A Note on Licensing and the Market for Real Estate Agents

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Abstract:
This study develops and estimates a model of real estate agent demand and supply. The estimates of the model show that the licensing examination pass rate and the educational requirements set by state licensing boards affect the numbers and incomes of real estate agents. The study further shows that the demand for agents is related to economic activity in the housing market and that the supply of agents is very elastic with respect to agent earnings.
Key Words: occupational licensor, earnings, broker income, entry borrowers

Article:
1. Introduction
State licensing is required widely in professions like real estate sales. Although the rationale for state licensing is consumer protection, a number of studies have linked occupational licensing to reduced competition and higher professional earnings (see, for example, Benham, Maurizi, and Reder, 1968; Friedman and Kuznets, 1945; Kleiner and Kudrle, 1997; and Rose, 1979). In the real estate field, however, the results reported by past studies have been inconsistent. Johnson and Loucks (1986) estimate a structural model of agent demand and supply. Based on the estimates of their model, they conclude that there is no support for the view that restricting the number of agents through licensing raises the average incomes of agents. Carroll and Gaston (1979) and Maurizi (1994), while not estimating complete structural models of the agent market, present correlations that suggest that licensing, indeed, does raise agent incomes. They find that licensing pass rates and agent incomes are negatively correlated, as would be expected if lower pass rates represent higher barriers to entry.

This article reexamines the issue of state licensing and its effects on incomes. We draw on new estimates of agent earnings by metropolitan area (MSA), and we adjust nominal incomes for regional cost of living differentials using the American Chamber of Commerce Research Association (ACCRA) regional cost of living index. The first section of the article sets forth the theoretical model. Section 2 discusses the empirical data and its sources. Section 3 presents empirical results. The final section summarizes relevant findings.

2. Licensing and the supply and demand for real estate agents

At any point in time, a person contemplating a career in real estate sales can be expected to compare the expected utility of the earnings as a real estate agent U(ERE) to the expected utility of the earnings from the person's next best alternative U(E.). If there are no barriers to entry and, thus, it is costless to enter the real estate field, the individual would become a real estate agent if $U(E_{RE})$ is greater than $U(E_a)$.

However, if a state licensing examination must be passed prior to becoming a real estate agent, the prospective agent must compare the present value of the expected gain in earnings utility over the individual's working time horizon with the cost (C_0), both in time and capital, of acquiring the necessary knowledge to pass the state examination. The expected marginal benefit of becoming a real estate agent in period t is the probability of passing the exam, pe, multiplied by $U(E_{RE})$ minus $U(E_a)$, or p_e $U(E_{RE})$ — $U(E_a)$.

We assume that the individual will choose to become a real estate agent if the expected net present value NPV_e of the investment in education and training necessary to pass the exam is positive—that is, if

$$NPV_e = \sum_{t=1}^{n} \frac{[p_e U(E_{RE,t}) - U(E_{a,t})]}{(1+r)^t} - C_0 > 0, \qquad (1)$$

where r is the individual's time value of money, or cost of capital, and the individual's expected marginal benefits are expected to accrue from time period t = 1 through period t=n[1] .

An individual is indifferent to changing to a real estate career when $NPV_e = 0$. By solving for the indifference probability when $NPV_e = 0$, the decision to take the examination becomes clear:

$$p_e = \frac{\sum_{t=1}^{n} U(E_{a,t})/(1+r)^t + C_0}{\sum_{t=1}^{n} U(E_{RE,t})/(1+r)^t}. \qquad (2)$$

Equation (2) suggests that increases in earnings as a real estate agent lowers an individual's required probability of passing the exam, while an increase in the cost increases the required probability. Moreover, higher wages in alternative employment increase the required probability of passing.

