Does Location Matter?

Do property fundamentals vary within markets, and is this reflected in pricing?

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The adage is that all real estate is local. Do individual locations within a metropolitan area have quite similar market movements, or do their fundamentals differ widely? If their fundamentals do differ, are these differences appropriately priced, so that the total returns to investors are roughly equal?

The theory of space price equilibrium allows for systematically different rent growth across locations, with prices that perfectly reflect these differences (see DiPasquale and Wheaton [1996]). Our central question here then is whether different locations within a metropolitan area do in fact exhibit fundamentals and prices consistent with such an equilibrium. If not, then investing in different locations offers considerable arbitrage opportunities.

Our analysis focuses on the Atlanta apartment market over the period 1994 through 2004. We study apartments because their fundamentals are relatively simple. Property gross income is very close to marginal market rent at any time—since leases are no longer than a year. Operating costs likewise consist of straightforward and relatively routine expenses. We select Atlanta among the larger metropolitan statistical areas because it has the largest sample of apartment transactions available from a provider of this information, Real Capital Analytics (RCA).

The efficiency of real estate asset pricing has been the subject of considerable analysis, but mostly at the market or metropolitan level. Froland [1987], Dokko et al. [1991], and Ambrose and Nourse [1993] all find evidence

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that expected market growth is reflected in asset prices over time. Sivitanidou and Sivitanides [1999] undertake a more comprehensive econometric endeavor, and use panel data to estimate the determinants of capitalization rates both over time and across markets. Subsequent authors, including Geltner [1991], Hendershott and Kane [1995], and Jud and Winkler [1995], raise issues over pricing that is based on appraisals as opposed to actual transactions. In all these studies there is considerable debate over whether market prices reflect historical growth or forward expected growth in rents.

When it comes to the efficiency of the markets for space within metropolitan areas, the literature becomes very sparse. In 1990, Capozza and Helseley argued that in a traditional monocentric city, predictable growth in citywide population and income would lead to a moving equilibrium that sees rent growing at different rates by location. Pricing in equilibrium would simply follow the regular principles of other asset markets; faster-growing locations would exhibit lower yields (rent/price ratios).

Capozza and Helseley also extend their analysis to incorporate uncertainty as to the growth in the economic fundamental propelling increases in rent. They obtain standard options theory results for the conversion of rural land to urban.

In the past decade there have been few attempts to test the efficiency of space markets. Young and Greig [1993] present evidence that individual office and industrial properties have total returns that are different by location within an MSA. Most of these differences, however, were due to lease structures, and the appraisal-based valuation used in the analysis fails to incorporate these features.

Taylor, Rubin, and Lynford [2000] present data showing that in some apartment and office markets, submarkets do vary systematically in their fundamentals. They do not investigate pricing.

Seslen, Wheaton, and Pollakowski [2005] examine whether local variations in risk and appreciation are reflected in single-family house prices. Expanding the traditional hedonic house pricing models in Alonso [1960] and Rosen [1974], they conclude there is considerable price inefficiency. This is quite possibly because in the case of housing, investors must also be occupiers, which creates considerable transactional frictions (Wheaton [1990]).

In the Atlanta apartment market, we find considerable evidence of correct market pricing across locations. Consistent with Capozza and Helseley [1990], our data suggest that different subareas can have sustained differences in longer-term rental growth (and to a lesser extent vacancy as well). Unlike single-family housing, in the case of apartments, the coefficient of the average local rental growth rate on property yields is in the neighborhood of –0.6. This is quite close to the theory's prediction of –1.0. We hypothesize that efficient pricing likely results because the market for apartment ownership is quite extensive, as well as liquid and populated by well-informed and generally experienced investors.

ATLANTA APARTMENT MARKET

In the 2000 census, the Atlanta metropolitan statistical area (MSA) comprised 20 counties covering a land area of 6,124 square miles, with a total population of 4.1 million people. The total housing inventory was 1.6 million units, 33.6% renter-occupied.

