Brokerage Intermediation in the Commercial Property Market

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Abstract

This study is one of the first to investigate brokerage intermediation effects in the income-producing commercial property market. Employing multifamily sales data from the Atlanta and Phoenix markets under alternative brokerage specifications, little evidence to support the existence of systematic, differential transaction pricing outcomes due to the presence of brokers is found. The results suggest that the existence of brokerage intermediation effects is likely minimal in commercial markets that are relatively transparent, that have participants who are knowledgeable, and where value and price are typically determined based on a property's income-generating capacity.

A brokerage intermediation effect refers to the ability of brokers to bring about differing market outcomes measured by real estate transaction price or time on market. Subsequent to Yinger's (1981) initial work on real estate brokerage, researchers have expressed a wide range of opinions, hypotheses, and postulates on the potential impact of brokerage intermediation. To date, however, empirical evidence supporting the existence of brokerage intermediation effects can be described as both limited and sometimes contradictory. While there are a few studies from the residential brokerage literature supporting the existence of intermediation effects, consistent evidence of such effects has not been generated.

The present work separates itself from the existing literature by being the initial investigation focused on brokerage intermediation in the commercial property market.[1] Apartment sales data with brokerage attributes from the Atlanta and Phoenix markets are used to test for the potential of a brokerage intermediation-induced pricing effect. The commercial property market differs from the residential property market because consumption is generally removed from the purchase decision and participants seek to maximize returns and optimize the investment decision. Commercial properties are purchased as investments generating income and appreciation returns. By investigating the presence of brokerage intermediation effects as measured by a pricing effect in the more transparent, return-oriented, income-producing property market where the private

party participants are typically knowledgeable, active owners and managers, the brokerage literature is extended and the existing debate on the potential effects associated with real estate brokerage activities is broadened.

The study findings imply little effect of brokerage intermediation on the sale prices of income-producing multifamily properties. The potential for brokerage intermediation to impact transaction price appears limited in markets where market participants are knowledgeable and are often known to one another. In markets characterized by relatively small numbers of typically informed, return-oriented participants and a small number of transactions, the market dynamics associated with brokerage differ from residential markets composed of substantially more unknown buyers, sellers, and brokers.[2] The results suggest that a pricing-based brokerage intermediation effect is more likely to be evident in the residential property market where the duality of the investment and consumption decision is more likely to affect individual market participants than in the relatively transparent commercial property market. Sections addressing the extant brokerage intermediation literature, data choice, empirical analysis, and concluding remarks follow.

Brokerage Intermediation Literature and Hypothesis

Existing research on real estate brokerage intermediation is solely focused on the residential property market. A summary of the extant literature on the pricing effect associated with residential brokerage intermediation is provided in this section. Brokerage intermediation in the commercial property market is then discussed and the testable hypothesis is developed. The investigation broadens the application of brokerage intermediation effects to the income-producing property market.

Yinger (1981) outlines a theoretical model of the supply and demand for brokerage services that provides the basis for subsequent studies of real estate brokerage. Salant (1991) provides a theoretical basis for the sequencing of asking price between the for sale by owner and broker marketed phases of a transaction and predicts that the property listing price will jump when transitioning from owner to broker marketed properties. Yavas (1992) delineates broker effects on the search behavior of residential buyers and sellers and postulates that search intensity decreases with broker-listed properties and that accompanying price increases associated with listing do not fully cover brokerage fees. Turnbull (1996) shows that brokers can compete along valuable ‘‘nonprice’’ lines such as level and quality of services offered to consumers of brokerage services, which suggests that intermediation effects may present themselves in metrics other than property price.

Empirical studies on the pricing effect of residential brokerage produce mixed results. Jud (1983) empirically investigates the impact of real estate brokers on the market price of residential housing and finds that brokers do not affect property price. Brokers, however, do stimulate consumer demand. Black and Nourse (1995)

examine the impacts of buyer agency on residential property price and the distribution of closing costs. They find no significant price effect, but do provide evidence of a significant reduction in closing costs paid by the buyer when using a buyer agent. Jud, Seaks, and Winkler (1996) study property marketing time effects with residential brokerage. Their study finds that while some pricing strategies impact property duration, there is little evidence to support the existence of a brokerage intermediation pricing effect, which is the focus of this paper. Elder, Zumpano, and Baryla (2000) revisit the issue of residential brokerage representation and market outcomes by investigating buyer representation, property price, and search duration and find no pricing effects regardless of the type of broker representation.

Other studies, however, do support brokerage-related pricing effects. For instance, Zietz and Newsome (2001) document a premium paid by the clients of buyer brokers in the lower priced segment of the housing market and suggest that this premium is a function of the institutional structure of sales commissions. In a complementary study, Zietz and Newsome (2002) further explore how representation type impacts property price and find that buyers not represented in the lower price range pay a 2% transaction premium. The findings of these two papers imply that residential price effects are market segment dependent. Johnson, Springer, and Brockman (2005) identify and investigate the affect of non-traditionally broker-marketed properties on property price and find that properties sell at a 6.0% premium, which suggests that brokerage intermediation effects can and do exist in the absence of a MLS, which reduces informational asymmetries. Rutherford, Springer, and Yavas (2005) argue that there is often an agency conflict between homeowners and agents in the residential housing market and find that agent-owned properties sell for premiums of between 4.5% and 7.0% when compared to non-agent-owned properties. The premium is attributable to informational asymmetries and additional effort by agents in selling their own properties. Hypothesizing that the homogeneous nature of condominiums will lead to a reduction in their earlier findings, Rutherford, Springer, and Yavas (2007) revisit the issue of agent-owned properties and show a narrower spread in the pricing premium between agent-owned and non-agent-owned properties in the condo market. Huang and Rutherford (2007) investigate differences in market outcomes (pricing and marketing time) between Realtor® and non-Realtor participants operating within the same multiple listing service (MLS). Their findings indicate Realtor participants outperform non-Realtor participants. Finally, Gardiner, Heisler, Kallberg, and Liu (2007) analyze the impact of disclosed versus undisclosed representation before and after the implementation of mandatory disclosure requirements in the state of Hawaii. Subsequent to mandatory disclosure of agency requirements, the negative price impact of dual agency is reduced from 8.0% to 1.4%.

