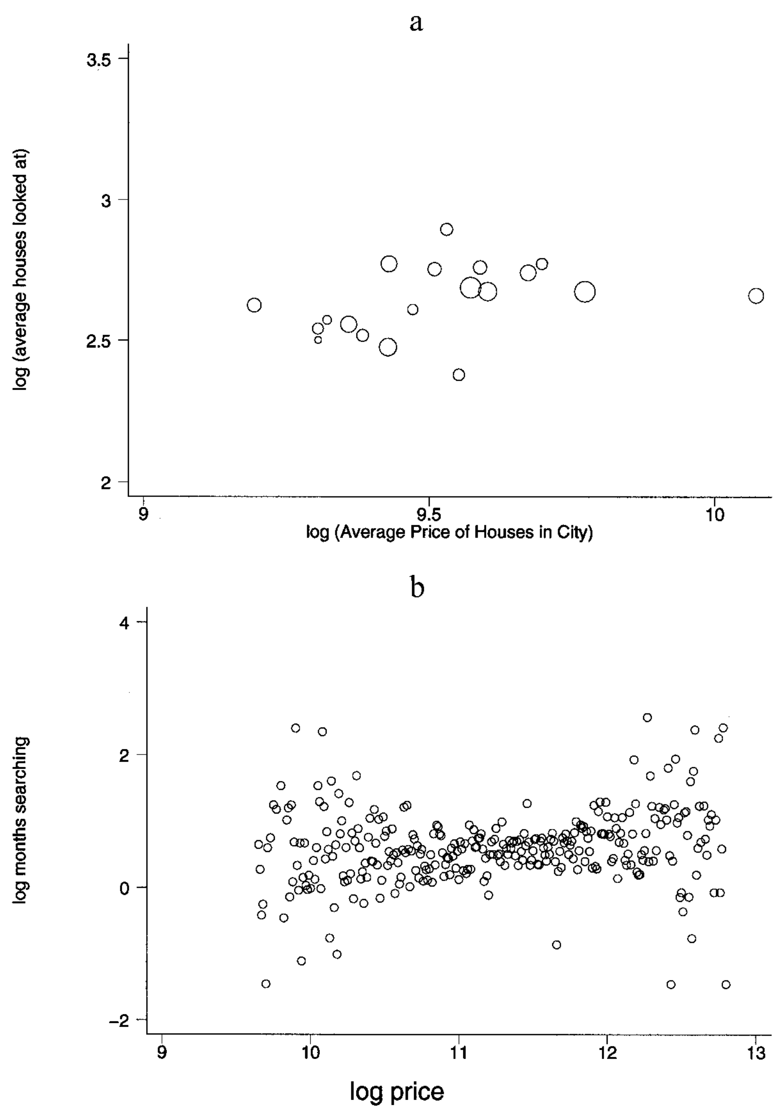

Fig. 11.—The effect of housing cost on the number of houses looked at and search duration. *a,* Data are taken from the 1997 Chicago Title and Trust Co. Annual Survey of Recent Home Buyers, a representative sample of approximately 1,800 home buyers in 20 cities. The cities included in the survey are Atlanta, Boston, Chicago, Cleveland, Dallas–Fort Worth, Denver, Detroit, Houston, Los Angeles, Memphis, Miami, Minneapolis–St. Paul, New York City, Orange County, Orlando, Philadelphia, Phoenix, San Francisco, Seattle-Tacoma, and Washington, D.C. *b,* Data are taken from the National Association of Realtors. Original data are at the household level ($N = 3{,}839$). Each point in the figure is the average number of months spent by the respondents searching within narrow intervals in housing price.

TABLE 8
EFFECT OF THE PRICE OF HOUSES ON THE NUMBER OF HOUSES LOOKED AT AND THE DURATION OF SEARCH

	Number of Houses Looked At	Duration of Search	
	(1)	(2)	(3)
Cost of houses	.135	.127	.102
	(.099)	(.032)	(.039)
Observations	20	3,839	3,069
R^2	.21	.04	.03

NOTE.—Standard errors are in parentheses. The dependent variable in col. 1 is the log of the number of houses looked at. Data are taken from the 1997 Chicago Title and Trust Co.'s Annual Survey of Recent Home Buyers, a representative sample of approximately 1,800 home buyers in 20 cities. The dependent variable in cols. 2 and 3 is the log of the duration of housing search (in months). Household-level data are taken from a survey collected by the National Association of Realtors. Both models include year effects. The model in col. 3 also controls for the age of the house and the number of bedrooms.