The universe of rental housing in properties with five or more units has grown from about 312,000 units in early 2000 to over 380,000 units today. With such active new construction in this market, over a third of Atlanta's professionally managed rental multihousing inventory is less than 15 years old. Most of this stock represents low-rise garden-style apartments.

As a rental market, the Atlanta MSA is subdivided into a number of distinct submarkets either catering to different socioeconomic groups or with distinct manmade, administrative, or natural boundaries. Submarket definitions reflect the best of local opinion as to market geographic segmentation and are used by apartment managers, appraisers, brokers, investors, and researchers to reference particular areas within the MSA. While there is no one official definition of Atlanta submarket boundaries, the various definitions used by apartment industry practitioners are generally quite similar.

For the purposes of this study, we use submarket definitions provided by M/PF YieldStar (MPF), a company that has surveyed Atlanta's apartment properties since the early 1990s. In the past decade, MPF has assembled a database of over 1,300 professionally managed apartment properties. It conducts quarterly surveys of vacancy and rent covering more than 213,000 units, or 56% of the rental inventory. The over 500 of these properties that constitute a same-store sample are surveyed each year. Aggregating property performance data from the same-store sample reduces unwanted variation resulting from possible changes in size or composition of the properties surveyed.

MPF also surveys all new apartment construction projects (from building permits) to track the total inventory of units. Combining this information with survey

EXHIBIT 1
Atlanta Submarket Characteristics

Submarket	Stock Units	% Surveyed		10-Year Average				
				Rent/Unit		Vacancy	Completion	Absorption
		Total	Same-Store	Level, $	Growth, %	Rate, %	Rate, %	Rate, %
Chamblee/Dunwoody	23,913	76%	52%	833	2.2	5.0	3.7	3.0
Clayton County	21,088	63%	41%	658	2.3	5.8	4.3	3.1
East Cobb County	23,106	69%	51%	720	2.1	5.1	2.5	1.5
East DeKalb County	25,802	55%	40%	659	2.2	5.7	1.2	0.5
East Gwinnett County	22,083	72%	52%	695	2.6	6.5	6.3	5.3
Intown/Midtown	27,347	37%	27%	924	2.8	5.2	3.1	2.3
North Atlanta/Buckhead	12,805	48%	30%	949	2.8	4.8	2.8	2.0
Northwest Atlanta	22,609	55%	35%	842	2.6	4.8	2.8	2.2
Outer Atlanta	34,411	47%	29%	686	1.4	6.3	8.8	7.2
Roswell/Alpharetta Area	27,982	69%	44%	787	2.2	5.2	4.4	3.7
South Atlanta/South Fulton County	51,576	32%	23%	586	3.4	6.5	1.1	1.5
West Cobb County	29,095	61%	39%	711	3.0	5.6	2.3	1.6
West DeKalb County/Decatur	31,529	58%	37%	764	2.7	4.9	1.9	1.2
West Gwinnett County	26,936	71%	47%	743	2.4	5.5	5.4	4.5
Total	**380,282**	**56%**	**38%**	**736**	**2.5**	**5.6**	**3.6**	**2.8**

Source: M/PF YieldStar, Torto Wheaton Research.

vacancy rates, MPF produces estimates of total ex post demand, or net absorption (change in occupied inventory). Rent, vacancy, supply, and demand thus represent a complete set of real estate fundamentals for each submarket.

We assume that the variation in these fundamentals over time and across submarkets can meaningfully determine local pricing. Thus, properly understanding this variation is the first step in the analysis.

MPF delineates the 14 submarkets in the Atlanta market shown in Exhibit 1. While these submarkets vary widely in terms of land area and overall housing density, most have 20,000 to 30,000 units of rental inventory in apartments with five or more units in the structure. The submarkets exhibit noticeable variation in their average construction (and absorption) rates since 1993. Some have doubled their stock over the last decade (e.g., East Gwinnett, Outer Atlanta), while others have grown very little (e.g., South Atlanta).

Average rents also differ a great deal by area—more than 50%. Differences between areas in rental growth seem permanent and unrelated to rent level. The correlation between initial rent level and rent growth (with only 14 observations) is not significant statistically, so rents are neither converging nor diverging across areas. Given wide differences in construction rates and rent, it is notable that the submarkets have very similar average vacancy rates.

