MULTIFAMILY APARTMENT MARKETS IN THE WEST:

METRO AREA APARTMENT CYCLES AND THEIR TRENDS

MANOVA TEST:

CONSTRAINED AND UNCONSTRAINED MARKETS
STRUCTURAL EFFECTIVE RENTS AND OCCUPANCY RATES

Written by

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AN INTRODUCTION TO APARTMENT CYCLES

For decades the Western economy and apartment market has moved in and out of cycles, cycles of over and under supply. The source, amplitude and duration, of these cycles have varied over time. In the West we have seen many different types of cycles, cycles emanating from excessive land speculation, hyper inflation, depressions, recessions, banking crises, wars, etc. But one fact remains, markets, and cycles associated with them, are self correcting and have become less volatile over the years.

There are two fundamental sources that cause apartment market cycles to occur. These are employment demand-shocks and employment supply-shocks. Metro area apartment markets experiencing employment demand-shocks see high levels of job growth, high housing demand due to in-migration, positive net absorption, dropping vacancy rates below their long-run average, rising effective rents and sale prices above replacement costs, and eventually new construction (Bay Area, Orange County, Los Angeles, Seattle, San Diego).

Flows of new construction continue up to the point where the market moves back into balance, where sales prices drop below or are equal to the cost of construction. Depending on capital market conditions and metro area characteristics, the apartment market runs the risk of becoming oversupplied in the short-run, but in the long-run the market gravitates toward more balanced conditions.

Metro area apartment markets experiencing employment supply-shocks see low or falling job growth, low levels of housing demand due to out-migration, negative net absorption, rising vacancy rates above their long-run average, falling effective rents and sale prices below replacement costs, and eventually low or no new construction until the market reaches more balanced conditions (Albuquerque, Las Vegas, Tucson).

In both cases, the apartment market eventually self corrects and moves toward a state of balance, and remains in balance until the next employment shock. On average, a market in balance is said to be the point at which vacancy rates stabilize at roughly 5% and effective rents grow at the local inflation rate. This rule of thumb may vary slightly depending on the market.

Over the past 19 years, Western region apartment markets have gone through many different types of cycles. Some markets experiencing severe conditions of over and under supply (Albuquerque, Las Vegas, Phoenix and Tucson), some markets experiencing states of balance for long periods of time (Los Angeles, Bay Area, Seattle

and San Diego), and some markets experiencing more modest conditions of over and under supply (Denver, Salt Lake City and Sacramento).

This article looks at historical apartment market cycles and current and future market conditions in the West, focusing mainly on the top 14 metro areas in regards to population. Metro areas analyzed are: Albuquerque, Denver, Las Vegas, Los Angeles, Orange County, Phoenix, Portland, Riverside, Sacramento, Salt Lake City, San Diego, Seattle, San Francisco Bay Area, and Tucson.

APARTMENT MARKET CHARACTERISTICS

Metro areas in the West can be put into two groupings, supply-constrained or supply-unconstrained. This grouping allows us to understand and assess the trade-off between risk and return for these markets over the long-run.

Supply-constrained markets tend to be more: 1) urban, 2) have high barriers to development, 3) lack developable land, 4) have complex or difficult entitlement processes and 5) strict environmental regulations. Supply-unconstrained markets tend to be more: 1) suburban, 2) have low barriers to development, 3) have an abundance of developable land, and 4) have easy entitlement processes and 5) lack environmental regulations. Table #1 in the Appendix identifies those markets with supply-constrained and supply-unconstrained characteristics, along with other unique characteristics for the individual markets.

TOTAL RETURN COMPARISON

Supply-constrained markets are less likely to become oversupplied in the short-term, are less volatile, and provide higher real rates of return over the long-run. Supply-unconstrained markets are more likely to become oversupplied in the short-term, are more volatile, and provide high real returns in the short-run but lower real rates of return in the long-run.

