Contract Incentives and Effort

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Abstract   In a prevailing employment contract the agent receives a
                  proportional split of commissions. Alternatively, the agent
                  receives a contract paying 100% of revenue above a fixed
                  payment to the firm. In this contract the firm has a prior payment
                  position, similar to a landlord or lender. The coexistence of these
                  equity-only and debt-equity type contracts allows testing
                  incentives for productivity and effort for real estate licensees in
                  the United States. Hourly wages and productivity are increasing
                  in the agent's split, up to and including 100%. Effort as measured
                  by hours worked are positively affected by the split. The contract
                  incentives motivate productivity and induce effort without
                  requiring monitoring.

In a traditional real estate employment contract, agents split the gross commissions earned proportionally with the firm. The firm is effectively an equity joint venture partner with the agent. The agent and firm receive compensation contemporaneously. The agent's split has conventionally been viewed as 50%, but it is negotiable. The result is a range of splits that allow the agent to respond to incentives.

Another employment contract has emerged in real estate. Instead of proportional sharing, the firm charges a fixed desk fee analogous to rent or a debt payment. That payment is no longer contemporaneous but prior to compensation received by the agent. The agent is left with a residual position, retaining any overage. In this 100% equity contract the agent is similar to a retail tenant after paying a fixed but no percentage rent to the landlord. The agent is similar to the landlord making a debt payment to the lender. The payment sequence is consecutive instead of contemporaneous. RE/MAX and Keller Williams are among firms that offer 100% equity contracts.

This paper examines how the agent responds to contract incentives with a range of splits including receiving 100% of the commission after a fixed fee. The contract is determined by agreement prior to the agent's production. The firm or principal has the problem of monitoring effort and productivity, satisfied by providing appropriate incentives.

The model divides total revenue generated into the portion allocated to the firm and the agent. The agent's earnings are the product of the average hourly wage

and hours worked. This division allows separate incentive effects to be determined for productivity in the hourly wage and effort in hours worked.

Estimation is for 1,750 real estate licensees in 2004 in the United States, using a sample from the National Association of Realtors (NAR). As compared with a benchmark 50:50 partnership, higher splits to the agent result in increased hourly wages and productivity. Each successive increment in agent compensation results in higher average productivity. Effort or hours worked differ between the 100% contract and the base 50:50 contract. In addition, hours worked are successively increasing, but these are not statistically different among the contract groups above the 50:50 contract except for agents on the 100% contract. Percentage increases in productivity translate into similar total earnings gains for the agents. The results are controlled for location, market, education and experience, and demographic characteristics including race, gender, and ethnicity.

At some point the firm is unwilling to surrender its return to star agents, and that provides the underlying rationale for the 100% contract. The 100% contract allows the firm as principal to change the negotiations to put a floor on its return to cover its fixed costs. The agent benefits from being able to bargain over the incremental return. The 100% contract prevents firms from becoming negligible equity partners while retaining incentives for agents to work harder and produce.

The next section provides some background on contracts for real estate agents. Next, the model is introduced, along with its specifications. In the model, the agent negotiates a split with the firm on commissions generated. The unique risk of the 100% contract compared to other split contracts suggests a potential sample selection problem that should be addressed. Therefore, a probit model is estimated in the first step. Conditional on the contract the agent responds with average productivity as the hourly wage and with hours worked. The data are discussed next, followed by an interpretation of the empirical results. The paper closes with concluding remarks.

Background

The contract between a real estate agent and a broker has elements of sharecropping, equity sharing, and venture capital. The contract has evolved to allow agents to retain 100% of commissions above a fixed amount, analogous to a debt-equity or landlord-tenant sequential payoff structure. The spectrum includes proportional payments that make the agent and principal equity partners when the split is less than 100%. The principal or broker observes the agent's track record, allowing the split to be negotiated. Kaplan and Stromberg (2003) examine this track record. They indicate the contract structure, which includes sequential payment rights.