To track the behavior of each submarket over time, we prepare the four graphs shown in Exhibits 2 through 5. In Exhibits 2 and 3 we track quarterly submarket absorption and completions as a percent of the submarket stock to allow comparisons across the series for each area. Exhibits 4 and 5 track submarket vacancy and rents. Each thin line represents the path of an individual submarket series, while the heavy boldfaced line represents the corresponding MSA marketwide series.

Most individual submarket absorption and completions series exhibit great quarter-to-quarter variation—up to 10 percentage points. There also is a strong seasonal pattern to absorption. It is easy to see how investors might come to believe that submarket movements in supply and demand are erratic and quite different across areas. The metro series is much smoother (varying by no more than about 2 percentage points between periods).

The smoother MSA series implies that big surges in development and demand in each submarket (the visible spikes) must be negatively correlated across areas. In Exhibit 6 we show that this is true. Of 91 correlations between submarkets, almost half are negative or insignificantly different from zero. Hence, the average intersubmarket correlation is quite low. Spikes aside, there is generally a positive correlation between most submarkets and the MSA—strong years tend to be stronger in most areas, and vice versa.

In Exhibit 4 there appears to be less quarter-to-quarter variation in submarket vacancy rates. In fact, if just four visible area-quarter spikes are removed, vacancy in each area tracks the MSA vacancy rate quite closely.

In Exhibit 6 we see that vacancy is indeed positively correlated in each of the 91 possible cases, and that no pair of submarkets has a negative correlation. With respect to

EXHIBIT 2
Absorption Rates

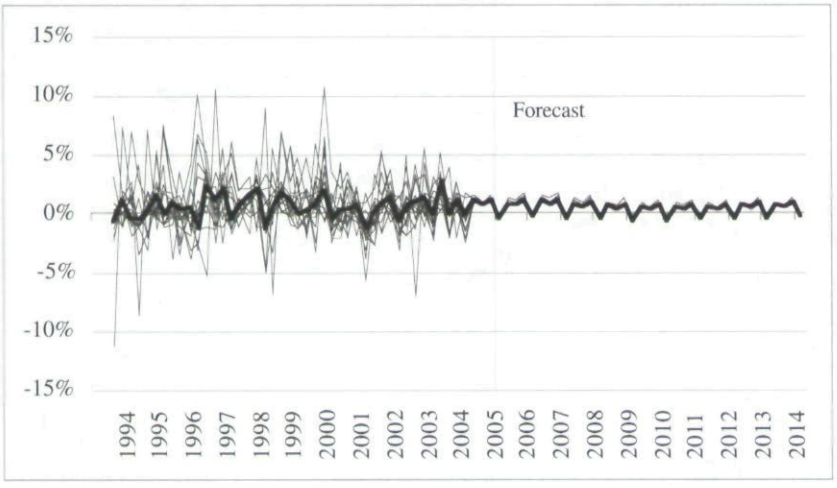
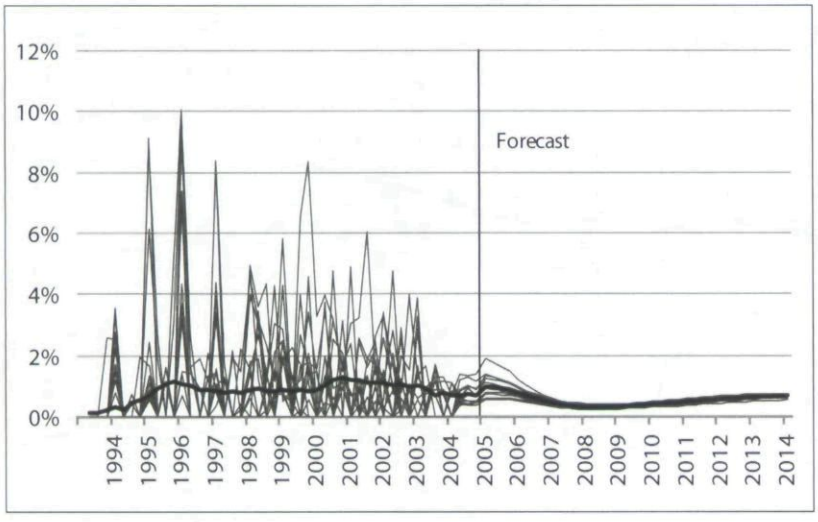