Suppose the pass rate is lowered, which has the effect of decreasing p_e to p_e^*, increasing C_0 to C_0^*, and increasing $E_{RE,t}$ to $E_{RE,t}^*$. The revised NPV, (NPV_e^*), is as follows:

$$NPV_e^* = \sum_{t=1}^{n} \frac{\lfloor p_e^* U(E_{RE,t}^*) - U(E_{a,t}) \rfloor}{(1+r)^t} - C_0^* > 0. \qquad (3)$$

By subtracting equation (3) from equation (1), the change in net present value attributable to a change in the pass rate is determined:

$$\Delta NPV_e = p_e^* \sum_{t=1}^{n} \frac{U(E_{RE,t}^*)}{(1+r)^t} - p_e \sum_{t=1}^{n} \frac{U(E_{RE,t})}{(1+r)^t} - \Delta C_0, \qquad (4)$$

where $\Delta NPV_e = NPV_e^* - NPV_e$, and $\Delta C_0 = C_0^* - C_0$. A lower pass rate results in $p_e^* < p_e$ and $C_0^* > C_0$. The additional entry barrier also may raise earnings so that $E_{RE,t}^* > E_{RE,t}$. In this case, the sign and magnitude of ΔNPV_e will be indeterminant.

The indifference probability of passing is found by setting equation (4) equal to zero and solving for p_e^* as follows:

$$p_e^* = p_e \left[\frac{\sum_{t=1}^{n} \frac{U(E_{RE,t})}{(1+r)^t} + \Delta C_0}{\sum_{t=1}^{n} \frac{U(E_{RE,t}^*)}{(1+r)^t}} \right]. \qquad (5)$$

The new break-even NPV probability is determined by the original probability of passing, the present value of the utility of original earnings, the additional cost imposed by the new pass rate, and the present value of the utility of new earnings. In simple terms, for the net present value for an individual to remain unchanged, increases in the initial cost of taking the exam must be offset by a sufficient increase in earnings in the real estate field. If not, the new (lower) pass rate will lower the NPV, reducing the likelihood that an individual will decide to enter the profession.

Past research has shown that pass rates on state licensing exams are negatively related to the number of complaints logged against real estate agents Shilling and Sirmans, (1988). Thus, higher complaint levels appear to lead to lower pass rates. This research suggests that state licensing boards use low pass rates to limit entry in order to raise the quality of service and protect consumers. Indeed, licensing boards may use low pass rates as a signal to potential entrants into the profession that substantial investment is necessary to acquire the knowledge necessary to pass the licensing exam. And, over time, lower pass rates can be expected to reduce the number of entrants into the profession, as the higher up-front investment costs reduce the payoff of becoming an agent.

In addition to increasing the difficulty of their licensing exams, many licensing boards impose additional entry restrictions such as education and experience requirements. Such requirements also raise the cost of entry into the real estate profession, making it less likely that an individual will choose to enter the field.

To explore the impact of licensing on the market for agents, we posit the following model of demand and supply for real estate agents:

- *Demand*: $E_i = f(A_i, H_i, PCH_i^* HC_i, Inc_i)$ (6)
- *Supply*: $A_i = f(E_i, H_i, PR_i, Ed_i, HC_i)$, (7)

where

A_i = number of real estate agents per 1,000 households in the ith MSA (1989);
E_i = average earnings of real estate agents in the MSA (1989) standardized for education, experience, gender, full-time work, and regional cost of living differentials;
Ed_i = a factor index of the education requirements for real estate licensure in the MSA (1989);
H_i = number of households in the MSA (1989), in 1,000s;
HC_i = an index of relative housing costs in the MSA (1990);
Inc_i = average household income in the MSA (1989) adjusted for regional cost of living differentials;
PCH_i = percent change in the number of households in the MSA (1985–90);
PR_i = percent of applicants passing the state broker's licensing examination in the previous period (1988).

The model consists of two equations and eight variables. The number of agents per household (A_i) and average agent earnings (E_i) are endogenous; while the other variables are exogenous. Both the demand equation and the supply equation are overidentified.

Prior research has looked extensively at the factors that influence the earnings of individual agents (see, for example, Glower and Hendershott, 1988; Crellin, Frew, and Jud, 1988; Sirmans and Swicegood, 1997; and Jud and Winkler, 1998). These studies have shown that earnings are influenced by human capital factors (education, experience, etc.) and aggregate market conditions (market size, income, etc). In our model of average earnings, or market demand, we assume the distribution of human capital factors constant and relate average earnings to the number of agents and market conditions.