Rationales have been presented for why some agents accept 100% contracts and become self-employed entrepreneurs. Self-employment reduces agency problems associated with creating optimal incentives. Lazear (2004) hypothesizes that

entrepreneurs are generalists who do not excel in any one skill but are competent in many. In Lazear (1981) and Lazear and Moore (1984), self-employed workers have flatter and more variable wage rates with experience. As confirmation, Evans and Leighton (1989) find that the return to a year of experience for self-employment is 2.1% versus 5.6% in wage work. That effort has been examined in the real estate market by Benjamin, Jud, and Sirmans (2000) for hours worked of licensees. McGreal and Webb (2010) consider listings and sales time in the United Kingdom.

Regarding the split, Holmström (1979) models sharing rules in the principal-agent relationship given various states of observable information. A proportional sharing rule is optimal for specific utility functions. Baker (1992) develops a linear incentive contract system in a compensation contract. These incentives are testable for real estate agents. They have contracts with explicit incentives through the split, and output is observable and measurable.

Real estate research has investigated how incentive contracts are related to agent hours worked, earnings, and selling price. Miceli (1991) examines the influence of splits on broker hours worked. Splitting creates an incentive for brokers to acquire and share listings. Sirmans and Turnbull (1997) find that the commission rate responds to changes in the housing market and agent costs.

Williams (1998) finds a proportional rate is optimal by reducing dissipative actions. Bruce and Santore (2006) argue that above-normal commission rates are consistent with competition, and that a lower rate may lead to reduced hours worked.

Benjamin, Chinloy, Jud, and Winkler (2007) examine the work incentive differentials of a contract. Miceli, Pancak, and Sirmans (2007) show that while the ownership of a listing may be privately valuable, it is not competitively efficient. Technology acts to leverage human capital, permitting agents to extend their market size and enhancing communication with sales prospects.

Munneke and Yavas (2001) develop a model based on the agent maximizing commission profits. The most productive agents self-select into a 100% equity contract and there is an inducement to work harder. Agents on a 100% equity contract pay a fixed desk fee, and expend more effort on acquiring listings. The marginal effort per listing decreases with the number of listings acquired. Empirical tests examine whether 100% agents obtain higher house prices or reduced time-on-the-market. Freedom of entry dissipates any performance differentials in the house price and selling time.

The Model

The agent has skills such as education and experience. Some of these skills are specific to the industry, including years of experience licensed and whether specializing in listing or selling. Others are specific to the firm, including years

working there. These skills and characteristics of the agent are X. The agent and firm negotiate a contract prior to actual performance. The contract offers the agent a split of $s(X)$, $0 \leq s(X) \leq 1$. That contract includes the possibility of the agent receiving 100% of the income generated above a threshold. In this case the agent pays a fixed fee to the firm

The choice of contract split depends on the agent's preferences. Total time available to the agent is γ, bounded by 24 hours in a day. The number of hours worked are h. The agent's utility is $u(\gamma - h, s, X)$. Hours worked h reduce utility and the contract split s allows more consumption. Utility depends on the characteristics X. Agents may have preferences for being their own boss. Those preferences are $u_1(\gamma - h_1, 1 : X_1)$ for threshold levels of hours worked h_1, split $s = 1$, and characteristics X_1. A preference for being one's own boss means that utility is at least this threshold level, with $u(\gamma - h, s, X) \geq u_1(\gamma - h_1, 1 : X_1)$.

This condition leads to a distribution of agents over contracts and the decision rule:

$$
s = \begin{cases} 0 < s < 1 & u(\gamma - h, s, X) < u_1 \\ 1 & u(\gamma - h, s, X) \geq u_1 \end{cases} \tag{1}
$$

Equation (1) describes the selection of the contract. Those with preferences to be their own boss view the firm as a debt provider or landlord and $s = 1$. Agents willing to split earnings with the firm have contracts with splits $s < 1$.

The production or gross earnings of the agent are $f(h, s : X)$ depending on the hours worked h, split s, and characteristics X, such as education, experience, and specialization. The production function f is increasing and concave in the hours and split h, s. The net earnings of the agent are $sf(h, s : X)$. The firm's return for a split $s < 1$ is production less the agent's share or $f(h, s : X) - sf(h, s : X)$. When the agent chooses the 100% equity contract, the firm pays a fixed desk fee κ as rent.