Metro areas exhibiting the highest real rates of return over time are: the Bay Area, Salt Lake City, Seattle and Los Angeles; and metro areas exhibiting the lowest rates of return over time are: Las Vegas, Albuquerque, Riverside and Sacramento. As indicated in Table #2, supply-constrained markets tend to have higher rates of return over the long-run.

Table #2

Long-Run Total Apartment Returns			
Metro	**Rank**	**Average Return ***	**Market Type**
San Francisco Bay	**1**	14.7%	Constrained
Salt Lake City	**2**	14.4%	Constrained
Denver	**3**	13.7%	Un-Constrained
Seattle	**4**	13.1%	Constrained
Los Angeles	**5**	12.9%	Constrained
Pheonix	**6**	12.7%	Un-Constrained
Tucson	**7**	12.7%	Un-Constrained
San Diego	**8**	12.4%	Constrained
Sacramento	**9**	12.0%	Un-Constrained
Orange County	**10**	11.5%	Constrained
Riverside	**11**	10.9%	Un-Constrained
Portland	**12**	10.8%	Constrained
Albuquerque	**13**	9.0%	Un-Constrained
Las Vegas	**14**	8.0%	Un-Constrained

Source: Real rates of return were calculated by BRE Properties Research Department using date provided by the National Real Estate Index.

*Average annualized returns were calculated on a quarterly basis for years 1986-1998, except (Albuquerque 1996-1998), (Las Vegas, Salt Lake City, San Francisco 1990-1998), (Portland 1989-1998).

Note: Total real rates return were calculated using the year over year change in price per square foot plus the annualized income returns represented by the current cap rate, minus an average inflation rate of 3.0% per year.

RISK COMPARISONS

Supply-constrained markets tend to be less volatile or less risky than unconstrained markets in the long-run. Cycle risk is measured by the spread between the metro area's highest and lowest vacancy rate. Supply-constrained markets tend to experience less volatility in vacancy rates and are less likely to experience extreme over and under supplied conditions.

Markets exhibiting the tightest spreads or least amount of cycle risk are: Orange County, Seattle, the Bay Area, and Los Angeles; and markets exhibiting the widest spreads or greatest amount of cycle risk are: Denver, Tucson, Phoenix and Albuquerque. Of all of the markets analyzed, Salt Lake City experienced the widest spread at 13%, due to the preference for and abundance of single-family housing construction.

Over the years, vacancy rate spreads have narrowed in the majority of supply-unconstrained markets. This is attributed to higher levels of bank regulation and the larger role of public markets in allocating development capital. Tables #3 shows high-low vacancy rate spreads for supply constrained and unconstrained markets.

MAGNITUDE OF APARTMENT CYCLES IN THE WEST

MEASURED BY VACANCY RATES SPREADS

Metro Area	1981 - 1998 High	1981 - 1998 Low	1981 - 1998 High-Low Spread
Supply Constrained Markets			
Orange County	5.5%	2.0%	**3.5%**
Seattle	7.0%	3.0%	**4.0%**
Los Angeles	6.5%	2.0%	**4.5%**
San Francisco Bay Area	7.0%	2.5%	**4.5%**
San Diego	7.5%	2.0%	**5.5%**
Portland	8.5%	2.0%	**6.5%**
Salt Lake City	16.0%	3.0%	**13.0%**
Average for Supply-Constrained	**8.3%**	**2.4%**	**5.9%**
Supply-Unconstrained Markets			
Denver	13.9%	2.8%	**11.1%**
Tucson	15.0%	4.0%	**11.0%**
Phoenix	15.7%	5.5%	**10.2%**
Albuquerque	11.7%	3.2%	**8.5%**
Las Vegas	8.5%	2.7%	**5.8%**
Riverside	10.0%	5.5%	**4.5%**
Sacramento	7.0%	2.5%	**4.5%**
Average for Supply-Unconstrained	**11.7%**	**3.7%**	**7.9%**

