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Creating a Constant-Quality Index for Small Multifamily Rental Housing†

*Randall S. Guttery**
*C. F. Sirmans***

Abstract. **Researchers since the early 1960s have constructed constant-quality price indices (CQIs) for single-family dwellings. This paper, however, applies the methodology to construct CQIs for a different property type—small multifamily rental housing with two to four units (MRH)—so that price changes can be measured. Over the period 1983 through 1988, MRH prices increased 70% in Connecticut, but decreased nearly 65% in Baton Rouge, Louisiana. These locations and sample period are chosen because Connecticut's economy boomed, while Baton Rouge's collapsed; as well, Congress debated and passed the 1986 Tax Reform Act (TRA). TRA affected both regions' MRH prices, but other factors contributed to price changes, also.**

Introduction

Real estate assets are difficult to value, relative to financial assets such as publicly traded stocks and bond. Exchanges exist for stocks (e.g., the New York Stock Exchange), yet there are no such formal mechanisms for valuing and trading individual real estate properties. Consequently, while information dissemination is virtually instantaneous and low cost for stocks, it is relatively more costly for real estate. A major obstacle to valuing real estate versus stocks is that no two parcels of real estate are the same, while all shares of, say, IBM Class A common stock are identical. Seemingly endless reports are available on publicly traded stocks, but less information exists for specific real estate assets.

To provide real estate investors with a more efficient means of valuing property, studying mortgage default sensitivity, and estimating housing demand, researchers including Abraham and Schauman (1991), Bailey, Muth and Nourse (1963), Case, Pollakowski and Wachter (1991), Case and Quigley (1991), Hill, Knight and Sirmans (1995), and Haurin, Hendershott and Kim (1991) have attempted over the past thirty years to create price indices for single-family residential houses. Similar to the Consumer Price Index that tracks prices of various consumer products at any given time and compares them to prices in a base period, a real estate price index tracks the price of a "constant-quality" property (i.e., a *theoretical* property that does not change in location or physical characteristics) at any given time and compares it to its price in a base period. Case and Shiller (1987, 1989), Clapp and Giaccotto (1992), Mark and Goldberg (1984), Pollakowski and Wachter (1990), Shiller (1991), Hill et al. (1995) and others have argued

†MIG Realty Advisors 1995 manuscript prize winner for Best Paper on Apartments presented at the American Real Estate Society annual meeting.
*Finance, Insurance, Real Estate and Law Department, College of Business Administration, University of North Texas, Denton, Texas 76203.
**Finance Department, School of Business Administration, University of Connecticut, Storrs, Connecticut 06269-2041.

the merits of implementing various methodologies when constructing *single-family dwelling* constant-quality housing price indices (CQIs). The purpose of this paper, however, is to construct CQIs for *two-to-four unit, multifamily rental housing (MRH)*, so that price changes can be measured.[1]

MRH constant-quality price indices are created for Greater Manchester, Connecticut (CT) and Baton Rouge, Louisiana (BR) over the period 1983 through 1988. These locations are chosen because over this six-year period, their respective economies moved in opposite directions; CT's MRH market experienced a major boom, while BR's suffered significantly. This time horizon is chosen, also, because the 1986 Tax Reform Act (TRA) was introduced to Congress in August 1982 and President Reagan signed it into law in October 1986, effective January 1, 1987. While considerable debate has taken place about TRA's effect on property values, no study has shown how MRH prices responded.

This analysis suggests that MRH prices over the sample period differed significantly between the two regions. CT prices appreciated over 70%, while BR prices declined nearly 65%. Moreover, prices were generally quite volatile from one quarter to the next. These findings complement those of Follain and Calhoun (1994), who create an index for multifamily properties with more than four units.

This paper proceeds as follows. Section two provides a brief overview of two methods of creating real estate CQIs. Section three describes the empirical models used to create the CQIs for MRH and offers the underlying hypotheses. Section four discusses the data sets for the two samples. The fifth section provides the regression results, CQI values over the six-year period, and evidence of TRA's effect on MRH values. Section six concludes the paper.