The firm's profit is maximized subject to the agent's utility and preferences as a constraint. This maximization is on $(1 - s)f$ subject to the incentive compatibility constraint on utility at limit u^* and the self-selection on the split (1). The maximization problem is:

$$
\max_{s,h} (1 - s)f(\gamma - h, s : X) \tag{2}
$$

$$
ST \quad \begin{array}{ll} u(\gamma - h, s : X) < u^* & s < 1 \\ u \geq u^* & s = 1 \end{array}
$$

The maximization problem is $(1 - s)f(s, h) + \theta_1(u(s, \gamma - h) > u^*) + \theta_2(1 - s)$ for a given skill set X. Prices of the incentive compatibility and self-selection constraints are θ_1, θ_2. Maximizing firm profits with respect to the split and hours leads to the first-order condition, where lower-case letter subscripts indicate partial derivatives:

$$\begin{cases} s : (1 - s^*)f_s - f - \theta_1 u_s + \theta_2 s^* = 0 \\ h : -(1 - s^*)f_h + \theta_1 u_h = 0 \end{cases} \qquad (3)$$

From the optimal split and hours, the hourly wage satisfies:

$$w^*(s^*, X) = \frac{s^*(h^*, X)f(h^*, s^* : X)}{h^*}. \qquad (4)$$

The wage is conditional on the self-selection for those taking an equity contract. The agent's ability to generate sales and revenue is in the production function f. The optimal split and hours are obtained from the optimization as s^*, h^*. These determine the hourly wage as w^*.

Specification

The agent negotiates a contract choice indexed by I. A 100% contract agent receives all earnings above a fixed desk fee or rent, and is denoted by $I = 1$, $s = 1$. An agent under a split commission contact has $I = 0$, $0 < s < 1$. The agent prefers a 100% contract over splitting with the firm for given characteristics X when:

$$I^* = u(s = 1) - u(s < 1) > 0. \qquad (5)$$

A linear specification is $I^* = X\alpha + v$ with parameters α and $E(I^*) = X\alpha$. A disturbance term v has zero mean with $E(v) = 0$. The assignment is:

$$\begin{cases} I^* = X\alpha + v \\ I = 1 \quad s = 1 \quad X\alpha + v \geq 0 \\ I = 0 \quad s < 1 \quad X\alpha + v < 0 \end{cases} \qquad (6)$$

An agent with the 100% contract has $s = 1$. Skills including experience, education, and specialization are observed in X. The conditional assignment of the agent is an adverse selection, where those with fewer skills are assigned smaller splits. The self-selection variable is m.

The wage and hours equations are estimated concurrently as:

$$\begin{cases} w = X_w\beta_w + \theta_w s + \lambda_m m + \varepsilon \\ h = X_h\gamma_w + \theta_h s + \lambda_m m + \omega \end{cases}. \tag{7}$$

The selection parameter on whether a person wants to accept the 100% contract is λ. The split is s with parameters θ. If the split induces greater productivity or effort, $\theta > 0$.

Data and Empirical Results

The data for this study are from the National Association of Realtors Member Survey. The sample includes 8,450 agents surveyed in June 2005 for the 2004 calendar year. The data distinguish wage and hours worked by contract conditions including split. The survey provides information on beginning and end of year agent split, total compensation, hours worked, and skill and demographic variables.

To focus the study, personnel other than sales agents are excluded. Additional constraints are that agents must earn at least 50% of their real estate income from residential sales and receive at least a 50% commission split. Those agents who received less than a 50% commission comprise 4.6% of the all agents in the NAR survey of residential agents. These agents could be in training or have a fixed salary in addition to a commission. Because there is reason to believe that these agents are atypical compared to other agents on commission, they were excluded from the final sample.

With these restrictions and for those answering on hours, split, compensation income to determine tax rates there are 3,099 applicable observations. The additional restriction of the seemingly unrelated regression (SUR) is concurrent, non-missing observations in both the wage and hours equations results in 1,750 observations for the regression analysis. Those employed as full time are defined using the Bureau of Labor Statistics measure of working at least 20 hours per week.