In the market demand, or earnings equation (6), the sign on A; is expected to be negative because greater numbers of agents per household, other things equal, is thought to result in smaller commissions or lower numbers of houses sold per agent. Demand, or the earnings of agents, is expected to rise with the number of households and household income because real estate agency service is thought to be a normal good. The sign on the interaction term $(PCH_i^{\cdot}HC_i)$ is expected to be positive because agent demand is derived from the demand for housing services and, therefore, is positively related to housing market activity.2

In the supply equation (7), the sign on agent earnings (E_i) is expected to be positive. Supply also is expected to be positively related to the pass rate (PR_i). We assume that supply is responsive to the pass rate from a previous period. Because the pass rate is a signal to applicants of the level of study and effort required to pass the exam and their probability of passing, it is reasonable to assume that it takes time for the signal to be received and interpreted by potential applicants. The lagged value for the pass rate thus helps ensure that there is a one-way flow of causation in the supply equation (7).3

Supply is expected to be negatively related to the level of licensing educational requirements (Ed;). Housing cost (HC;) is included because agents are likely to be attracted to higher-cost

areas where commissions are likely to be larger. The number of households (Hi) is included as an additional exogenous variable that helps identify the supply function.

3. Empirical data

Empirical data to estimate the system of equations are available for 54 metropolitan areas. A listing of the specific MSAs included in the sample along with a table showing sample means and standard deviations is included in the Appendix. Data on the number of agents in each MSA were obtained from tabulations derived from the 1990 Census (Bureau of the Census, 1994). The data show the number of full-time equivalent workers in real estate sales as reported to the Census. The earnings variable in this study is derived from a vector of MSA dummy variable coefficients obtained from a real estate agent earnings equation estimated using Census data and reported previously by Jud and Winkler (1998).4 The earnings variable represents the relative level of average nominal earnings of real estate agents in the MSA, standardized for education, experience, gender, and full-time work. This measure of nominal earnings is deflated by the ACCRA regional cost of living index (1989) to adjust for regional differences in the cost of living. The housing cost variable (HC_i) is the ACCRA regional housing cost index (1989).

The lagged pass rate variable (PR_i) and the data for the educational variable (EDi) are taken from the NARELLO (1988 and 1990) annual reports. All other data are obtained from the Woods and Poole regional data bank. Average household income (Inc_i) is deflated by the ACCRA regional cost of living index.

The annual NORELLO reports reveal several ways to measure the stringency of state educational standards. Most states require a certain number of classroom hours to sit for the salesperson's exam. Additional classroom hours usually are required to take the broker's exam. After an agent is licensed, many states have begun to require continuing education hours prior to license renewal, which increase the cost and time necessary for an agent to remain licensed. We use the educational requirements reported in the NORELLO (1990) report.

To avoid the collinearity problems of using these multiple education indexes, we create an aggregate measure of state educational requirements using principal components. In essence, this method reduces the number of educational variables to a smaller subset that contains most of the licensing information from the full set.5 Table 1 reports a factor analysis with principal components as the factor method. The eigenvalue of 1.4413 (the sum of the squared factor loadings) suggests a strong common principal component for the three indexes; these indexes are the educational requirements for brokers and salespersons prior to taking their respective examinations as well as continuing education requirements necessary for license renewal. The proportion of total variance explained by one factor is approximately 48 percent (the eigenvalue divided by the number of indexes). All subsequent principal components (not reported in Table 1) have eigenvalues less than 1.0 and explain less than 1/p of the variation, where p denotes the number of original variables. Therefore, only the first principal component is reported in Table 1. The first column of Table 1 shows the coefficients for the principal components. Higher values of

Table 1. Principal component analysis.

Index Variable	Factor Loading	Factor Coefficient	Scoring
Educational broker	0.7730	0.5975	0.5363
Educational salesperson	0.7747	0.6001	0.5375
Continuing education	0.4936	0.2437	0.3425
Eigenvalue		1.4413	
Proportion		0.4804	

each index indicate higher educational requirements. The third column of Table 1 renders the scoring coefficients estimated by regression; the transformed data becomes the education variable for the regression analysis.

4. Empirical results

Table 2 shows the estimates of equations (6) and (7) obtained using two-stage least squares (TSLS). The equations were estimated using the White correction for heteroskedasticity-consistent standard errors and covariances. All but one of the estimated coefficients (that is, the coefficient on the income variable in the demand equation) are statistically significant at the 0.05 level using a two-tailed test.