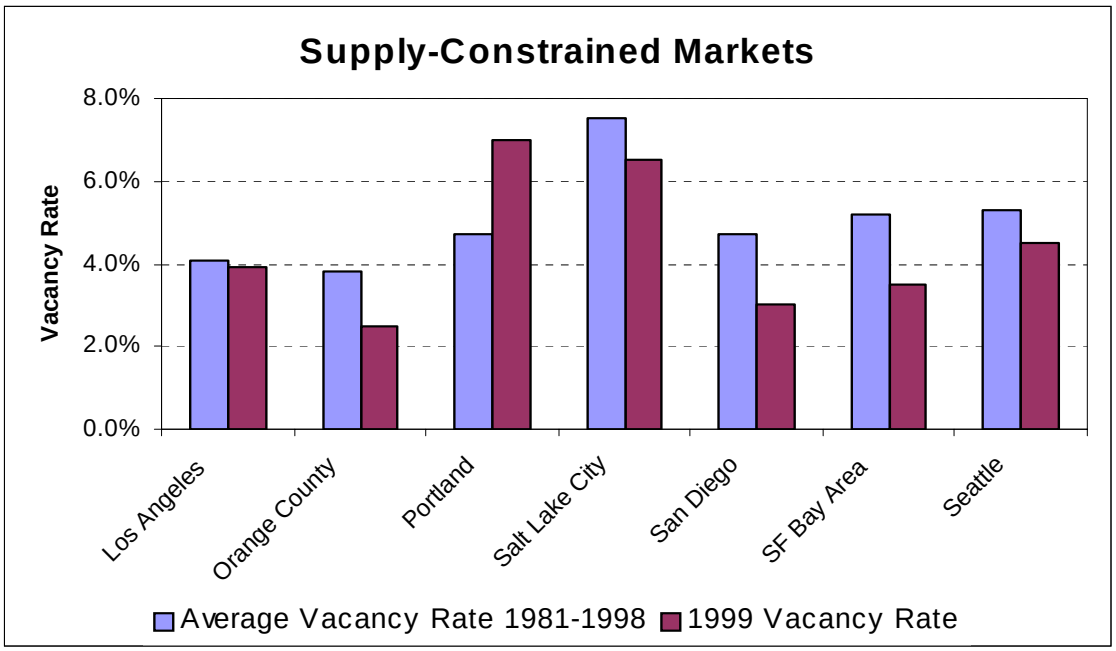
Sources: MP/F Research, RealFacts, RealSource, REIS Reports, Marcus & Millichap, Clayton-Fillmore, ULI, and BRE Properties Research Department.

VACANCY RATE COMPARISIONS

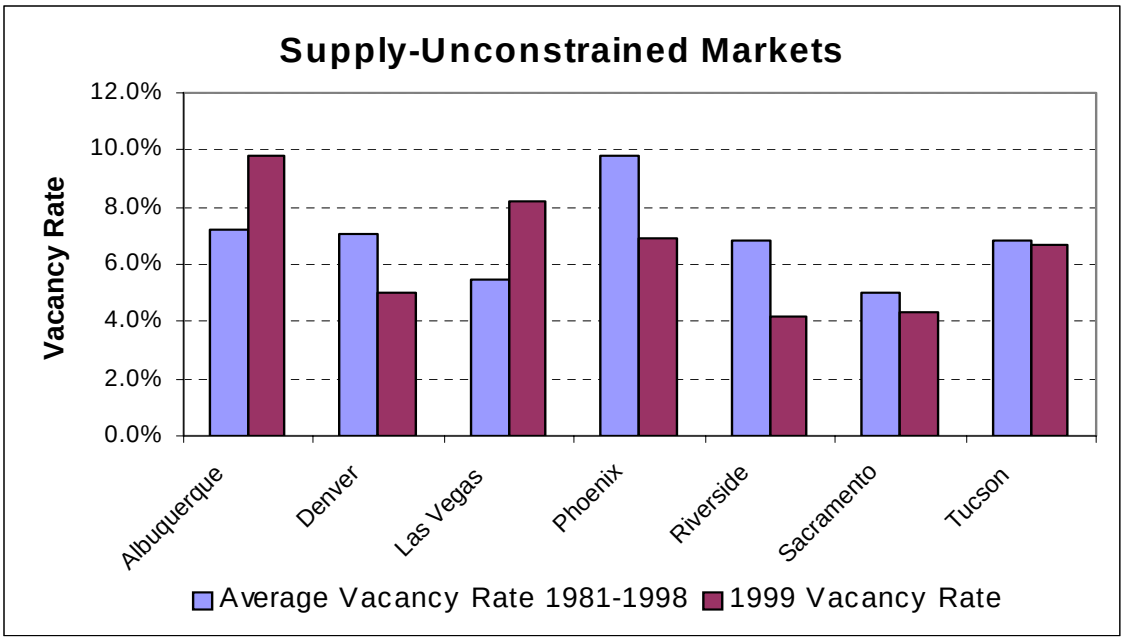
Current vacancy rates are also significantly lower than their long-term average for supply-constrained markets compared to supply-unconstrained markets. Current vacancy rates lower than long-term averages would indicate that the majority of Western apartment markets should experience above inflation rent growth, and that supply-constrained markets are expected to experience rent growth at levels well above the local inflation rate.