EXHIBIT 3
Completion Rates



MSA vacancy, all areas have significant positive correlation. This of course implies that there is a longer-run vacancy cycle. Vacancy was low in the mid-1990s and then much higher recently, affecting all submarkets quite uniformly

Despite the substantial variation in submarket rates of completion and absorption, submarket rents move even more in tandem than vacancy. Exhibit 6 shows the average correlation in rent between pairs of submarkets is 0.91, and each area has significant positive correlation with the MSA average rent. There is, of course, also a long-run relationship between rent and vacancy in each area. Higher vacancy rates during 2000-2004 definitely have softened rents in every submarket.

Included in Exhibits 2 through 5 are forecasts for ten years forward. These forecasts are developed two different ways. The MSA forecast is from a full structural econometric model of the region's apartment market (similar to that described in DiPasquale and Wheaton [1990]). The forecast for each submarket is an aggregately consistent share model. Using a panel data base of the individual submarket time series, we have estimated a logistic function share model for allocating MSA absorption and completions to each submarket.

In these submarket models, we find that quarterly variation in submarket vacancy is quite a strong positive predictor of the absorption share and a negative predictor of subsequent completions. Interestingly, we do not get similarly strong results for quarterly movements in submarket rents—perhaps because these movements are so small. Putting the two share forecasts together, we get changes in submarket vacancy.

Using a panel regression, we find that the quarterly movements in submarket rents, while small, are statistically related both to MSA as well as submarket levels of vacancy. The impact of MSA vacancy, however, is more pronounced than individual submarket vacancy. Thus the complete model to share the MSA forecast down to local areas is composed of two logistic equations and one rent-vacancy adjustment equation (Wheaton [1988]). All are estimated using the panel database. The actual forecasts of course are smoother than the historical data since they do not incorporate the various random shocks that (quite often) have hit supply and demand at small-area levels.

APARTMENT TRANSACTIONS: 2000–2004

The second source of data for this study is Real Capital Analytics, Inc. (RCA). For the last several years, RCA

EXHIBIT 4
Vacancy Rates (%)

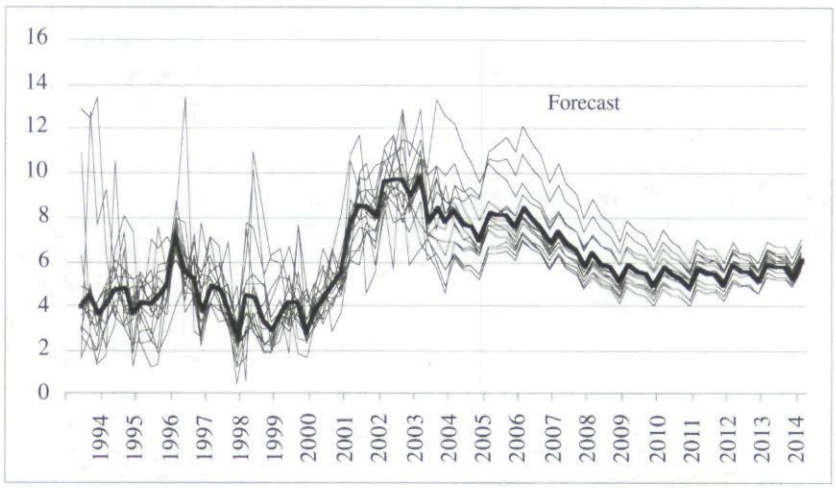


EXHIBIT 5
Rental Rates ($/Month)