In summary, while a number of previous studies show that brokers and agents working in the residential property market, regardless of type or motivation, cannot produce different market outcomes as measured by transaction price, other works

provide opposite results, especially when there is informational asymmetry or segmentation of the market by active and passive market participants, as measured by the agent and non-agent studies of Rutherford, Springer, and Yavas (2007). The issue of brokerage intermediation thus remains an area of interest for both market and public policy reasons. Importantly, in the context of this study, all of these existing works concentrate exclusively on the residential real estate market. The current study extends empirical analysis of brokerage intermediation to the commercial property market.

The commercial property market is centered on investment constructs with transaction participants basing their decisions on return possibilities. More importantly, when compared to the residential property market, this market is characterized by a much smaller number of participants, who often know the other transaction participants and who make acquisitions based on investment criteria that require data collection and analysis. In this regard, brokerage intermediation in the commercial property market is substantially different from that in the residential market where there are typically a large number of less sophisticated purchasers searching a substantial number of residential properties with more unknown market participants. In the commercial property market there are a smaller number of transactions, a largely known group of investors, and a much reduced number of active brokerage firms and brokers who often know the other market participants. Relative to the residential market, the commercial market is more transparent (or less informationally asymmetric) with decisions based on standard evaluation techniques. While return expectations may differ between participants, the decision-making techniques and risk assessment tools used are widely known and exercised. In addition, due diligence is rigorous as potential buyers review rent rolls, leases, physical property conditions and other property attributes during the sales process. If the commercial property market is sufficiently transparent and the market participants are knowledgeable and use standard evaluation criteria, one would expect there to be no price premium associated with the presence of a broker in a commercial property transaction. On the other hand, if there are informational asymmetries in the commercial property market and the function of a commercial broker is to help facilitate information acquisition or if agency problems are acute, one would expect to see a price premium for a property transaction with broker involvement. The impact of brokerage intermediation in the commercial markets is, however, ultimately an empirical question to test.

The remainder of this paper presents an investigation of brokerage intermediation in the commercial property market using data on income-producing properties that are typically bought as investments and where market participants are normally active in the real estate market and are knowledgeable of market conditions and agency relationships. The investment decision is isolated by investigating brokerage intermediation effects in the multifamily income-producing property market. The study findings provide evidence that brokers involved in non-residential commercial transactions are not likely to impact property prices,

and suggests that intermediation effects, if they do exist, reside primarily in the consumption decision of residential market participants, who are less knowledgeable and search for houses from a large number of residential properties, or perhaps in more complex property types than the multifamily property type used in this study.[3]

Data

To focus the investigation on the investment decision, this work employs multifamily transaction data. Apartment complex sales are well qualified for use in this study for three reasons. First, and foremost, the decision to purchase this type of income-producing property is based on return maximization with little consideration for investor utility brought about by property amenities. Second, apartment rent flows and costs are more transparent relative to other property classes such as office and hotel properties. Third, leases are of relatively short terms. The first reason serves to isolate the property investment decision from the property consumption issue as investors buy apartment complexes for economic reasons and not as a direct way to impact personal utility. The latter two reasons reduce modeling concerns. Specifically, the ownership and transparency of cash flows reduce both informational asymmetries and the need to simultaneously model property price and marketing time as is common in residential studies. The relative shortness of apartment leases makes it less necessary to control for valuation gains and losses due to long-term leases commonly employed in other income-producing properties such as commercial office, retail, or industrial properties.[4]

Apartment complex sales data inclusive of brokerage participants are provided by CoStar for the Atlanta and Phoenix markets from 1995 through 2003.[5] The data from Costar are collected and verified from market participants including buyers, sellers, and brokers. The data are not taken from a single marketing channel. Detailed time on market data, as acknowledged in Endnote 4, are not available. The initial analysis is based on the data from the Atlanta market while the Phoenix data is examined to provide additional robustness to the results.[6] A total of 712 observations with complete data from the Atlanta market are generated. Summary statistics are found in Exhibit 1. Transaction characteristics from Exhibit 1 related to brokerage intermediation include the observation that 33% of the sample transactions close without the use of a broker. Forty-one percent of all transactions have some form of buyer brokerage and 59% of all transactions have seller broker representation. Transactions in which only the buyer has a broker make up 7% of the cases, as opposed to 26% of cases where only the seller works with a broker. Interestingly, only 33% of the cases involve a transaction in which both parties have a broker. Even more interesting, fully 27% of the sample involves transactions in which the same broker works with both the buyer and seller. Nonetheless, as expected in an investment-oriented property market, the use of brokers is substantially more limited than in the residential housing markets.[7] The

Exhibit 1 | Summary Statistics from the Atlanta MSA: 1995–2003

Variable	Mean	Median	Std. Dev.	Min.	Max.
Complex price	8,132,674	3,844,098	10,178,855	250,000	67,250,000
Unit price	44,285	38,554	27,839	3,390	290,740
Log of unit price	10.51	10.56	0.64	8.12	12.58
Buyer uses broker	0.41	0.00	0.49	0.00	1.00
Seller uses broker	0.59	1.00	0.49	0.00	1.00
Buyer only	0.07	0.00	0.26	0.00	1.00
Seller only	0.26	0.00	0.44	0.00	1.00
Buyer seller	0.33	0.00	0.47	0.00	1.00
Either buyer seller	0.67	1.00	0.47	0.00	1.00
No broker	0.33	0.00	0.47	0.00	1.00
Same broker	0.27	0.00	0.43	0.00	1.00
Age dummy	0.02	0.00	0.13	0.00	1.00
Institutional	0.19	0.00	0.39	0.00	1.00
Non-institutional	0.71	1.00	0.46	0.00	1.00
Non-local buyer	0.28	0.00	0.45	0.00	1.00
Age	29.20	29.00	18.10	0.00	101
Units in complex	166.47	127.50	151.59	4.00	972
Complex size (s.f.)	166,802	124,517	158,288	3,376	962,014
Lot size (s.f.)	543,430	327,789	621,346	3,920	6,316,200
Good condition	0.25	0.00	0.43	0.00	1.00
Average condition	0.71	1.00	0.45	0.00	1.00
Poor condition	0.04	0.00	0.19	0.00	1.00