Supply-constrained markets with vacancy rates well below their long-term average are: Orange County, San Diego, the Bay Area and Seattle; and supply-unconstrained markets with vacancy rates below their long-term average are: Phoenix, Denver, Riverside and Sacramento. Graphs #1 and #2 compare long-term average vacancy rates to current vacancy rates for supply-constrained and unconstrained markets.

Graph #1



Graph #2



EFFECTIVE RENT COMPARISONS

Supply-constrained markets are projected to have higher effective rent growth and lower vacancy rates than supply-unconstrained markets over the next three years. Markets expected to experience high effective rent growth are: Los Angeles, Orange County, San Diego and the Bay Area; while markets expected to experience low effective rent growth are: Albuquerque, Las Vegas, Portland and Phoenix. Table #4 shows metro area effective rent growth projections for supply-constrained and unconstrained markets.

Table #4

Effective Rent Growth Rankings				
		Effective Rent Growth	Average Vacancy Rate	
Rank	Metro	1999-2001	1999-2001	Market Type*
1	Los Angeles	6.0%	3.6%	SC
2	Orange County	5.7%	2.8%	SC
3	San Diego	5.2%	3.4%	SC
4	San Francisco Bay	4.3%	4.3%	SC
5	Denver	4.2%	5.2%	SU
6	Sacramento	4.0%	4.8%	SU
7	Riverside	3.8%	4.3%	SU
8	Seattle	3.8%	5.5%	SC
9	Tucson	2.7%	6.6%	SU
10	Salt Lake City	2.5%	6.0%	SC
11	Pheonix	2.3%	7.0%	SU
12	Portland	-0.5%	6.5%	SC
13	Las Vegas	-0.8%	7.4%	SU
14	Albuquerque	-2.2%	9.3%	SU

* Market Types: SC - Supply Constrained Markets, SU - Supply-Unconstrained Markets.

Source: MP/F Research, RealFacts, RealSource, REIS Reports, Marcus & Millichap, Clayton-Fillmore, ULI, and BRE Properties Research Department.

CYCLE COMPARISONS

Supply-constrained markets experience longer periods of time between cycles, limiting the risk of becoming oversupplied, thus adding to their return stability. Apartment vacancy rate cycles are measured by their peaks (high vacancy rates) and troughs (low vacancy rates) over time.

Supply constrained market cycles last roughly:

- 12 years from peak-to-peak, compared to 11 years for supply-unconstrained markets.

- 13 years from trough-to-trough, compared to 11 years for supply-unconstrained markets.

- 7 years from peak-to-trough, compared to 4 years for supply-unconstrained markets.

It takes longer for supply-constrained market cycles to go from high vacancy to low vacancy compared to unconstrained markets, thus mitigating the odds of experiencing boom-bust, and periods of rapidly rising and falling effective rents.

Metro areas exhibiting long time periods between cycles are: Los Angeles, San Diego, the Bay Area and Orange County; and metro areas exhibiting short time periods between

cycles are: Las Vegas, Tucson and Riverside. Table #5 shows average time periods between cycles for supply-constrained and supply-unconstrained markets.