Respondents indicate the local market where they operate. To adjust for these local market conditions, metro employment and unemployment data are obtained from the BLS. To control for regional variation in house prices, the median in the local market for the fourth quarter of 2004 is used from the National Association of Realtors.

Sample statistics on the contract, showing the variation in the agent shares are in Exhibit 1. The pooled sample columns are for the entire sample, reflecting promotions and demotions. The split agent unchanged columns shows the descriptive statistics for agents who kept the same split for the entire calendar year. The contract terms at the beginning of the year are known before returns are observed.

The conventional notion that the agent and firm split the revenue 50:50 is not necessarily the case. While 27% are on a 50:50 split, 73% of agents have contract splits more than 50%. Of all agents, 13% are on 100% contracts paying the firm a fixed rental or desk fee.

Exhibit 1 has sample statistics for non-contract variables. The average agent works 42.2 hours a week with annualized hourly earnings of $1,542, and has earnings of about $65,000 per year. Based on a 50-week work year, the average hourly wage is $30.83. The average full-time agent has 14.7 years of schooling and 10.7 years of experience.

Empirical findings for the probit model are N in Exhibit 2. The dependent variable is whether or not the agent holds a 100% contract at the beginning of the calendar year. Column section 1 shows the findings of all agents, while column section 2 focuses on agents who did not have a change in their commission split during the year. The findings indicate that experience increases the likelihood that an agent will have a 100% contract. Likewise, agents who have a personal webpage for business or own other residential properties are more likely to have a 100% contract. Agents who are married, female, describe themselves as firm employees, or work for larger firms are less likely to have 100% contracts.

Results for wages of agents are shown in Exhibit 3. The table distinguishes between all agents and those who kept the same percentage payout of their contract for the entire calendar year. An interactive variable for experience and the 100% contract is included, and the coefficient is negative. At higher levels of experience, the 100% contract recipient eventually has a wage below that at the 91%–99% level. This result is consistent with the loss of comparative advantage in entrepreneurial activity in Moskowitz and Vissing-Jorgenson (2002).

The contract split is divided into split categories. The reference group is those receiving a 50% split. The groups are in deciles beginning at 51%, 61%, 71%, 81%, and 91% with a separate category for 100% contracts. The base group is agents on a 50:50 split.

Agents receiving 51%–60% are more productive than those in the reference category of 50%. Once the agent receives more than 60% of the revenue, wages rise sharply, and continue to increase successively throughout the split contracts. For a 100% contract, the wage increase reflects a prominent jump compared to split contracts. The hourly wage is net of all business expenses, and therefore, reflects the fixed costs obligations incurred by agents with 100% contracts. The coefficients appear uniformly larger for agents who did not incur a split change during the calendar year.

Exhibit 1 | Descriptive Statistics of Non-Commission Share Variable

	Pooled			Agent Split Unchanged		
	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.
Beginning of Year Commission	67.966	17.383	3,099	70.927	18.374	2,181
End of Year Commission	71.882	18.412	3,099	70.927	18.374	2,181
50% Commission Split	0.271	0.445	3,099	0.2423	0.429	2,181
51%–60% Commission Split	0.187	0.390	3,099	0.159	0.365	2,181
61%–70% Commission Split	0.213	0.410	3,099	0.194	0.395	2,181
71%–80% Commission Split	0.134	0.340	3,099	0.146	0.354	2,181
81%–90% Commission Split	0.038	0.192	3,099	0.045	0.207	2,181
91%–99% Commission Split	0.028	0.166	3,099	0.037	0.189	2,181
100% (No Commission Split)	0.126	0.331	3,099	0.174	0.379	2,181
Net Hourly Wages (Annualized) ($)	1,541.510	2,733.770	3,099	1,511.670	2,953.650	2,181
Ln(Net Wages Annualized)	7.105	0.922	3,099	7.043	0.960	2,181
Ln(Net After Tax Wages)	6.257	1.108	2,996	6.181	1.157	2,113
Hours Worked Weekly	42.154	15.478	3,099	41.061	15.821	2,181
Ln(Weekly Hours)	3.645	0.505	3,099	3.607	0.537	2,181
Own Listings / Other Agents Listings Sold	0.584	1.111	2,937	0.583	1.119	2,076
Personal Webpage for Business	0.486	0.500	3,099	0.448	0.497	2,181
Employee of Firm	0.016	0.125	3,099	0.017	0.129	2,181
Number Vacation Homes Owned	0.182	0.484	3,094	0.181	0.483	2,177
Number Other Residential Properties Owned	1.163	3.322	3,091	1.191	3.414	2,178