Notes: Summary statistics for 712 multifamily sales transactions from the Atlanta, GA MSA for the nine year period from 1995 to 2003. Transaction dates are used in the analysis with observations classified by transaction year. The data are further decomposed into 22 submarkets identified and employed by the brokerage community through the use of dummy variables. *Buyer uses broker* is a dummy variable equal to one when a buyer uses a broker. *Seller uses broker* is a dummy variable equal to one when a seller uses a broker. *Buyer only* is a dummy variable indicating that only the buyer uses a broker. Similarly, *Seller only* is a dummy variable reflecting only a seller uses a broker and *Buyer seller* is a dummy variable equal to one when both buyer and seller use a broker. *Either buyer seller* is a dummy variable equal to one when either the buyer or the seller uses a broker.

data are reflective of a market with a relatively small number of participants including private owners and brokers who are often known to one another or who can be easily identified. The characteristics on brokerage from the Phoenix market are similar to the Atlanta market (see Exhibit 2).

Exhibit 2 | Summary Statistics from the Phoenix MSA: 1999–2003

Variable	Mean	Median	Std. Dev.	Min.	Max.
Complex price	3,638,072	1,100,000	6,628,169	170,000	54,000,000
Unit price	40,506	37,694	15,190	10,976	138,636
Log of unit price	10.55	10.54	0.34	9.30	11.84
Buyer uses broker	0.60	1.00	0.49	0.00	1.00
Seller uses broker	0.65	1.00	0.48	0.00	1.00
Buyer only	0.03	0.00	0.18	0.00	1.00
Seller only	0.08	0.00	0.27	0.00	1.00
Buyer seller	0.57	1.00	0.50	0.00	1.00
Either buyer seller	0.68	1.00	0.47	0.00	1.00
No broker	0.32	0.00	0.47	0.00	1.00
Age dummy	0.03	0.00	0.16	0.00	1.00
Institutional	0.06	0.00	0.24	0.00	1.00
Non-institutional	0.48	0.00	0.50	0.00	1.00
Non-local buyer	0.48	0.00	0.50	0.00	1.00
Age	34.93	35.00	13.28	4.00	93.00
Units in complex (100)	0.77	0.30	1.11	0.05	12.06
Complex size (s.f.)	60,426	22,500	91,502	3,088	829,684
Lot size (s.f.)	144,635	51,629	227,184	6,873	2,541,211
Good condition	0.05	0.00	0.22	0.00	1.00
Average condition	0.94	1.00	0.23	0.00	1.00
Poor condition	0.00	0.00	0.06	0.00	1.00

Notes: Summary statistics for 1,366 multifamily sales transactions from the Phoenix market from 1999 to 2003. Transaction dates are used in the analysis with observations classified by transaction year. *Buyer uses broker* is a dummy variable equal to one when a buyer uses a broker. *Seller uses broker* is a dummy variable equal to one when a seller uses a broker. *Buyer only* is a dummy variable indicating that only buyer uses a broker. Similarly, *Seller only* is a dummy variable reflecting only a seller uses a broker and *Buyer seller* is a dummy variable equal to one when both buyer and seller use a broker. *Either buyer seller* is a dummy variable equal to one when either the buyer or the seller uses a broker. The data are further decomposed into 27 submarkets identified and employed by the brokerage community through the use of dummy variables.

Model Specification and Empirical Analysis

Model and Specification

The specification of the income-producing property pricing model used in this study is based on works by Hardin and Wolverton (1999) and Lambson, McQueen, and Slade (2004). Both of these studies use the multifamily property class as the basis for their evaluations and both explore potential clientele effects. Hardin and Wolverton investigate acquisition premiums paid by REITs while Lambson, McQueen, and Slade investigate the propensity of out-of-state buyers to pay acquisition premiums. The following general framework is used to investigate the intermediation impact of brokerage on income-producing commercial property pricing:

$$\text{Apartment Unit Price} = \Omega(B, \lambda, \chi, \psi), \tag{1}$$

where apartment unit price is a function of B, a vector of variables representing type of brokerage participation (the variables of interest), λ, a vector of variables delineating the organizational aspects of the purchaser as either a local or non-local and as either an institutional or non-institutional sized property, χ, a vector of property characteristic and condition variables, and ψ, a vector of variables controlling for property submarkets and time of transaction.[8]

Equation (1) is initially operationalized in the following general pricing model:

$$\begin{aligned} \textit{Ln of unit price} = {} & \alpha + \beta_1 \textit{buyer uses broker} \\ & + \beta_2 \textit{seller uses broker} + \beta_3 \textit{age dummy} \\ & + \beta_4 \textit{institutional} + \beta_5 \textit{non-institutional} \\ & + \beta_6 \textit{age} + \beta_7 \textit{age squared} + \beta_8 \textit{units} \\ & + \beta_9 \textit{units squared} + \beta_{10} \textit{unit size} \\ & + \beta_{11} \textit{unit size squared} + \beta_{12} \textit{land size} \\ & + \beta_{13} \textit{land size squared} + \beta_{14} \textit{non-local buyer} \\ & + \beta_{15} \textit{average} + \beta_{16} \textit{poor} + \tau_i \textit{year controls} \\ & + \delta_i \textit{submarket controls} + \varepsilon. \end{aligned} \tag{2}$$