Methods of Creating Constant-Quality Indices

Because real estate assets are heterogeneous, a fundamental problem arises as to how an index can be created, such that their quality is constant over the sample period. Three methods are available.[2] In real estate markets with many transactions (e.g., Dallas-Fort Worth, Atlanta, Los Angeles), the repeat-sales methodology can be utilized. This approach tracks houses that sell more than one time during the sample period. A comparison is made between each house's initial sale price and its subsequent sale price(s). The change in price is assumed to be attributed to factors other than locational or structural ones because the subject property is immovable and presumably has the same physical characteristics. Problems with this approach, however, include: (i) *sample selection bias* because starter homes, rehabs, and lower priced homes tend to resell more frequently than houses owned by older homeowners[3] (Haurin and Hendershott, 1991; Gatzlaff and Haurin, 1993); (ii) the *change in price capturing capital improvements, rather than appreciation*; and (iii) *a voluminous database requirement*. Jud and Seaks (1994) find, on average, only about 6% of existing residential housing stock resells each year, so repeat sales are infrequent.[4]

The hedonic methodology can be implemented to construct a real estate price index, also. Using multiple regression analysis, this method estimates the price of a constant-quality property over the sample period by using locational and structural characteristics as explanatory variables. The ratio of the constant-quality property's price (say, $115,000) in a subsequent time period, relative to its price (say, $100,000) in the base period, obtains the subsequent period index value, 1.15 ($115,000/100,000). A significant advantage of

the hedonic methodology over the repeat-sales approach is that it allows the separate identification of time-varying attribute prices (i.e., capital improvements). As well, it is more robust to additional factors than the repeat-sales method (Case et al., 1991).

Case and Quigley (1991) and Hill et al. (1995) have proposed an alternative methodology that incorporates both repeat-sales and single-sales data to compute a price index. Because both sets of data contain unique information, a methodology that takes advantage of both has been shown to be a superior estimation technique.

Empirical Models and Hypotheses

To build the two indices, hedonic price equations are constructed for the CT and BR samples. The sale price of each MRH property, the dependent variable, is regressed on several explanatory variables that capture market conditions, location, size, financing terms, and the date of sale. The price equation is:

$$SALEPRICE_i = \beta_0+\beta_1 DOM_i+\beta_2 LA_i+\beta_3 83Q2_i+\ldots+\beta_{25} 88Q4_i + \beta_{26} AREA1_i+\ldots+\beta_{30} AREA5_i+\beta_{31} FIN_i+\varepsilon_i\,, \quad (1)$$

where $SALEPRICE_i$[5] is the sale price of property i; β_0 is the intercept term and β_k ($k=1, 2, \ldots, 31$) are coefficients of the explanatory variables; DOM is the number of days the property was on the market; LA is the square feet of living area for each property; $83Q2$ (the second quarter of 1983) through $88Q4$ are dummy variables equal to one if the property were sold in that respective quarter, and zero otherwise; $AREA1$ through $AREA5$ are location dummy variables equal to one if the property were located in that respective area, and zero otherwise; FIN is a dummy variable equal to one if the property were sold with below-market financing, and zero otherwise; and ε is an error term.[6]

The hypotheses are that the CT (BR) sample's price equation will yield an increasing (decreasing) CQI over the sample period. DOM (LA) is expected to be negative (positive) for both samples. The quarterly dummy variables' coefficients are expected to increase for the CT sample, but decrease for the BR sample.

Once the price equations are estimated, a constant-quality MRH property's price can be calculated for the CT (BR) sample as:

$$CQPRICE_Q=b_0+b_1 AVGDOM+b_2 AVGLA+b_3 83Q2_Q+\ldots+b_{25} 88Q4_Q\,, \quad (2)$$

where $CQPRICE_Q$ is the constant-quality price in quarter Q ($Q=83Q1, 83Q2, \ldots, 88Q4$); b_k ($k=0, 1, 2, \ldots, 25$) are the *estimated values* of the intercept and quarterly regression coefficient results of DOM, LA, and the quarterly dummy variables from equation 1; $AVGDOM$ is the average days on the market for the sample properties; $AVGLA$ is the average living area for the sample; and $83Q2$ through $88Q4$ are as defined previously. Then, the constant-quality prices are transformed into raw index values, such that the raw index value for quarter Q equals the constant-quality price in quarter Q divided by the constant-quality price in the base quarter, $83Q1$. Finally, the raw index values are scaled by a factor of 100 to obtain the CQIs.