	Pooled			Agent Split Unchanged		
	Mean	Std. Dev.	Obs.	Mean	Std. Dev.	Obs.
Years of Schooling	14.709	1.968	3,096	14.675	1.962	2,179
Years of Experience	10.672	9.875	3,078	10.998	9.933	2,164
Years of Experience Squared	211.382	326.210	3,078	219.568	326.316	2,164
Years of Experience with Firm	5.946	6.277	3,001	6.049	6.383	2,115
Married	0.727	0.445	3,099	0.722	0.448	2,181
Real Estate Not First Career	0.957	0.202	3,099	0.960	0.197	2,181
Broker	0.178	0.383	3,099	0.189	0.392	2,181
Owner	0.004	0.062	3,099	0.005	0.068	2,181
Female	0.561	0.496	3,099	0.549	0.498	2,181
African-American	0.040	0.196	3,099	0.038	0.190	2,181
Asian	0.020	0.140	3,099	0.019	0.136	2,181
Native	0.008	0.088	3,099	0.008	0.091	2,181
Hispanic	0.031	0.172	3,099	0.034	0.180	2,181
Ln(Firm Size, Number of Employees)	4.104	1.917	3,099	3.925	1.941	2,181
Employment Growth, Area, 2004 %	1.257	1.274	2,317	1.278	1.278	1,659
Employment, Area, 12/04, millions	1.097	1.026	2,317	1.076	1.000	1,659
Median Housing Price in MSA ($1,000)	195.573	81.877	2,020	194.082	82.224	1,439
Ln(Median Housing Price)	5.206	0.360	2,020	5.198	0.359	1,439
Full Time	0.885	0.319	3,099	0.865	0.342	2,181

Exhibit 2 | Agent Splits: Probit Estimates

Variable	(1) Pooled Sample			(2) Agent Split Unchanged		
	Coeff.	SE	P-value	Coeff.	SE	P-value
Constant	−1.6244	0.2717	0.0001	−1.7885	0.3000	0.0001
Own Listings / Other Agents Listings Sold	−0.0462	0.0303	0.1271	−0.0436	0.0326	0.1810
Years of Schooling	0.0092	0.0161	0.5671	0.0216	0.0178	0.2241
Years of Experience	0.0971	0.0112	0.0001	0.0985	0.0122	0.0001
Years of Experience Squared	−0.0021	0.0003	0.0001	−0.0021	0.0004	0.0001
Married	−0.1281	0.0702	0.0682	−0.1143	0.0770	0.1375
Female	−0.1589	0.0642	0.0133	−0.1672	0.0705	0.0177
Personal Webpage for Business	0.4376	0.0655	0.0001	0.5729	0.0716	0.0001
Employee of Firm	−0.4217	0.3157	0.1816	−0.4600	0.3361	0.1710
No. of Other Resid. Prop. Owned	0.0281	0.0079	0.0004	0.0348	0.0093	0.0002
Ln(Firm Size)	−0.0985	0.0166	0.0001	−0.0785	0.0182	0.0001

Notes: The dependent variable = 1 if agent has a 100% contract and zero otherwise. Column section (1) shows the entire (entire) sample of agents and brokers. Column section (2) shows those agents and brokers that retained the same split during the year. Own Listings / Other Agents Listings Sold is the ratio of listings sold from the agents own listings divided by the number of listings sold by the agent that are from listings of other agents. Years of schooling based on highest level of education completed. Years of experience based on years active as a real estate professional. Married = 1 if the agent is married. Female = 1 if the agent is female. Personal Webpage for Business = 1 if the agent has own web page for real estate business purposes. Employee = 1 if the agent is affiliated with the real estate firm as an employee. No. of Other Resid. Prop. Owned is the number of residential properties owned for investment purposes (excludes primary residence and vacation homes). Logarithm of firm size is in number of employees. For the Pooled Sample, $N = 2,898$ and Log-Likelihood $= -984.23$; for Agent Split Unchanged, $N = 2,048$ and Log-Likelihood $= -833.95$.