The natural log of the per unit apartment sales price, as in Hardin and Wolverton (1999) and Lambson, McQueen, and Slade (2004), is chosen as the dependent variable. The variable definitions are self-explanatory with the exception of *institutional*, *non-institutional*, and *age dummy*. *Institutional* is a dummy variable for properties with a sales price greater than or equal to $15,000,000; *non-institutional* is a dummy variable for properties with a sales price less than $10,000,000; and *age dummy* is a dummy variable for properties built after 1998. These additional variables are used to control for property attributes that might be associated with institutional ownership, such as the dollar amount of the transaction and the property's relative age. From Equation (2), a direct test of the impact of commercial brokerage on apartment unit sales price is conducted. The base model is also modified to evaluate various additional combinations of broker representation. The initial models focus on the market for brokered and non-brokered properties and whether brokered properties have different price outcomes in a market primarily composed of knowledgeable and sophisticated participants. The additional models address possible within brokerage effects. The modeling differences allow for the assessment of broker versus non-broker effects, as well as effects attributable to the type of broker activity. Statistically significant results associated with the *buyer uses broker* variable (buyer worked with a broker) or the *seller uses broker* variable (seller worked with a broker) would provide evidence supporting brokerage intermediation effects. Alternatively, statistically insignificant findings would provide evidence suggesting that the existence, if at all, of brokerage intermediation resides most likely in the consumption decision of residential market participants, in situations where consumers and investors both acquire similar properties with differing objectives as investigated by Rutherford, Springer, and Yavas (2005), or in commercial markets that are less transparent than the multifamily property class. Finally, intra-brokerage models refine the analysis to additional intra-broker combinations of broker representation.

Empirical Analysis

The initial empirical results based on the Atlanta market data are presented in Exhibit 3. Four models with the natural log of apartment unit price as the dependent variable are provided. Model 1 is an OLS model; Model 2 is a GLS model;[9] Model 3 is an OLS model restricted to transactions from the top five most active property submarkets; and Model 4 is an OLS model using observations not found in the top five most active property submarkets.[10] The use of different modeling methodologies and the segmentation of the observations based on submarket sales activity are used to address the potential for biased estimates of the coefficients of the brokerage variables of interest. Neither the buyer's use of a broker nor the seller's use of a broker appears to consistently impact transaction price. The buyer's use of a broker variable is only marginally statistically significant in Model 4, which uses data restricted to the least active submarkets. The seven other brokerage measures from the four models are not statistically

Exhibit 3 | Income-producing Property Pricing Models using the Atlanta MSA Data

	Model 1		Model 2		Model 3		Model 4	
Variable	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Intercept	10.648***	73.44	10.554***	63.81	10.689***	39.73	10.489***	55.53
Buyer uses broker	0.015	0.61	0.022	0.70	−0.013	−0.34	0.067*	1.94
Seller uses broker	0.025	0.95	0.041	1.32	0.043	1.05	0.005	0.15
Age dummy	−0.197***	−3.02	−0.228	−1.59	−0.151	−0.96	−0.198***	−3.04
Institutional	0.114***	2.66	0.105	1.51	0.306***	3.84	0.014	0.27
Non-institutional	−0.324***	−6.98	−0.364***	−5.45	−0.234***	−2.83	−0.359***	−6.62
Age	−0.024***	−8.03	−0.024***	−7.33	−0.025***	−5.37	−0.026***	−7.18
Age squared	0.25E-03***	8.09	0.25E-03***	7.75	0.26E-03***	5.68	0.27E-3***	7.39
Units in complex	−0.001***	−4.32	−0.001***	−4.18	−0.001***	−2.67	−0.001***	−3.27
Units squared	0.10E-05***	2.89	0.11E-05**	2.54	0.87E-06	1.49	0.96E-06**	2.17
Unit size	0.001	3.23	0.001***	3.42	0.84E-04	0.21	0.001***	3.83
Unit size squared	−0.56E-07	−0.67	−0.85E-07	−0.95	0.22E-06	1.08	−0.18E-06*	−1.97
Land size per unit	0.53E-05	0.16	0.16E-04	0.55	0.14E-04	0.26	0.18E-04	0.46
Land size per unit squared	0.22E-08	0.63	0.11E-08	0.36	0.40E-09	0.06	0.15E-08	0.36
Non-local buyer	0.139***	4.74	0.144***	3.70	0.116**	2.60	0.159***	3.90
Average condition	−0.157***	−4.83	−0.172***	−3.99	−0.130**	−2.54	−0.152***	−7.18
Poor condition	−0.645***	−6.32	−0.690***	−10.17	−0.487***	−3.24	−0.733***	−5.51

Exhibit 3 | (continued)

Income-producing Property Pricing Models using the Atlanta MSA Data

	Model 1		Model 2		Model 3		Model 4	
Variable	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Year 1996	0.099*	1.84	0.133***	2.67	0.064	0.88	0.162**	2.27
Year 1997	0.247***	4.32	0.287***	5.59	0.256***	3.53	0.259***	3.21
Year 1998	0.233***	4.07	0.263***	4.42	0.257***	3.20	0.225***	3.07
Year 1999	0.550***	9.57	0.613***	10.27	0.586***	7.30	0.508***	6.54
Year 2000	0.567***	10.19	0.637***	11.69	0.639***	7.83	0.555***	7.44
Year 2001	0.644***	10.59	0.727***	12.56	0.577***	6.48	0.728***	9.46
Year 2002	0.699***	9.89	0.741***	11.38	0.778***	7.51	0.670***	7.14
Year 2003	0.724***	11.19	0.816***	12.67	0.650***	6.20	0.782***	9.77
F-Value	45.76		47.91		25.39		35.65	
Adj. R^2	0.743		0.752		0.637		0.779	

Notes: Income-producing property pricing models with the natural log of the unit price as the dependent variable using the Atlanta MSA data. The variables of interest are *buyer uses broker* and *seller uses broker*. The year coefficients represent the change in value over the base year of 1995. Four model specifications are presented: an OLS model (Model 1), a GLS model (Model 2), an OLS model restricted to the most active submarkets (Model 3), and an OLS model restricted to the non-active submarkets (Model 4). The *t*-statistics for the OLS models are based on White heteroscedastic consistent errors. The submarket coefficients are not reported to reduce the length of the exhibit. For Models 1 and 2, $N = 712$; for Model 3, $N = 348$; and for Model 4, $N = 364$.

*Statistically significant at the 10% level.