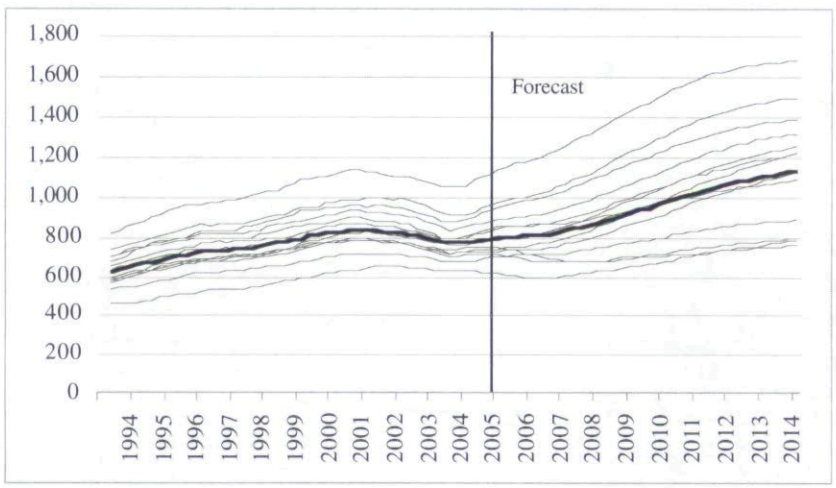


EXHIBIT 6
Atlanta Intersubmarket Correlations

	Absorption	Completions	Vacancy	Rent
Average Correlation	0.21	0.14	0.76	0.91
Number 0 or Negative (of 91)	43	42	0	0
Number 0 or Negative with MSA (of 14)	3	2	0	0

EXHIBIT 7
RCA Apartment Transactions

	Transacted properties					
Submarket	**2000**	**2001**	**2002**	**2003**	**2004**	**Total**
Intown/Midtown		1	5	1	1	8
Northwest Atlanta		2		1	1	4
North Atlanta/Buckhead		2	1			3
Chamblee/Dunwoody		2	3	2	1	8
West DeKalb County/Decatur		5	3	1		9
South Atlanta/South Fulton Co		1		1	1	3
West Cobb County				2		2
East Cobb County	1	2	2	1	1	7
Roswell/Alpharetta Area	1	2	1	3	1	8
West Gwinnett County		5	2		6	13
East Gwinnett County		2	1	1	2	6
East DeKalb County	1	1	2	2	3	9
Clayton County			2	1	2	5
Outer Atlanta	1	1	2	3	4	11
Total	**4**	**26**	**24**	**19**	**23**	**96**

has been collecting information on actual commercial property sales transactions in many MSAs around the country. RCA screens the initial data obtained mainly from registries of deeds to be sure that each transaction is both arm's-length and reflects a 100% interest. It then surveys the owner/manager to obtain information on property age and number of units (if these are not recorded) and in the process inquire about current net operating income. The latter data are sometimes not available, so we can combine the RCA transaction information with the MPF data to fill in missing information on property income.

Between 2000 and 2004, the RCA database includes entries for 294 transactions. Of these 96 include information on gross and net property income in addition to full sales price. Each transaction is matched by address or geo code to the MPF-defined submarkets.

Exhibit 7 shows the number of transactions by submarket and year. Aggregating across years (2000-2004), we can compute the average cap rate by submarket across the 14 Atlanta areas. The range in average cap rates shown in Exhibit 8 is about 250 basis points, but this average masks differences that have occurred over time.

As the apartment market has become of greater interest to institutional investors, the number of transactions has increased (*Exhibit 7*), and the average cap rate has moved down (*Exhibit 9*). Any study of average cap rates by submarket would be biased because the distribution of transactions across years varies by area.

The database of 96 transactions also includes information on the age of the property and the number of units. No data are available to indicate unit quality such as number of bathrooms or extent of kitchen facilities, or common amenities such as pools or recreation facilities.