While 100% contracts result in high wages compared to others, they reflect the wages of a comparatively small percentage of high performing agents who are willing to accept the risk of self employment, and who are capable of achieving high levels of productivity. Moreover, the contract coefficients appear consistently larger for agents whose split remains unchanged during the calendar year, suggesting that stability of the contract is accompanied by higher wages.

In addition to the contract, skill measures influence wages. An additional year of general real estate experience and specific firm experience raises wages by 2.6% and 2.2%, respectively. The experience effect is concave, increasing at a

Exhibit 3 | 3SLS SUR Regressions of Hourly Wages: Skills and Contract Incentives

Variable	(1) Pooled Sample			(2) Agent Split Unchanged		
	Coeff.	SE	P-value	Coeff.	SE	P-value
Constant	3.9210	0.4158	0.0001	4.0215	0.4808	0.0001
Agent Share						
51%–60%	0.5775	0.1694	0.0007	0.6166	0.2034	0.0024
61%–70%	0.9703	0.1899	0.0001	1.1282	0.2250	0.0001
71%–80%	1.2789	0.2061	0.0001	1.5460	0.2394	0.0001
81%–90%	1.4611	0.2332	0.0001	1.7797	0.2670	0.0001
91%–99%	1.5521	0.2255	0.0001	1.8470	0.2589	0.0001
100% (fitted value from probit)	2.2775	0.4542	0.0001	2.3897	0.4313	0.0001
Skills						
Years of Schooling	0.0228	0.0102	0.0254	0.0252	0.0118	0.0334
Years of Experience	0.0264	0.0159	0.0971	0.0274	0.0171	0.1080
Years of Experience Squared	−0.0007	0.0004	0.0581	−0.0008	0.0004	0.0326
Years of Experience with Firm	0.0219	0.0049	0.0001	0.0230	0.0056	0.0001
Full Time	−0.4013	0.0663	0.0001	−0.4580	0.0730	0.0001
Second Career	−0.3073	0.0966	0.0015	−0.2465	0.1134	0.0297
Broker	−0.1389	0.0652	0.0330	−0.1057	0.0712	0.1376
Owner	0.4950	0.3809	0.1937	0.4799	0.4153	0.2479
Own Listings / Other Agents Listings Sold	0.0472	0.0194	0.0150	0.0425	0.0222	0.0554
Macro and Controls						
Ln(Firm Size)	0.0744	0.0139	0.0001	0.0623	0.0140	0.0001
Employment Growth in Metro.	−0.0274	0.0246	0.2668	−0.0241	0.0262	0.3578
Dec. 2004 Employment in Metro.	−0.0755	0.0262	0.0040	−0.0708	0.0303	0.0197
Ln(Median Housing Price)	0.3783	0.0666	0.0001	0.3016	0.0775	0.0001

Notes: The wages regression and hourly wages regression are estimated as seemingly unrelated equations. The dependent variable is the employee's wage, the logarithm of the before-tax annualized hourly net wage; wages are net of business expenses. Independent variables: Contract incentives: share of total production retained by employee from 50% through 100%; the 50% commission group is the base. The 100% contract variable is formed from the fitted probabilities from the probit equation. Skills: Years of schooling based on highest level of education completed. Years of experience based on years active as a real estate professional. Full Time = 1 if agents working more than 20 hours per week. Second Career = 1 if employee had another job previously outside of real estate. Broker = 1 if holding this license designation. Owner = 1 if owns firm. Macro and Controls: Logarithm of firm size in number of employees. Employment growth rate in the MSA is for December 2003–December 2004. December 2004 MSA employment is in millions. Estimates include controls for marital status, gender and race-ethnicity variables for African-American, White, Asian, Hispanic and Native-American. For the Pooled Sample, N = 1,750 and Log-Likelihood = −2,138.09; for Agent Split Unchanged, N = 1,259 and Log-Likelihood = −1,506.68.