**Statistically significant at the 5% level.

***Statistically significant at the 1% level.

significant. The control variables are also as might be expected from an aggregate market model. Price is negatively related to the age and the quality of the apartment complex as the base case used in the models includes properties rated with good or better quality. The real estate market from which the data are taken evidences increasing per unit prices for the period investigated as would be expected. The *institutional* and *non-institutional* variables are as might be expected as is the *age dummy* variable. The non-local control variable is statistically significant and positive as has been the case with prior research from Lambson, McQueen, and Slade (2004) that implied that search costs and an own-market anchoring bias might lead to such a premium.[11]

Additional results evaluating subgroups of brokerage associations are provided in Exhibit 4. The combinations of brokerage usage evaluated include *seller only*, *buyer only*, *buyer and seller use*, and the base case of no brokerage representation. The four model specifications from Exhibit 3 are used. The institutional, physical, condition, submarket, and temporal control variable coefficients are generally as expected. With regard to the variables of interest, none of the *seller only* and the *buyer only* coefficients are statistically significant in any of the models. In two of the models, the GLS Model 2 and the low transaction activity GLS Model 4, the *buyer and seller use* variable is barely statistically significant at the 10% level. In ten of the twelve models, no intermediation effects are found. Even in the two instances where marginal effects are found, the results are in-line with the basic expectations from a market composed primarily of sophisticated, knowledgeable investors and operators. The overall assessment of these brokerage combinations is supportive of the initial results that imply little or no consistent intermediation price effects.

Further analysis of brokerage effects when both participants use the same broker and either the buyer or seller uses a broker are provided in Exhibit 5. The OLS and GLS results are provided. Results from the other models are quantitatively and qualitatively the same. No intermediation effects are found in these models.[12] Use of the same broker and having either the seller or buyer use a broker are not statistically related to sales price.

Finally, to test the robustness of the results from the Atlanta MSA in another large MSA, apartment sales and brokerage data from the Phoenix MSA were obtained from CoStar.[13] The data are summarized in Exhibit 2. The Phoenix market data are similar to those from the Atlanta market, although brokerage use seems to be slightly higher and the apartment complex size and sales price data are lower. A complete picture is found in Exhibit 2. The data also indicate that there are fewer institutional properties in Phoenix and a greater percentage of non-institutional properties. Notwithstanding these differences, the Phoenix MSA is representative of a major market with investor appeal and activity.

The basic OLS and GLS models applied to the Atlanta market as presented in Exhibits 3 and 4 are generated for the Phoenix data.[14] The results for this application are found in Exhibit 6. Neither the *buyer uses broker* nor the *seller*

Exhibit 4 | Income-producing Property Pricing Models using the Atlanta MSA Data

	Model 1		Model 2		Model 3		Model 4	
	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Intercept	10.652***	73.67	10.566***	63.16	10.695***	39.63	10.482***	56.38
Buyer only	0.001	0.03	0.019	0.34	−0.035	−0.51	0.006	0.10
Seller only	0.019	0.59	0.039	1.08	0.034	0.67	−0.012	−0.30
Buyer seller	0.041	1.24	0.064*	1.82	0.031	0.63	0.071*	1.65
Age dummy	−0.195***	−2.99	−0.225	−1.59	−0.149	−0.94	−0.232***	−3.32
Institutional	0.114***	2.68	0.105	1.51	0.309***	3.90	0.025	0.50
Non-institutional	−0.325***	−7.02	−0.368***	−5.46	−0.235***	−2.85	−0.353***	−6.60
Age	−0.024***	−8.02	−0.023***	−7.26	−0.025***	−5.36	−0.025***	−7.09
Age squared	0.25E-03***	8.09	0.25E-03***	7.70	0.26E-03***	5.68	0.27E-03***	7.31
Units in complex	−0.001***	−4.29	−0.001***	−4.16	−0.001**	−2.60	−0.001***	−3.30
Units squared	0.10E-05***	2.87	0.11E-05**	2.54	0.85E-06	1.49	0.96E-06**	2.20
Unit size	0.001***	3.24	0.001***	3.31	0.79E-04	0.20	0.001***	3.90
Unit size squared	−0.57E-07	−0.67	−0.81E-07	−0.88	0.22E-06	1.08	−0.19E-06**	−2.03
Land size per unit	0.50E-05	0.17	0.15E-04	0.53	0.14E-04	0.27	0.11E-04	0.28
Land size per unit squared	0.22E-08	0.64	0.12E-08	0.38	0.40E-09	0.06	0.19E-08	0.46
Non-local buyer	0.138***	4.63	0.144***	3.67	0.114**	2.53	0.162***	3.97
Average condition	−0.157***	−4.82	−0.171***	−3.96	−0.129**	−2.50	−0.153***	−7.09
Poor condition	−0.645***	−6.31	−0.687***	−10.08	−0.483***	−3.23	−0.735***	−5.49

Exhibit 4 | (continued)

Income-producing Property Pricing Models using the Atlanta MSA Data

	Model 1		Model 2		Model 3		Model 4	
	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Year 2003	0.724***	11.20	0.812***	12.58	0.647***	6.23	0.769***	9.67
Year 2002	0.697***	9.89	0.737***	11.29	0.775***	7.59	0.665***	7.11
Year 2001	0.644***	10.60	0.724***	12.48	0.575***	5.87	0.730***	9.58
Year 2000	0.568***	10.21	0.633***	11.55	0.640***	7.83	0.552***	7.46
Year 1999	0.550***	9.59	0.610***	10.22	0.585***	6.93	0.505***	6.52
Year 1998	0.234***	4.07	0.260***	4.34	0.259***	3.01	0.223***	3.08
Year 1997	0.248***	4.33	0.284***	5.53	0.257***	3.08	0.255***	3.17
Year 1996	0.099*	1.84	0.130**	2.60	0.063	0.79	0.159**	2.24
F-Value	44.72		46.63		24.74		36.51	
Adj. R^2	0.743		0.751		0.665		0.800	

Notes: Income-producing property pricing models with the natural log of the unit price as the dependent variable using the Atlanta MSA data. The variables of interest are *Buyer only* (*only buyer uses broker*), *Seller only* (*only seller uses broker*), and *Buyer seller* (*both buyer and seller use broker*). The base is no use of a broker. Four model specifications are presented: an OLS model (Model 1), a GLS model (Model 2), an OLS model restricted to the most active submarkets (Model 3), and an OLS model restricted to the non-active submarkets (Model 4). The *t*-statistics for the OLS models are based on White heteroscedastic consistent errors. The submarket coefficients are not reported to reduce the length of the exhibit. For Models 1 and 2, $N = 712$; for Model 3, $N = 348$; and for Model 4, $N = 364$.