Table #5

APARTMENT VACANCY RATE CYCLES IN THE WEST BY TIME PERIOD

Metro Area	Peak-to-Peak	Peak-to-Trough	Trough-to-Trough	Trough-to-Peak
Supply Constrained Markets				
Los Angeles	1993 to 2008 **15 years**	1993 to 2000 **7 years**	2000 to 2017 **17 years**	2000 to 2008 **8 years**
Orange County	1992 to 2004 **12 years**	2004 to 2010 **6 years**	1998 to 2013 **15 years**	1998 to 2004 **6 years**
Portland	1991 to 2000 **9 years**	2000 to 2004 **4 years**	1995 to 2004 **9 years**	1995 to 2000 **5 years**
Salt Lake City	1988 to 2000 **12 years**	2000 to 2007 **7 years**	1995 to 2007 **12 years**	1995 to 2000 **5 years**
San Diego	1987 to 2002 **15 years**	2002 to 2013 **11 years**	1988 to 2013 **15 years**	1998 to 2002 **4 years**
San Francisco Bay Area	1988 to 2003 **15 years**	2003 to 2010 **7 years**	1996 to 2010 **14 years**	1996 to 2003 **7 years**
Seattle	1993 to 2001 **8 years**	2001 to 2005 **4 years**	1997 to 2005 **8 years**	1997 to 2001 **4 years**
Average Duration in Years - SC	1990 to 2002 **12 years**	2001 to 2008 **7 years**	1995 - 2008 **13 years**	1995 - 2002 **7 years**
Supply-Unconstrained Markets				
Albuquerque	1988 to 1999 **11 years**	1999 to 2005 **6 years**	1994 to 2005 **11 years**	1994 to 1999 **5 years**
Denver	1986 to 2000 **14 years**	2000 to 2008 **8 years**	1994 to 2008 **14 years**	1994 to 2000 **6 years**
Las Vegas	1991 to 1999 **8 years**	1999 to 2003 **4 years**	1994 to 2003 **9 years**	1994 to 1999 **5 years**
Phoenix	1986 to 2000 **14 years**	2000 to 2008 **8 years**	1994 to 2008 **14 years**	1994 to 2000 **6 years**
Riverside	1997 to 2007 **10 years**	1997 to 2002 **5 years**	1993 to 2002 **9 years**	2002 to 2008 **6 years**
Sacramento	1989 to 2001 **12 Years**	2001 to 2008 **7 years**	1995 to 2008 **13 years**	1995 to 2001 **6 years**
Tucson	1997 to 2007 **10 years**	1997 to 2004 **7 years**	1994 to 2004 **10 years**	2004 to 2009 **5 years**
Average Duration in Years - SU	1990 to 2001 **11 years**	2001 to 2005 **4 years**	1994 to 2005 **11 years**	1994 to 2001 **7 years**

Notes: A **Peak** in the vacancy rate cycle is a peak in the vacancy rate and a **Trough** in the vacancy rate is the bottom of the vacancy rate cycle.
Sources: MP/F Research, RealFacts, RealSource, REIS Reports, Marcus & Millichap, Clayton-Fillmore, ULI, and BRE Properties.

METHODOLOGY

This analysis utilized multivariate statistics, Multivariate Analysis of Variance (MANOVA), the statistical procedure that involves more than one dependent variable (structural effective rent growth and occupancy rates).

MANOVA was selected to test the significance of group differences, the difference between structural effective rent growth and occupancy rates for supply constrained and unconstrained apartment markets in the western United States. MANOVA test whether mean differences among the two groups on a combination of the two dependent variables are likely to have occurred by chance.

Under the MANOVA approach, a new dependent variable is created, it is a linear combination of the original measured dependent variables, combined in a way that maximizes the group differences, it separates the two groups as much as possible. The new dependent variable is created by developing a linear equation where each measured dependent variable has an associated weight, and when combined and summed, creates maximum separation of group means with respect to the new dependent variable.