earnings of brokers are equal to their opportunity cost, the social losses from excess entry in a city can be approximated by the difference between the total earnings of brokers in a city and total variable costs.[56] The main difficulty is that we do not observe costs, and we need to rely on assumptions that are necessarily arbitrary. To impute costs, we use the fact that our most robust estimate indicates that wasteful entry lowers the productivity of real estate agents by 7 percent in a city in which housing prices are 10 percent higher. On the basis of this finding, we infer that marginal costs should increase by 3 percent for each 10 percent increase in housing prices. Therefore, if we can identify a benchmark city in which there is no excessive entry, the total variable costs in city j can be approximated as

$$\text{cost}_j = \frac{S_j \cdot w_j}{\text{productivity}_{\text{benchmark}}} \cdot \left[1 + 0.3 \cdot \ln\left(\frac{P_j}{P_{\text{benchmark}}}\right)\right], \qquad (3)$$

where $\text{productivity}_{\text{benchmark}}$ and $P_{\text{benchmark}}$ refer to the productivity (sales per hour worked) and the average price of housing in a benchmark city. It is easy to see that equation (3) assumes that there is no socially wasteful entry in the benchmark city since cost equals total earnings of brokers.[57] For cities with productivity lower than the benchmark city, the first term in equation (3) calculates what brokers' earnings would have been had their productivity been equal to the productivity of brokers in the benchmark city. The second term in equation (3) accounts for the fact that cities with lower productivity have higher prices of

[56] If the demand curve is somewhat price-elastic, we shall also have the usual loss from pricing above marginal cost. We abstract from this triangle loss in our calculations.

[57] To the extent that this is not true and there is some socially wasteful entry in the benchmark city, eq. (3) will overstate variable costs and thus understate the social waste from entry in city j.

TABLE 9
Social Losses from Excessive Entry and Excess Number of Brokers, 1990

		Benchmark			
	(1)	Athens, Ga. (90th Percentile) (2)	Urbana, Ill. (75th Percentile) (3)	Pittsburgh, Pa. (Median) (4)	Des Moines, Iowa (25th Percentile) (5)
Total brokers' earnings	16.1				
Social loss		8.2	5.6	2.6	1.1
Total number of brokers	777,086				
Excess entry		422,922	332,846	161,296	63,758

Note.—Social loss is calculated as the difference between the total earnings of brokers and imputed costs. Imputed costs are based on a benchmark city. All monetary figures are in billions of 1990 dollars. Excess entry is calculated as the difference between the total number of brokers and the efficient number of brokers. The efficient number of brokers is imputed on the basis of a benchmark city.

housing, which results in higher costs of doing business. In particular, on the basis of our estimates, the second term in equation (3) assumes that 30 percent of the additional price of housing relative to the benchmark city translates into higher costs. The total social loss from excess entry is the sum over all cities of the difference of total earnings of brokers in a city and the imputed variable cost.[58]

Using this formula, table 9 presents alternative estimates of the total social losses from excess entry in 1990. Because we do not know which city has an efficient real estate brokerage industry, we present estimates based on four different cities as possible benchmarks. For reference, column 1 in table 9 reports total earnings of brokers in 1990, which is \$16.1 billion.[59] Column 2 uses as the benchmark the city at the ninetieth percentile of the brokers' productivity distribution (Athens, Ga.). This estimate suggests that the social loss from excess entry in 1990 is roughly \$8.2 billion (roughly 0.16 percent of gross domestic product). We assume that there is no socially inefficient entry in cities in which the productivity of realtors is higher than in the relevant benchmark city.[60] The subsequent columns use cities with lower productivity (higher mar-

[58] See Berry and Waldfogel (1999) for an alternative approach to estimating the social losses from free entry.

[59] As we have shown in Sec. IV*B*, variation in total earnings of brokers closely matches 6 percent of the total value of houses sold. In our sample, 6 percent of the total value of houses sold is \$18.4 billion. These two figures are also roughly consistent with the total revenue of real estate brokerage firms reported by the Economic Census. For example, in 1992, total revenue of residential real estate firms is equal to \$20 billion (see U.S. Department of Commerce 1995, table 1).

[60] For example, the estimate in col. 2 is the sum of social losses for cities in which the productivity of realtors is lower than in Athens and is based on the assumption that there are no social losses in cities in which the productivity of realtors is equal to or higher than the productivity of realtors in Athens.

ginal costs) as benchmark markets. The benchmarks in columns 3–5 are the cities at the seventy-fifth, fiftieth, and twenty-fifth percentiles, respectively, of the productivity distribution. Since the benchmark marginal cost increases and the number of cities in which we assume that there is no socially wasteful entry also increases as we move from column 2 to column 5, the estimated social losses from entry decline. If we use the median city (Pittsburgh) as the benchmark, the social loss from entry in 1990 was \$2.6 billion. Our most conservative estimate, which uses Des Moines as the benchmark city (col. 5), indicates that the social loss from entry was \$1.1 billion.