*Statistically significant at the 10% level.

**Statistically significant at the 5% level.

***Statistically significant at the 1% level.

Exhibit 5 | Income-producing Property Pricing Models using the Atlanta MSA Data

	OLS (1)		GLS (2)		OLS (3)		GLS (4)	
Variable	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Intercept	10.661***	74.12	10.557***	64.83	10.646***	73.21	10.534***	63.80
Same broker	0.008	0.27	0.008	0.23				
Either buyer seller					0.028	0.98	0.045	1.54
Age dummy	−0.203***	−3.13	−0.248*	−1.79	−0.202***	−3.15	−0.241*	−1.65
Institutional	0.113***	2.64	0.106	1.56	0.113***	2.64	0.104	1.52
Non-institutional	−0.323***	−6.98	−0.362***	−5.55	−0.322***	−6.97	−0.363***	−5.49
Age	−0.024***	−7.99	−0.024***	−7.44	−0.024***	−8.03	−0.023***	−7.27
Age squared	0.25E-03***	8.07	0.25E-03***	7.82	0.25E-03***	8.09	0.25E-03***	7.74
Units in complex	−0.001***	−4.23	−0.001***	−4.12	−0.001**	−4.32	−0.001	−4.15
Units squared	0.10E-05***	2.86	0.98E-06**	2.44	0.10E-05***	2.92	0.10E-05**	2.50
Unit size	0.001***	3.27	0.001***	3.63	0.001***	3.24	0.001***	3.47
Unit size squared	−0.60E-07	−0.72	−0.10E-06	−1.14	−0.57E-07	−0.68	−0.86E-07	0.87
Land per unit	0.52E-05	0.18	0.21E-04	0.72	0.58E-05	0.20	0.25E-04	−0.98
Land per unit squared	0.22E-08	0.66	0.85E-09	0.26	0.22E-08	0.63	0.98E-10	0.02
Non-local buyer	0.138***	4.67	0.139***	3.56	0.140***	4.75	0.150***	3.85
Average condition	−0.159***	−4.89	−0.175***	−4.10	−0.158***	−4.84	−0.174***	−4.03
Poor condition	−0.653***	−6.40	−0.696***	−10.38	−0.649***	−6.36	−0.700***	−10.38

Exhibit 5 | (continued)

Income-producing Property Pricing Models using the Atlanta MSA Data

	OLS (1)		GLS (2)		OLS (3)		GLS (4)	
Variable	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Year 2003	0.730***	11.10	0.832***	12.95	0.726***	11.16	0.817***	12.74
Year 2002	0.696***	9.79	0.740***	11.47	0.700***	9.85	0.746***	11.45
Year 2001	0.640***	10.55	0.723***	12.68	0.643***	10.55	0.730***	12.55
Year 2000	0.566***	10.11	0.632***	11.57	0.566***	10.14	0.635***	11.75
Year 1999	0.554***	9.53	0.610***	10.17	0.551***	9.50	0.614***	10.31
Year 1998	0.236***	4.08	0.266***	4.47	0.233***	4.06	0.258***	4.36
Year 1997	0.246***	4.27	0.281***	5.55	0.246***	4.29	0.288***	5.65
Year 1996	0.100*	1.83	0.123**	2.48	0.099**	1.84	0.135***	2.73
F-Value	46.69		49.3		46.78		49.1	
Adj. R^2	0.743		0.754		0.743		0.753	

Notes: Income-producing property pricing models with the natural log of the unit price as the dependent variable, based on the Atlanta MSA data. The variables of interest are *same broker* and *either buyer seller*. An OLS and a GLS model are used for each specification: (1) and (3) for OLS, and (2) and (4) for GLS. The *t*-statistics for the OLS models are based on White heteroscedastic consistent errors. The submarket coefficients are not reported. For Models 1–4, $N = 712$.

*Statistically significant at the 10% level.

**Statistically significant at the 5% level.

***Statistically significant at the 1% level.

Exhibit 6 | Income-producing Property Pricing Models using the Phoenix MSA Data

	OLS (1)		GLS (2)		OLS (3)		GLS (4)	
	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Intercept	9.976***	121.16	9.984***	144.70	9.972***	121.33	9.970***	145.09
Seller uses broker	0.000	−0.01	0.000	0.00				
Buyer uses broker	0.016	0.78	0.024	1.22				
Buyer only					0.043	1.15	0.033	0.99
Seller only					0.038	1.46	0.042*	1.75
Either buyer or seller					0.018	1.28	0.024*	1.75
Age dummy	0.130**	2.53	0.118**	2.49	0.133**	2.60	0.120**	2.59
Institutional	0.373***	9.73	0.388***	9.37	0.372***	9.70	0.390***	9.64
Non-institutional	−0.078***	−4.71	−0.078***	−4.48	−0.078***	−4.71	−0.077***	−4.39
Age	−0.010***	−3.48	−0.009***	−4.17	−0.009***	−3.37	−0.008***	−4.00
Age squared	0.77E-04**	2.19	0.65E-04***	2.62	0.74E-04**	2.07	0.56E-04***	2.33
Units in complex	−0.001***	−4.53	−0.001***	−5.19	−0.001***	−4.57	−0.001***	−5.02
Units squared	0.4E-06	1.31	0.20E-06	1.32	0.40E-06	1.36	0.20E-06	1.18
Unit size	0.001***	14.93	0.001***	15.97	0.001***	14.88	0.001***	15.94
Unit size squared	−0.18E-06***	−12.15	−0.18E-06***	−9.42	−0.18E-06***	−12.11	−0.18E-06***	−9.41
Land per unit	0.69E-04***	6.37	0.66E-04***	6.60	0.70E-04***	6.43	0.67E-04***	6.68
Land per unit squared	−0.30E-08***	−3.43	−0.20E-08***	−3.87	−0.30E-08***	−3.44	−0.20E-08***	−3.91
Non-local buyer	0.059***	4.76	0.062***	4.78	0.059***	4.79	0.062***	4.79
Average condition	−0.140***	−3.84	−0.165***	−5.01	−0.139***	−3.84	−0.161***	−4.92
Poor condition	−0.245**	−2.27	−0.198*	−1.71	−0.247**	−2.20	−0.171	−1.50