For this study, we are investigating the differences between constrained and unconstrained apartment markets in the western region, measured by structural effective rent growth and occupancy rates, for markets in different geographic areas. In this analysis, a new dependent variable is created, a linear combination of rents and occupancies. The new dependent variable would then be subjected to a univariate ANOVA by comparing veriances on the new dependent variable for the two groups defined by geographic region.

ASSUMPTIONS AND LIMITATIONS

Multivariate analysis of variance assumptions:

- Observations must be randomly sampled and independent.
- Dependent variables must follow a multivariate normal distribution in each group.
- Population covariance matrices for dependent variables in each group are equal.
- Relationships among dependent variable pairs for each cell in data matrix are linear.

STATEMENT OF RESEARCH QUESTION

Research Question: Do structural effective rent growth and occupancy rates differ by constrained (C) and unconstrained (U) markets?

Null Hypothesis: **$H_0$1:** Structural effective rent growth and occupancy rates will not differ by constrained and unconstrained markets.

Description of Population and Sample Data

- Apartment submarkets a made-up of pre-defined geographic boundries, defined by REIS Reports, Inc., New Jersey, and surveys are conducted on properties of 50+ units.

- 200 apartment submarkets in the western region:

    - San Francisco Bay Area
    - Sacramento
    - Seattle
    - Portland
    - Los Angeles
    - Orange County
    - San Diego
    - Phoenix
    - Denver
    - Salt Lake City

- Structural effective rent growth and occupancy rates for each submarket are average effective rent growth rates and occupancy rates from 1991 to 2000.

- See above text for definitions of supply constrained and unconstrained markets.

ANOVA ANALYSIS AND RESULTS

Descriptive Statistics I

Positive and negative skewness for structural effective rent growth (EFFRNTSTRU) and occupancy rates (OCCRTSTRUC) require tansformations. Square root transformations were used to mitigate positive and negative skewness in the data distribution.

Descriptives

			Statistic	Std. Error
EFFRNTSTRU	Mean		4.360E-02	1.487E-03
	95% Confidence Interval for Mean	Lower Bound	4.067E-02	
		Upper Bound	4.653E-02	
	5% Trimmed Mean		4.256E-02	
	Median		4.000E-02	
	Variance		4.423E-04	
	Std. Deviation		2.103E-02	
	Minimum		.00	
	Maximum		.10	
	Range		.10	
	Interquartile Range		3.000E-02	
	Skewness		.760	.172
	Kurtosis		-.113	.342
OCCRTSTRUC	Mean		.9563	1.062E-03
	95% Confidence Interval for Mean	Lower Bound	.9542	
		Upper Bound	.9584	
	5% Trimmed Mean		.9568	
	Median		.9600	
	Variance		2.254E-04	
	Std. Deviation		1.501E-02	
	Minimum		.91	
	Maximum		.99	
	Range		.08	
	Interquartile Range		2.000E-02	
	Skewness		-.537	.172
	Kurtosis		.360	.342

Descriptive Statistics II

Descriptive Statistics

	MCLASS	Mean	Std. Deviation	N
TROCCRT	C	.9805	7.006E-03	121
	U	.9738	6.917E-03	79
	Total	.9779	7.694E-03	200
TREFFRT	C	.2032	5.448E-02	121
	U	.2017	4.458E-02	79
	Total	.2026	5.069E-02	200

Correlation Matrix

The Pearson correlation test for linearity between dependent variables is somewhat significant at 49%; this is also indicated in the scatter plots in the Appendix.

Correlations

		EFFRNTSTRU	OCCRTSTRUC
EFFRNTSTRU	Pearson Correlation	1.000	.488**
	Sig. (2-tailed)	.	.000
	N	200	200
OCCRTSTRUC	Pearson Correlation	.488**	1.000
	Sig. (2-tailed)	.000	.
	N	200	200

**. Correlation is significant at the 0.01 level (2-tailed).

Box's Test of Equality of Covariance Matrices

Box's test is not significant; therefore, Wilks' Lambda criteria is used to test group means.