Exhibit 4 | 3SLS SUR Regressions of Hours Worked: Skills and Contract Incentives

	(1) Pooled Sample			(2) Agent Split Unchanged		
Variable	Coeff.	SE	P-value	Coeff.	SE	P-value
Constant	2.5223	0.1580	0.0001	2.4136	0.1903	0.0001
Agent Share						
51%–60%	0.1552	0.0644	0.0159	0.1978	0.0805	0.0140
61%–70%	0.1588	0.0722	0.0278	0.2195	0.0890	0.0137
71%–80%	0.1974	0.0783	0.0117	0.2578	0.0947	0.0065
81%–90%	0.2261	0.0886	0.0107	0.2972	0.1057	0.0049
91%–99%	0.2379	0.0857	0.0055	0.3473	0.1024	0.0007
100% (fitted value from probit)	0.4010	0.1726	0.0202	0.4661	0.1707	0.0063
Skills						
Years of Schooling	−0.0028	0.0039	0.4717	−0.0021	0.0047	0.6467
Years of Experience	−0.0084	0.0060	0.1659	−0.0120	0.0068	0.0749
Years of Experience Squared	0.0002	0.0001	0.2552	0.0002	0.0002	0.1359
Years of Experience with Firm	0.0003	0.0019	0.8545	0.0011	0.0022	0.6041
Full Time	1.1292	0.0252	0.0001	1.1105	0.0289	0.0001
Second Career	0.0129	0.0367	0.7255	−0.0096	0.0449	0.8314
Broker	0.0099	0.0248	0.6894	0.0117	0.0282	0.6784
Owner	0.0857	0.1447	0.5539	0.2293	0.1643	0.1630
Own Listings / Other Agents Listings Sold	0.0139	0.0074	0.0602	0.0139	0.0088	0.1140
Macro and Controls						
Ln(Firm Size)	0.0248	0.0053	0.0001	0.0215	0.0056	0.0001
Employment Growth in Metro.	−0.0020	0.0094	0.8300	−0.0083	0.0104	0.4221
Dec. 2004 Employment in Metro.	−0.0040	0.0100	0.6841	−0.0127	0.0120	0.2898
Ln(Median Housing Price)	−0.0080	0.0253	0.7527	0.0103	0.0307	0.7368

Notes: The wages regression and hourly wages regression are estimated as seemingly unrelated equations. The dependent variable is agent hours worked, the logarithm of hours worked per week. Independent variables: Contract incentives: share of total production retained by employee from 50% through 100%; the 50% commission group is the base. The 100% contract variable is formed from the fitted probabilities from the probit equation. Skills: Years of schooling based on highest level of education completed. Years of experience based on years active as a real estate professional. Full Time = Agents working more than 20 hours per week. Second Career = 1 if employee had another job previously outside of real estate. Broker = 1 if holding this license designation. Owner = 1 if owns firm. Macro and Controls: Logarithm of firm size in number of employees. Employment growth rate in the MSA is for December 2003–December 2004. December 2004 MSA employment is in millions. The logarithmic before-tax fitted wage (wage) variable from Table 3 is used to calculate the after-tax rate. Estimates include controls for marital status, gender and race-ethnicity variables for African-American, White, Asian, Hispanic and Native-American. For the Pooled Sample, $N = 1,750$ and Log-Likelihood = −444.74; for Agent Split Unchanged, $N = 1,259$ and Log-Likelihood = −339.56.