As expected, the sign on the number of agents (A_i) in the demand equation is negative and the sign on earnings (E_i) in the supply equation is positive. In the demand equation, the elasticity of agent earnings with respect to the number of agents, estimated at the means, is — 0.82, indicating that average earnings is inelastic with respect to increases in the number of agents. Demand is strongly related the level of economic activity in the housing market, as measured by the interaction term $(PCH_i^*HC_i)$. In the supply equation, the elasticity of the number of agents with respect to earnings is 1.98, showing that supply is very elastic with respect to changes in earnings. Supply also is positively related to housing cost (HC_i), suggesting that agents are attracted to areas where commissions are likely to be higher.

The pass-rate variable (PR_i) in the supply equation is positive, which demonstrates that changes in the average pass rate exert a significant influence on the supply of agents. The elasticity of agent supply with respect to the examination pass rate is 0.60, inelastic with respect to the pass rate. The supply of agents is negatively related to the stringency of educational requirements. However, the estimated elasticity is small, indicating that supply is relatively unresponsive to changes in this variable. Using the model in Table 1 to simulate the effect of a 10 percent reduction in the examination pass rate, we find that average earnings increase 2.0 percent and quantity supplied falls — 2.7 percent.

Table 2. The market for real estate agents (two-stage least squares).

Dependent Variable	Demand Earnings (E_i)	Supply Agents (A_i)
Constant	2,830.552	− 15.532
	(2.94)	(3.46)
Agents (A_i)	− 351.301	—
	(− 2.35)	
	− 0.82	
Earnings (E_i)	—	0.005
		(4.14)
		1.98
Households (H_i)	1.050	− 0.002
	(3.50)	(− 2.82)
	0.20	− 0.18
Pass rate (PR_i)	—	0.069
		(2.86)
		0.60
Education (Ed_i)	—	− 0.813
		(2.19)
		− 0.05
Housing cost (HC_i)	—	0.052
		(3.78)
		0.74
Percent Charge in households (PCH_i)*		
Housing cost (HC_i)	1.139	—
	(3.65)	
	0.40	
Household income (Inc_i)	0.053	—
	(1.25)	
	0.33	
N	54	54
R^2	0.199	0.407

Note. T-values reported in parentheses. Elasticities evaluated at the means are listed below the t-values.

5. Conclusions and implications

This study develops and estimates a model of real estate agent demand and supply. The estimates of the model show that licensing affects the number and average income of real estate agents.6 The study also shows that the demand for agents is related to economic activity in the housing market. On the supply side, quantity supplied is found to be very elastic with respect to earnings.

The results reported here differ in several important respects from those reported in past studies. First, in the demand equation, the number of agents is shown to exert a clear negative influence on average earnings, as would be expected with traditional theory. Second, the pass rate in the supply equation is shown to be positive, indicating that state licensing boards affect agent supply by their decisions involving examination pass rates. Educational requirements are found to have little influence on supply, and therefore, a small influence on earnings of real estate professionals.

Table 3. Means and standard deviations.

Variable	Mean	Standard Deviation
Agents (A_i)	7.39	2.29
Earnings (E_i)	3,158.93	587.33
Households (H_i)	591.97	569.41
Pass rate (PR_i)	64.89	15.09
Education (Ed_i)	0.45	0.91
Housing cost (HC_i)	106.00	23.32
Percent change in households (PCH_i) *Housing cost (HC_i)	1,113.87	822.13
Household income (Inc_i)	19,333.26	1,249.69
N	54	54

Table 4. List of metropolitan areas.