Box's Test of Equality of Covariance Matrices[a]

Box's M	23.117
F	7.616
df1	3
df2	1386223
Sig.	.000

Tests the null hypothesis that the observed covariance matrices of the dependent variables are equal across groups.

a. Design: Intercept+MCLASS

MANOVA Summary Table

Eta Square and F Statistics indicate that the classification (MCLASS) between constrained (C) and unconstrained (U) is statistically significant in affecting the combined dependent variables of structural effective rents and occupancy rates.

Multivariate Tests[b]

Effect		Value	F	Hypothesis df	Error df	Sig.	Eta Squared
Intercept	Pillai's Trace	1.000	2527402[a]	2.000	197.000	.000	1.000
	Wilks' Lambda	.000	2527402[a]	2.000	197.000	.000	1.000
	Hotelling's Trace	25658.908	2527402[a]	2.000	197.000	.000	1.000
	Roy's Largest Root	25658.908	2527402[a]	2.000	197.000	.000	1.000
MCLASS	Pillai's Trace	.233	29.859[a]	2.000	197.000	.000	.233
	Wilks' Lambda	.767	29.859[a]	2.000	197.000	.000	.233
	Hotelling's Trace	.303	29.859[a]	2.000	197.000	.000	.233
	Roy's Largest Root	.303	29.859[a]	2.000	197.000	.000	.233

a. Exact statistic

b. Design: Intercept+MCLASS

MANOVA Tests Between-Subjects Effects

Significants and F test statistics indicate that the category of the submarket significantly affect occupancy rate, but it does not affect effective rents. This leads us to conclude that there are other unobserved variables with in the categorical analysis. Future research would require continued transformation of the effective rent variable, and to extend the analysis to MANCOVA, controlling for other variable influences.

Tests of Between-Subjects Effects

Source	Dependent Variable	Type III Sum of Squares	df	Mean Square	F	Sig.	Eta Squared
Corrected Model	TROCCRT	2.158E-03[a]	1	2.158E-03	44.405	.000	.183
	TREFFRT	9.623E-05[b]	1	9.623E-05	.037	.847	.000
Intercept	TROCCRT	182.550	1	182.550	3756530	.000	1.000
	TREFFRT	7.835	1	7.835	3034.718	.000	.939
MCLASS	TROCCRT	2.158E-03	1	2.158E-03	44.405	.000	.183
	TREFFRT	9.623E-05	1	9.623E-05	.037	.847	.000
Error	TROCCRT	9.622E-03	198	4.860E-05			
	TREFFRT	.511	198	2.582E-03			
Total	TROCCRT	191.260	200				
	TREFFRT	8.720	200				
Corrected Total	TROCCRT	1.178E-02	199				
	TREFFRT	.511	199				

a. R Squared = .183 (Adjusted R Squared = .179)

b. R Squared = .000 (Adjusted R Squared = -.005)

CONCLUDING REMARKS

Overall, apartment markets in the West have gone through many cycles over the past 19 years, and will continue to go through cycles in the future. However, in the past, where most metro area apartment markets in the West would go though their cycles together, in the 1970s and 1980s, they are now, in the 1990s and 2000s, going through their cycles independently and with less risk of overbuilding.

Supply-constrained markets tend to be more stable over the long-run and experience longer and shallower cycles when compared to supply-unconstrained markets. Although supply-constrained markets are projected to outperform supply-unconstrained markets in the future, the majority of supply-unconstrained markets in the West are projected to see above inflation effective rent growth and healthy rates of total return.

Building a Western focused portfolio of supply-constrained and supply-unconstrained markets provides for greater geographical and economic diversification and higher total returns over the long-run, without having to go to a national strategy.

As the apartment sector continues to move from private to public ownership, and as the capital markets play a larger roll in allocating development capital, supply-unconstrained markets in the West will start to take on supply-constrained market characteristics. This, in the long-run, should smooth out the cycles of severe over and under supply, extend the cycles out farther into the future, and provide higher rates of return in the long-run.