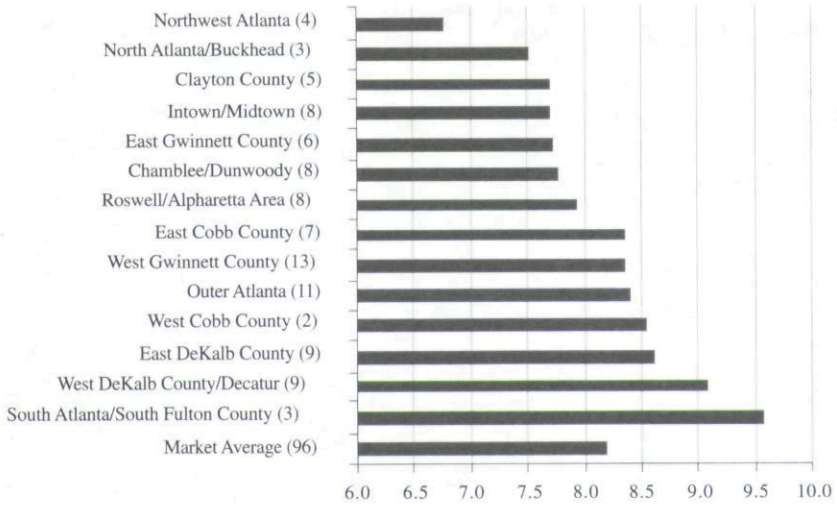
EXAMINATION OF LOCAL ASSET PRICING

Any number of regression equations are possible for examining local asset pricing. One might be a cross-section of the submarket areas, but this would involve only 14 observations and would be biased because of the non-uniform distribution of transactions across areas by year. Instead, we choose an equation at the individual property/transaction level. This provides 96 observations.

We control for the time trend in cap rates with a variable depicting the year sold (YSOLD). A regression using individual transactions also gives us added explanatory variables in the form of property-level information on age (AGE2) and number of units (UNITS2).

To identify market characteristics for each sub area, we include submarket size (as measured by number of units, SUBSTOCK) and then a series of variables closely related to average rental income performance in recent years. The first is average rental growth over 1998-2004 (SUBRENT_CH_6), followed by the addition of average vacancy over 2000-2004 (SUBVAC_4). Finally, we compute the quarterly standard deviation of rental growth in each area as a measure of income risk (SUBRENT_Q_SD). Exhibits 10, 11, and 12 describe the regression results.

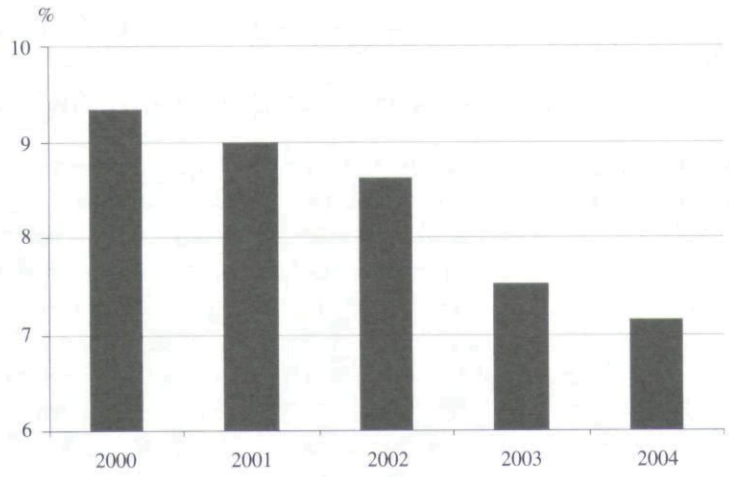
EXHIBIT 8
Average Submarket Cap Rates



Number of transacted properties in parentheses.

Sources: Real Capital Analytics, Torto Wheaton Research.

EXHIBIT 9
Atlanta Cap Rates by Year



Sources: Real Capital Analytics, Torto Wheaton Research.

It is clear throughout that older properties in larger submarkets have higher cap rates, although investors seem not to care about property or project size. The variable YSOLD clearly shows the significance of the downward trend in cap rates in recent years. Of most interest is the submarket growth rate in rents, which exerts significant downward pressure on a property's cap rate.

In Exhibit 11, we include the average vacancy rate of the property's submarket in recent years, which adds explanatory power with an appropriate effect. The significance of rental growth is reduced a bit, but given the long literature on how vacancy and rental growth are connected, we should certainly expect colinearity in these two variables.