Exhibit 6 | (continued)

Income-producing Property Pricing Models using the Phoenix MSA Data

	OLS (1)		GLS (2)		OLS (3)		GLS (4)	
	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.	Coeff.	*t*-Stat.
Year 2000	0.051***	2.65	0.054***	2.74	0.051***	2.63	0.054***	2.71
Year 2001	0.101***	5.13	0.102***	5.41	0.101***	5.10	0.101***	5.34
Year 2002	0.157***	7.91	0.162***	8.45	0.157***	7.92	0.163***	8.44
Year 2003	0.211***	11.19	0.212***	11.17	0.211***	11.17	0.211***	11.16
F-Value	47.83		44.78		46.90		44.73	
Adj. R^2	0.612		0.596		0.612		0.601	

Notes: Income-producing property pricing models with the natural log of the unit price as the dependent variable, based on the Phoenix MSA data. The variables of interest are *buyer uses broker*, *seller uses broker*, *buyer only, seller only*, and *buyer seller*. Four model specifications are presented: two OLS models (OLS (1) and OLS (3)), and two GLS models (GLS (2) and GLS (4)). The *t*-statistics for the OLS models are based on White heteroscedastic consistent errors. The submarket coefficients are not reported to reduce the length of the exhibit. For Models 1–4, $N = 1{,}366$.

*Statistically significant at the 10% level.

**Statistically significant at the 5% level.

***Statistically significant at the 1% level.

uses broker variables are statistically significant in the base models (OLS (1) and GLS (2)) evaluating whether the use of brokers impacts asset prices. As was the case with the Atlanta MSA data, the control variables for apartment condition, attributes, and submarket are as might be expected. In a market primarily composed of knowledgeable and skilled investors, the ability of brokers to affect pricing is constrained. With the addition of the broker combination variables to the models, there are no statistically significant outcomes in the OLS (3) Model. In the GLS (4) Model, the *seller only* and the *either seller or buyer* variables are positive and marginally significant at the 10% level. Again, the control variables are as might be expected. The overall assessment of the results using the Phoenix data support the initial Atlanta results and provide additional evidence of little or minimal brokerage intermediation effects.

These findings from two large commercial real estate markets suggest that commercial brokers do not significantly affect the transaction price of income-producing property. Broker intermediation appears to have little practical impact on transaction prices in the multifamily market, which implies little broker intermediation effect in the commercial property markets where market participants are generally known and evaluation techniques employed are similar across investors.[15] A larger implication is that an impact based on brokerage intermediation is likely to be limited to the consumption decision of residential market participants, or perhaps, to other less transparent commercial property classes. What remains of interest is the further definition and investigation of brokerage activity in commercial property markets.

Conclusion

The brokerage intermediation literature is broadened from its application solely to residential brokerage to investment-oriented commercial property brokerage. Specifically, the impact of brokerage intermediation on the price of multifamily income-producing commercial real estate is evaluated. No consistent statistical relationships between the presence of a broker or brokers and transaction price are found. In addition, the role of the brokers in the transaction on an intra-brokerage basis appears minimal. These results have important implications to the literature. First, this work provides direct evidence that commercial brokers do not systematically influence income-producing property transaction price modeled using multifamily residential data. There is little evidence that commercial brokers can induce intermediation effects, especially in the transparent multifamily residential property market where information asymmetries are relatively low and the number of transaction participants is limited. Second, the results suggest the possibility that brokerage intermediation can be substantially reduced or eliminated in transparent markets such as those typically associated with investment-oriented properties. In particular, these findings suggest that if brokerage intermediation effects do exist, they exist in the residential property market where the duality of the investment and consumption decision may affect

individual market participants who are less knowledgeable and search for houses from a large number of residential properties, in markets where consumers and investors compete for the same properties, or in commercial markets that are much less transparent than the multifamily markets examined in this research.

Moreover, the results suggest that in markets with more sophisticated and knowledgeable buyers and sellers, transaction prices for real estate assets will be less impacted by brokerage activities. In real estate markets with transparency and knowledgeable participants, investors are not heavily reliant on third party direction in making investment decisions. The brokerage function in this environment then should be focused on facilitating the market transaction and providing sufficient information so that buyers can evaluate a prospective purchase and sellers can price their properties correctly. While beyond the scope of this study, fees in such markets are more likely to be based on activities and services provided by brokerage firms than on the reduction of market asymmetries. Commercial property markets are relatively efficient in determining price, or at a minimum, using additional sources of market information other than the information provided by a broker. In addition to serving the informational functions noted above, successful brokerage firms and agents must understand the investment and valuation processes used by market participants. These participants are likely to be focused on property performance and capital market return requirements.

As this is an initial investigation of issues in commercial brokerage, other avenues of study are readily apparent. Future research on brokerage intermediation in commercial property should investigate situations where property information and performance are less transparent than in the multifamily property category. Extension of the findings to other property types and geographic markets with different market structures is needed as is further development of the role of brokerage in the commercial real estate arena. Not all income-producing property markets are as transparent as the multifamily market. Hence, more analyses of the role and cost of brokerage in commercial markets are warranted. Also, if brokerage does not influence transaction prices, what benefits do brokers bring to the real estate market? What is the actual role of brokerage in a commercial transaction and how does it differ across transaction size and type? How does it differ from the residential market?[16] With respect to investigating intermediation in residential brokerage, the continued introduction of consumer utility constructs versus a strict adherence to financial decision-making constructs may be warranted. Finally, given the expected role of experience suggested in this investigation, another area of interest is the role of experience, both from an investor and a broker prospective. Huang and Rutherford (2007), in the residential literature, find that increased experience among listing agents results in higher prices. Would a market with experienced investors, using similar assessment techniques as found in the commercial market, evidence a similar effect? Additional questions of interest remain.