To test the significance of the 1986 Tax Reform Act on small multifamily residential real estate values, the CQI values are regressed on a dummy variable that measures

whether or not a MRH property was purchased before or after the 1986 Tax Reform Act, a volume variable, an interaction term, and a time-trend variable. This equation is:

$$INDEX_Q = \delta_0 + \delta_1 TAX86_Q + \delta_2 VOLUME_Q + \delta_3 TAXTREND_Q + \delta_4 SQRTREND_Q + \upsilon_Q , \quad (3)$$

where $INDEX_Q$ is the CT (BR) CQI value in quarter Q; δ_0 is the intercept term and δ_k (k=1, 2, 3, 4) are coefficients of the explanatory variables; *TAX*86 is a dummy variable equal to one for all quarters after 86*Q*3,[7] and zero otherwise; *VOLUME*, the number of sales in quarter *Q*, is included to control for any change in demand by investors choosing to take title before TRA's effective date; *TAXTREND*, designed to capture simultaneous changes in the intercept term and some of the slope parameters, is an interaction term between *TAX*86 and *TREND* (a time-trend variable equal to one for 83*Q*1, two for 83*Q*2, . . . , twenty-four for 88*Q*4); *SQRTREND*, the square of *TREND*, is included to capture any time trend in the CQI; and υ is an error term.

*TAX*86 is expected to be negative for both samples because TRA was perceived by many real estate investors to effect after-tax cash flows adversely, thus, depressing prices. *VOLUME* is hypothesized to be positively correlated with the index because an increase in demand should increase sale prices in both locations. *TAXTREND* is difficult to predict a priori because its effect depends on how the tax changes affect the slope of the price index. *SQRTREND* is hypothesized to be positive (negative) for the CT (BR) sample because CT's (BR's) MRH values were rising (falling).

Data and General Analysis

The Multiple Listing Service (MLS) provided data for both samples from its Quarterly Comparable Sales Books. The CT (BR) sample consists of 528 (382) duplexes, triplexes and fourplexes that sold over the period January 1983 through December 1988. MRH sales are excluded from the sample if any relevant information is omitted from the MLS Comp Books, or if the properties are located outside of the six areas of each geographic region. Exhibit 1 reports the samples' mean values and standard deviations for each variable in equation 1.

The sale price of CT properties range from $35,000 to $267,000, with a mean of $128,325, while BR properties range from $8,800 to $218,000, with a mean of $88,661. MRH values in both locations are relatively flat during 1983 and 1984; thereafter, CT values rise steadily, while BR values decline rapidly. This is evidenced by the fact that *DOM*, a proxy for market conditions, averaged 66 days for the CT sample, but 107 days for the BR sample; therefore, the average MRH property was on the market 62% longer in BR than in CT. Finally, the mean living area is 2,560 (3,564) square feet in CT (BR).

Connecticut's economy fared much better over the sample period than Baton Rouge's. For example, CT's civilian labor force unemployment rate averaged 3.4%, population grew 6.7%, average house prices soared 123.3%, and inflation-adjusted per capita personal income rose 30.1%. On the other hand, BR's civilian labor force unemployment rate averaged 8.4%, population declined 1.2%, average house prices dropped 13.0%, and inflation-adjusted per capita personal income rose only 0.2%.[8] These statistics lend support as to why Connecticut's MRH appreciated in value, while Baton Rouge's did not.