Finally, in Exhibit 12 we include the measure of rental growth risk. Here again we get the correct sign for its impact, although it is not significant at traditional confidence levels.

In the three regressions, the value of the rent growth coefficient is between –0.45 and –0.61. In an asset pricing model, the value of the coefficient should be –1.0. We cannot explain this discrepancy at this time, although in theory investors should be pricing expected future income growth, which in Exhibit 5 is closely but imperfectly related to recent history.

DOES LOCATION MATTER?

Several results are quite clear from this examination of apartment submarkets in the Atlanta metropolitan area. First, there is a great deal of short-run noise in the movement of local supply and demand conditions (absorption, completions) that tends to be negatively correlated across areas—since the metro series are much smoother. Second, these short-run swings seem to have little economic meaning, and because of this local movements in vacancy do not have the impact upon rents that the smoother and more long-term metrowide vacancy swings do. Finally, there are large differences in rent levels between submarkets that are permanent, but there also are differences in long-run rental growth. Thus in terms of fundamentals, location does seem to matter.

In terms of investment return, however, location does not seem to matter—at least not very much. According to actual transaction prices, the yield in areas with rising vacancy and slower growing rents is higher—closely compensating investors and providing roughly equivalent total returns. We even find weak evidence that greater risk associated with rental growth demands higher yields.

EXHIBIT 10

Submarket Cap Rate Regression—Average Rental Growth

Usable Observations	96	Degrees of Freedom	90	
Centered R^2	0.494658	$\bar{R}^2$	0.466583	

	Variable	Coeff	Std Error	T-Stat	Signif
1.	Constant	1229.016669	177.900629	6.90844	0.00000000
2.	AGE2	0.032562	0.009167	3.55192	0.00061106
3.	UNITS2	-0.000794	0.000926	-0.85739	0.39350579
4.	YSOLD	-0.610817	0.088898	-6.87098	0.00000000
5.	SUBSTOCK	0.340477	0.072466	4.69847	0.00000937
6.	SUBRENT_CH_6	-0.613005	0.268312	-2.28467	0.02468278

EXHIBIT 11

Submarket Cap Rate Regression—Average Vacancy

Usable Observations	96	Degrees of Freedom	89	
Centered R^2	0.539875	$\bar{R}^2$	0.508855	

	Variable	Coeff	Std Error	T-Stat	Signif
1.	Constant	1271.845350	171.319293	7.42383	0.00000000
2.	AGE2	0.036734	0.008909	4.12323	0.00008372
3.	UNITS2	-0.001006	0.000891	-1.12912	0.26188281
4.	YSOLD	-0.634055	0.085664	-7.40164	0.00000000
5.	SUBSTOCK	0.297031	0.071070	4.17943	0.00006816
6.	SUBRENT_CH_6	-0.471790	0.261852	-1.80175	0.07497122
7.	SUBVAC_4	0.556902	0.188309	2.95738	0.00397279

EXHIBIT 12

Submarket Cap Rate Regression—Quarterly S.D. of Rental Growth

Usable Observations	96	Degrees of Freedom	88	
Centered R^2	0.547640	$\bar{R}^2$	0.511657	

	Variable	Coeff	Std Error	T-Stat	Signif
1.	Constant	1267.751678	170.862300	7.41973	0.00000000
2.	AGE2	0.037669	0.008916	4.22480	0.00005818
3.	UNITS2	-0.000882	0.000894	-0.98555	0.32705732
4.	YSOLD	-0.633129	0.085423	-7.41171	0.00000000
5.	SUBSTOCK	0.268694	0.074523	3.60553	0.00051600
6.	SUBRENT_CH_6	-0.451901	0.261604	-1.72742	0.08760046
7.	SUBVAC_4	0.818965	0.284109	2.88258	0.00495610
8.	SUBRENT_Q_SD	0.115702	0.094134	1.22912	0.22230402

With efficient asset pricing, location does not seem to matter very much in terms of investment return.

ENDNOTE

The authors are indebted to Torto Wheaton Research, MPF Yield Star, and Real Capital Analytics for providing the databases necessary for this research.

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