Finally, in the bottom row, we report estimates of the excess number of brokers. Excess entry in city j is defined as the difference between the actual number of brokers in j and the number of brokers that would exist in the benchmark city if city j and the benchmark city had the same size.[61] If we use the median city as the benchmark (col. 4), our estimates suggest that the excess number of realtors in 1990 was 161,000, or about a quarter of the total. The most conservative estimate in column 5 suggests that there was an excess of 63,000 realtors, or about 8 percent of the total.

VI. Conclusion

This paper exploits the unique institutional characteristics of the U.S. residential real estate market to measure the extent of socially wasteful entry by real estate agents into markets with high housing prices. We show that under the following three assumptions—(1) commission rates are fixed, (2) there is relatively free entry into the real estate business, and (3) it does not take more work to match buyers and sellers in cities in which housing is more expensive—higher commissions for each housing transaction in a high–housing cost city will be fully dissipated through entry and wasteful prospecting activities. Therefore, our main empirical test is that the productivity of an average realtor in a city with high property prices will be lower than in cities in which housing is cheaper.

The empirical evidence confirms this prediction. In our most robust estimates that control for fixed differences in the difficulty of matching buyers and sellers across cities, we find that roughly two-thirds to three-quarters of the higher commissions in a city in which the price of land has increased is dissipated by socially wasteful entry. In turn, we find that an average real estate broker in a high-priced city is no better off than her counterpart in a city with cheaper housing. The outcome of

[61] Specifically, excess entry is $b_j - [N_j \times (b_{\text{benchmark}}/N_{\text{benchmark}})]$, where N_j is the total number of workers in city j.

a fixed commission is thus truly tragic: real estate agents are no better off in cities in which housing prices have increased, yet home owners and home sellers are clearly worse off.

The fact that a 1 percent increase in housing costs translates into a 0.75 percent drop in productivity, rather than a 1 percent decline, may simply reflect higher business costs in these cities.[62] In addition, we cannot completely rule out the argument that the lower number of sales per agent in expensive cities may reflect unmeasured differences in the quality of services provided by brokers. We provide four pieces of evidence on this point. First, we show that our results hold up when we control for permanent characteristics of cities and time-varying characteristics of housing. Second, we show that the results do not change when we measure the effect of changes in housing prices that are entirely due to changes in the price of land. Third, we show that by one measure—average time on the market—it is easier, not more difficult, to match buyers and sellers in cities with more expensive housing. Fourth, we show that there is a weak relationship between the average number of houses visited by a home buyer and the average price of housing in a city.

If our interpretation is correct, then the higher commission fees in more expensive cities are dissipated by excessive entry of brokers. What is striking about this story is that increases in housing prices raise commission fees paid by consumers but do not raise brokers' profits. In this sense, this story is different from the standard analysis of welfare losses due to a monopoly.[63] Increases in housing prices translate into pure economic losses since brokers are not made better off but consumers are made worse off.

Finally, we want to be clear about the message of this paper. First, we do not mean to imply that restricting entry into the real estate brokerage industry would necessarily reduce social losses. If one were to restrict entry into the real estate brokerage industry, we can easily imagine a scenario in which the large profits from being a realtor in high–housing cost cities would be dissipated through lobbying by agents attempting to become realtors. It may be possible to address this problem by auctioning real estate brokerage licenses, but the point is that the mechanism that one uses to restrict entry is critically important. Second, our claim is not that free entry is generally socially wasteful. Clearly, it depends on the extent to which competition lowers prices and improves quality, on the one hand, and the extent to which entry spreads output over more producers, on the other hand. In an industry in which de-

[62] Alternatively, it may indicate that commission rates are in fact lower in high–housing cost cities.

[63] Our argument, however, is exactly the same as Posner's (1975), who argued that monopoly rents should be counted in the costs of a monopoly.

mand is relatively price-elastic, it is likely that entry will be socially beneficial. Ultimately, however, whether entry is beneficial is an empirical matter, and our hope is that this paper will prompt others to go out and uncover evidence of the net social gains from entry into other settings.