Endnotes

[1] An as yet unpublished work by Garmaise and Moskowitz (2000) investigating commercial financing partially addresses brokerage-related outcomes. Garmaise and Moskowitz (2004) also look at brokerage influence, property operating history, and transaction location within an asymmetric information model.

[2] This is not to say that brokers, buyers, and sellers are not known to one another, but that in the residential market much effort is expended on the identification of potential transaction participants who may not be known or linked in any way except through the property sale event.

[3] It can be argued that the multifamily property type is a relatively transparent property class as leases tend to be continuously re-priced due to their short term. However, additional studies across property types are warranted and need to be completed. Other properties types may be less transparent and may be more subject to broker intermediation effects.

[4] Marketing time is not a variable that most commercial transaction databases effectively measure. Hence, the focus is on transaction price as an investment return continues to be earned during the marketing period. While CoStar attempts to collect time on market data, the field in the transaction record is typically blank and when present is participant estimated and reported. Existing residential studies typically use MLS data that are generated from systems maintained by local Realtor associations. The ML systems require listing date, pending date, and closing date. While the larger associations also make this type of listing service available for commercial properties, large commercial properties are not typically marketed through this channel. For example, a review of the commercial MLS listings of a major MSA shows extremely limited listings in the apartment market, which is the subject of the study. Thus, the lack of available data to investigate the potential for time on market effects makes this issue subject to additional analysis.

[5] The data for the Phoenix market are largely not available before 1999, so the Phoenix data used in the present study ranges from 1999 to 2003.

[6] The session participants and discussant from the presentation of an initial draft of this paper at the American Real Estate Society Meeting in San Francisco (April, 2007) suggested the use of additional market data. Phoenix was selected.

[7] The number of transactions is substantially lower than would be the case in the residential market for the Atlanta MSA for a nine-year period. On a transaction count basis, the transaction volume is a fraction of the residential volume. Also, the market participants are largely known and are most involved in the business of investment real estate. It is also noted that while commercial listing services are available, there is no dominant listing service such as the residential MLS. Large commercial properties have historically been marketed and sold outside a centralized listing service. This may be due to the required use by many listing services of an exclusive right to sell listing agreement.

[8] We do not include the REIT dummy variable as in Hardin and Wolverton (1999) and Lambson, McQueen, and Slade (2004) as our analysis reveals that REITs pay a positive acquisition premium only during a specific, short time period, as shown in Hardin and Wu (2008).

[9] The GLS model is estimated as a robustness check to control for potential spatial autocorrelation. Kramer and Donninger (1987) evaluate ordinary and generalized least squares when spatial autocorrelation may be present. They find that, in the limiting case, GLS is more efficient than OLS in terms of mitigating the potential bias due to spatial autocorrelation. SAS is used to implement the feasible GLS model. In essence, an OLS model is first estimated to obtain the OLS residuals. Then, using the residuals, the conditional variance is estimated. Finally, the square root of the conditional variance is used as the weight in a standard OLS model to implement the GLS model. The use of geographical submarkets in both the Atlanta and Phoenix markets controls for submarket variation in employment, income, and other submarket-specific variation. There are other ways to address this variation at the submarket level as noted, for example, in Frew and Jud (2003), where distance to the CBD, income, and other attributes are used.

[10] Because of the potential for the endogeneity of brokerage selection, the Atlanta data were also modeled using an instrumental variable approach. We use dummy variables based on number of transactions that a buyer or seller makes as instruments for use of a broker in a probit model. The preliminary test results show that the use of a broker is positively associated with the number of transactions a buyer or seller makes over the period; however, the number of transactions a buyer or seller makes has no impact on transaction price. Specifically, a 2SLS procedure as follows is implemented. First, we predict the linear probability of using a broker based on the probit model. Then, a 2SLS model (instead of an OLS model) is estimated using the predicted probability as an instrument [see Wooldridge (2002)]. The pricing results are similar to those provided in the OLS and GLS models, suggesting that using a broker has little impact on property transaction price. In addition, the cdsimeq command in STATA is used to estimate a simultaneous equation model in which the two endogenous variables are ''Broker'' (a dichotomous variable, whether a broker is used) and ''Logpriceunit'' (a continuous variable), respectively. Again, the results show that using a broker has little discernible impact on property transaction price.

[11] Additional models using data segmented by property price also show results similar to those provided in the models in Exhibit 3. The findings concerning the variables of interest are robust to model specification.

[12] Evans and Kolbe (2005) evaluate dual agency, which is modeled in this case as same broker. The data does not, however, allow for the confirmation that a broker does in fact have fiduciary responsibilities. Such limitation is also likely the case in some of the existing brokerage work in the residential area where it is easy to identify the use of a specific agent or brokerage firm, but difficult to confirm fiduciary relationships.

[13] MSA level data are used as the modeling of sales price is dependent on submarket combinations that are not available with a national data set.

[14] All the model estimations that were applied to the Atlanta data were also applied to the Phoenix data. The standard results are presented. All results are qualitatively and quantitatively similar. The primary reason for the use of the Phoenix data is as a robustness check.

[15] A preliminary assessment of the impact of broker experience on price using proxies for experience such as broker sales volume and broker transaction distribution was completed. No effect is evident. Since experience is not the focus of this research, however, the present results on experience are cautionary and highlight an additional area for study.

[16] Application of the theory and findings related to the residential brokerage market to the commercial brokerage market must address differences in market participants and

function. This initial investigation implies that the commercial market is substantially different from the residential market. Appreciation of these differences is warranted.

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