1. Akron, OH PMSA
2. Albany-Schenectady-Troy, NY MSA
3. Allentown-Bethlehem-Easton, PA MSA
4. Atlanta, GA MSA
5. Austin-San Marcos, TX MSA
6. Bakersfield, CA MSA
7. Baton Rouge, LA MSA
8. Birmingham, AL MSA
9. Boulder-Longmont, CO PMSA
10. Charleston–North Charleston, SC MSA
11. Charlotte-Gastonia–Rock Hill, NC-SC MSA
12. Chicago, IL PMSA
13. Cincinnati, OH-KY-IN PMSA
14. Columbia, MO MSA
15. Dallas, TX PMSA
16. Dayton-Springfield, OH MSA
17. Denver, CO PMSA
18. El Paso, TX MSA
19. Fort, Worth, TX
20. Grand Rapids–Muskegon–Holland, MI MSA
21. Greensboro–Winston-Salem–High Point, NC MSA
22. Greenville-Spartanburg-Anderson, SC MSA
23. Harrisburg-Lebanon-Carlisle, PA MSA
24. Houston, TX PMSA
25. Indianapolis, IN MSA
26. Jacksonville, FL MSA
27. Knoxville, TN MSA
28. Las Vegas, NV-AZ MSA
29. Little Rock–North Little Rock, AR MSA
30. Los Angeles–Long Beach, CA PMSA
31. Louisville, KY-IN MSA
32. Memphis, TN-AR-MS MSA
33. Minneapolis, MN
34. New Orleans, LA MSA

Table 4. (continued)

35.	Oklahoma City, OK MSA
36.	Olympia, WA PMSA
37.	Orlando, FL MSA
38.	Phoenix-Mesa, AZ MSA
39.	Portland-Vancouver, OR-WA PMSA
40.	Raleigh–Durham–Chapel Hill, NC MSA
41.	Richmond-Petersburg, VA MSA
42.	Riverside–San Bernardino, CA PMSA
43.	Rocheste, NY MSA
44.	San Antonio, TX MSA
45.	San Diego, CA MSA
46.	Scranton–Wilkes Barre–Hazleton, PA MSA
47.	St Louis, MO-IL
48.	Syracuse, NY MSA
49.	Tacoma, WA PMSA
50.	Tampa–St. Petersburg–Clearwater, FL MSA
51.	Toledo OH MSA
52.	Tucson, AZ MSA
53.	Tulsa, OK MSA
54.	West Palm Beach–Boca Raton, FL MSA

Notes

1. If the costs in time and effort (C_0) are expected to occur in years following period t = 0, equation (1) must be modified as follows:

$$NPV_e = \sum_{t=1}^{n} \frac{\lfloor p_e U(E_{RE,t}) - U(E_{a,t}) - C_t \rfloor}{(1+r)^t} > 0.$$

2. If available, it might be desirable to include a more direct measure of housing transactions or other measure of housing stock turnover. However, we have not been able to locate a consistent national source for the number of home sales and similar measures of sales activity on a metropolitan (MSA) basis. Our decision to use MSA data is based on the need to construct an earnings variable that controls for education, experience, full-time work, and cost of living differences.
3. In this case, by using a lagged pass rate, it is expected that the lagged pass rate influences the number of real estate agent per 1,000 households; however, the opposite causation cannot occur.
4. Jud and Winkler (1998) estimate the following equation:

$$LnY = f(F/T, \text{Female}, \text{Sch}, \text{Exp}, \text{Region}),$$

where LnY is the natural log of annual earnings, F/T is a dummy variable equal 1 (0 otherwise) if employed full time, Female is a dummy variable equal 1 (0 otherwise) if female, Sch is the number of years of schooling, Exp is the number of years of general labor market experience, and Region is a vector of dummy variables representing the MSA of employment.

Data to estimate the equation are obtained from the Bureau of the Census (1994). These data reflect the earnings of workers in 1989. The "Region" variable is an array of 98 MSA dummy variables that is included to hold constant earnings differences among major areas of the country. Standard F-tests reveal that the metro-effects array (Region) is statistically significant. The calculated F-ratio is 5.08. The estimated regional earnings coefficients show

the effects of location on earnings, holding constant schooling, experience, gender, and part-time work.

5. Principle component analysis is used to explain the variance-covariance data structure through a lesser number of linear combinations of the original variables. The principal components replace the original variable (see Johnson and Wichern, 1982).
6. We do not attempt to assess the full magnitude of the welfare loss to consumers that results from professional restrictions to entry. Because past research (Shilling and Sirmans, 1988; Guntermann and Smith, 1988) has shown that entry restrictions raise the level of service quality and reduce consumer complaints, a complete analysis of the welfare effects must balance service quality gains against the lessened supply and higher incomes reported here.

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