Exhibit 5 | Contract Coefficient Equality Tests for Wages and Hours Worked

Coefficient Equality Test:	(1) Wage Regression		(2) Hours Worked Regression	
	Pooled Sample	Agent Split Unchanged	Pooled Sample	Agent Split Unchanged
51% − 60% = 61% − 70%	0.39	0.52	0.00	0.02
	31.62	35.72	0.02	0.41
	(0.01)	(0.01)	(0.90)	(0.53)
61% − 70% = 71% − 80%	0.31	0.42	0.04	0.04
	19.77	27.81	2.14	1.49
	(0.01)	(0.01)	(0.15)	(0.23)
71% − 80% = 81% − 90%	0.18	0.23	0.03	0.04
	2.67	3.70	0.46	0.67
	(0.11)	(0.06)	(0.50)	(0.42)
81% − 90% = 91% − 99%	0.09	0.07	0.01	0.05
	0.38	0.19	0.04	0.66
	(0.54)	(0.67)	(0.84)	(0.42)
51% − 60% = 100%	1.70	1.77	0.25	0.27
	31.87	49.66	4.61	7.26
	(0.01)	(0.01)	(0.04)	(0.01)
61% − 70% = 100%	1.31	1.26	0.24	0.25
	22.23	31.52	5.29	7.69
	(0.01)	(0.01)	(0.03)	(0.01)
71% − 80% = 100%	1.00	0.84	0.20	0.21
	14.19	15.65	4.09	6.09
	(0.01)	(0.01)	(0.05)	(0.02)
81% − 90% = 100%	0.82	0.61	0.17	0.17
	9.42	7.68	2.99	3.76
	(0.01)	(0.01)	(0.09)	(0.06)
91% − 99% = 100%	0.73	0.54	0.16	0.12
	6.51	5.37	2.28	1.64
	(0.02)	(0.03)	(0.14)	(0.20)
51% − 60% = 61% − 70% =	—	—	—	—
71% − 80% = 81% − 90% =	107.64	141.77	8.09	12.92
91% − 99% = 100%	(0.01)	(0.01)	(0.16)	(0.03)

Notes: The absolute difference in the agent share category coefficients from Exhibits 3 and 4 is reported on the top line. The statistical significance is measured by the Wald statistic that is reported on the second line. The statistical significance level of the Wald statistics is shown in parentheses on the third line.

decreasing rate. Agents who sell more of their own listings earn higher wages. Agents who had a previous career outside of real estate earn 26% less. Larger firms have scale and scope advantages that increase the wage. A 1% increase in the median housing price raises wage by 0.38%. Higher hourly wages are earned in more expensive housing markets.

The impact of contract terms on hours worked is shown in Exhibit 4 for all agents and those who kept the same payout for the calendar year. All contract coefficients are positive and statistically significant at the 5% level, and hours worked increase with the agent's split. Most notably, 100% contract agents work more hours than those on split contracts. Comparing all agents in the sample with agents whose split is unchanged during the calendar year, hours worked is higher across all split deciles.

With the exception of agents who are categorized as full time by virtue of working at least 20 hours, none of the other skill coefficients is statistically significant at the 5% level. Agents at larger firms work more hours. Contracts appear to provide motivation for agents to work more hours.

A remaining test is for equality of the contract coefficients for wages and hours worked. The joint test in Exhibit 5 indicates that the coefficients for wages are statistically different from each other. Split interval tests are shown with the associated levels of statistical significance. Wages of agents in contract deciles of 51%–80% are significantly higher than wages of agents on 50:50 splits; these differences are statistically significant at the 1% level. In addition, 100% contracts result in higher wages than all other contacts. These differences are statistically significant at the 5% level.

The joint tests of coefficients on hours worked indicates that for agents as a whole, contract splits do not have a statistically significant impact on hours worked. Agents working on 51%–80% split contracts whose splits are unchanged during the year and work fewer hours than those on a 100% contract.

Conclusion

Technology that facilitates communication and contacts has enabled agents to make a choice between incentive and focus. This has led to a dispersion of contracts by agent split. Higher splits motivate agents to increase wages and average productivity. This wage is particularly pronounced once an agent has more than a 60% split. Agents on a 100% contract have significantly higher wages and agents receiving a split, even after subtracting expenses. This is consistent with their holding additional risk.

Hours worked increase with the contract split, and 100% contract agents work more hours than agents on a split contract. For agents that keep the same split arrangement, the hours worked are higher across all categories including 100%

contracts. Other variables are largely unimportant in explaining hours worked, suggesting that real estate firms should view contracts as the most important motivator for enticing agents to work harder.

Munneke and Yavas (2001) suggest that 100% contracts lead to an adverse selection. More productive agents are attracted to the entrepreneurial nonlinear contract. The adverse selection here goes further. Contracts that pay agents 51%–99% splits lead to focus and a higher wage when compared to 50:50 split contracts.

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