Appendix A

Heterogeneous Agents

In this Appendix, we allow agents to differ by ability, which is referenced by an index i and is distributed uniformly from zero to one. If person i decides to work outside the real estate sector, her wage will be given by $w_i^j = w^j + \theta \cdot i$, where θ is a positive constant; high-ability individuals (people with high i's) have higher wages. In turn, if she decides to become a real estate agent, then her fraction of the "market" is $i/[2 \cdot i_{\max} \cdot b_j - (b_j)^2]$, where $i_{\max}$ is the ability index of the real estate agent with the highest ability and, as before, b_j is the equilibrium number of brokers in city j. (The term $2 \cdot i_{\max} \cdot b_j - (b_j)^2$ is the sum of i for all brokers, under the assumption that all individuals $i \in [i_{\max} - b_j,\, i_{\max}]$ choose to become brokers.) This formulation assumes that individuals with high ability (high i's) capture a larger share of the real estate market, but this share declines with the total number of people in the real estate sector (b_j). The earnings of individual i who decides to be a broker are thus the product of her share of the commissions and the total amount of commissions available in the city: $\{i/[2b_j - (b_j)^2]\} \cdot (c \cdot S \cdot P_j)$. We shall also assume that $w^j > (c \cdot S \cdot P_j)/(b_j)^2$ and $(c \cdot S \cdot P_j)/[2b_j - (b_j)^2] < w^j + \theta$: individuals at both extremes of the ability distribution (those with ability $i = 0$ and $i = 1$) will find it more profitable to work outside the real estate sector of the economy than to become a broker.

The equilibrium number of brokers is still determined by the condition that the wage must be the same in the two sectors, but now only for the *marginal* broker. This can be represented graphically by the intersection of lines *RS* and *PS* in figure A1, which plots the earnings in the two sectors against the ability index i. Schedule *PS* plots the wage in the non–real estate sector as a function of i, or $w_i^j = w^j + \theta \cdot i$. Schedule *RS* plots the wage in the real estate sector as

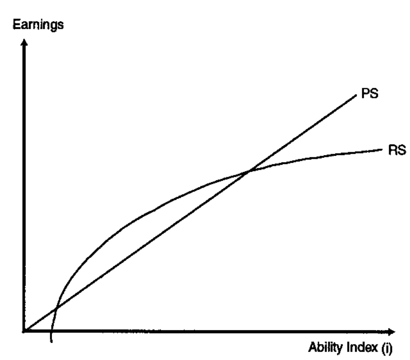

Fig. A1

a function of i, or $\{i/[2b_j - (b_j)^2]\} \cdot (c \cdot S \cdot P_j)$. The assumption that $w^j > (c \cdot S \cdot P_j)/(b_j)^2$ and $(c \cdot S \cdot P_j)/[2b_j - (b_j)^2] < w^j + \theta$ assures us that RS will lie below PS at $i = 0$ and below PS at $i = 1$. In equilibrium, all individuals with $i_{\max} - b_j < i < i_{\max}$ will choose to become brokers, and all individuals with $i < i_{\max} - b_j$ and $i > i_{\max}$ will choose to work outside real estate. Real estate therefore attracts people from the "middle class." The distribution of commissions among brokers is highly skewed: agents with high i's get a large share of the real estate market and those with low i's get a smaller share of the market. In this model, an increase in housing prices is represented by a backward shift in the RS schedule, which increases b_j. However, b_j will increase less than in a model in which all agents are homogeneous.

Appendix B

TABLE B1
Number of Active and Inactive Licensed Brokers by State

State	Active	Inactive
Alabama	19,599	4,435
Alaska	2,600	1000
Arizona	43,000	13,000
Arkansas	13,000	6,000
California	301,566	
Colorado	32,441	20,566
Connecticut	33,765	
Delaware	3,524	348
District of Columbia	7,047	
Florida	227,331	107,306
Georgia	37,837	15,235
Hawaii	14,323	7,852
Idaho	5,007	3,639
Illinois	88,097	21,145
Indiana	43,635	19,200
Iowa	14,543	3,562
Kansas	13,900	3,000
Kentucky	19,340	2,345
Louisiana	28,804	6,584
Maine	5,974	2,622
Maryland	34,285	1,581
Massachusetts	150,736	24,324
Michigan	46,700	30,500
Minnesota	26,000	
Mississippi	8,474	3,453
Missouri	53,825	4,356
Montana	4,642	561
Nebraska	8,945	1,737
Nevada	6,327	3,930
New Hampshire	11,896	
New Jersey	82,200	
New Mexico	9,474	1,840
New York	127,047	
North Carolina	65,820	
North Dakota	2,325	100

TABLE B1
(*Continued*)

State	Active	Inactive
Ohio	48,653	
Oklahoma	21,241	12,644
Oregon	14,731	1,652
Pennsylvania	46,789	57,354
Rhode Island	5,200	
South Carolina	20,922	1,620
South Dakota	3,165	1,702
Tennessee	21,980	13,240
Texas	154,564	22,965
Utah	9,316	7,884
Vermont	5,599	
Virginia	44,178	14,989
Washington	25,653	29,369
West Virginia	8,319	
Wisconsin	32,000	
Wyoming	2,322	1,505

SOURCE.—*Digest of Real Estate License Laws,* 1987.

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