Exhibit 1
Mean Values and Standard Deviations for Small Multifamily Residential Properties in Greater Manchester, Connecticut and Baton Rouge, Louisiana

	Greater Manchester		Baton Rouge	
Variable	Mean	Std Dev.	Mean	Std Dev.
SALEPRICE	128,325	46,600	88,661	48,640
DOM	66	67	107	126
LA	2,560	608	3,564	1,010
83*Q*2	.011	.106	.084	.277
83*Q*3	.015	.122	.097	.296
83*Q*4	.023	.149	.034	.182
84*Q*1	.011	.106	.018	.134
84*Q*2	N/A	N/A	.016	.124
84*Q*3	.011	.106	.026	.160
84*Q*4	.008	.087	.010	.102
85*Q*1	.009	.097	.021	.143
85*Q*2	.017	.130	.031	.174
85*Q*3	.030	.172	.029	.167
85*Q*4	.009	.097	.010	.102
86*Q*1	.006	.075	.023	.152
86*Q*2	.023	.149	.016	.124
86*Q*3	.097	.296	.031	.174
86*Q*4	.165	.371	.047	.212
87*Q*1	.049	.217	.023	.152
87*Q*2	.089	.285	.023	.152
87*Q*3	.093	.290	.026	.160
87*Q*4	.059	.235	.047	.212
88*Q*1	.064	.246	.034	.181
88*Q*2	.089	.285	.094	.292
88*Q*3	.053	.224	.094	.292
88*Q*4	.059	.235	.112	.316
*AREA*1	.017	.130	.092	.229
*AREA*2	.023	.149	.110	.313
*AREA*3	.252	.435	.076	.265
*AREA*4	.040	.196	.298	.458
*AREA*5	.025	.155	.191	.394
FIN	.045	.208	.170	.376

Source: Authors

Results

Regression Results

The price equations for each sample yield the regression results reported in Exhibit 2. For the Connecticut sample, both *DOM* and *LA* are significant at the 1% level and of the hypothesized signs. All areas' MRH sold for about $30,000 less than those in the base location, with the exception of those located in *AREA*1, where average MRH sold for about $10,000 less. Every quarterly dummy variable after 86*Q*2 is significantly positive at the 1% level except 87*Q*1, which is significantly positive at the 5% level. Note that this corresponds to the potential tax effect. The adjusted *R*-squared statistic is .736, and the *F*-statistic of 50.033 is significant at the 1% level.

Exhibit 2
Regression Results for Small Multifamily Residential Properties in Greater Manchester, Connecticut and Baton Rouge, Louisiana

	Greater Manchester		Baton Rouge	
Variable	Coefficient	*T*-Stat.	Coefficient	*T*-Stat.
Intercept	40,829.852	3.37*	43,337.332	6.12*
DOM	−51.712	−3.13*	5.637	.56
LA	24.597	11.80*	24.970	18.49*
83*Q*2	901.253	.06	10,504.067	1.60
83*Q*3	−5,139.469	−.37	17,886.119	2.80*
83*Q*4	9,065.811	.71	14,217.400	1.76***
84*Q*1	−1,219.907	−.08	7,437.295	.74
84*Q*2	N/A	N/A	22,425.896	2.10**
84*Q*3	7,315.618	.50	−11,530.702	−1.30
84*Q*4	4,674.865	.29	−19,010.947	−1.53
85*Q*1	−4,090.702	−.27	−2,262.184	−.24
85*Q*2	−1,265.363	−.09	−11,857.528	−1.42
85*Q*3	2,934.558	.24	−36,125.704	−4.28*
85*Q*4	6,526.610	.43	−27,530.181	−2.23**
86*Q*1	20,081.381	1.14	−22,272.216	−2.44**
86*Q*2	16,022.414	1.23	−22,544.239	−2.15**
86*Q*3	29,817.605	2.59*	−49,189.844	−5.97*
86*Q*4	35,453.321	3.15*	−49,319.646	−6.61*
87*Q*1	24,248.421	2.02**	−51,252.925	−5.65*
87*Q*2	36,480.592	3.15*	−54,988.876	−6.01*
87*Q*3	48,254.820	4.17*	−60,798.290	−6.96*
87*Q*4	49,610.509	4.22*	−67,426.904	−9.05*
88*Q*1	63,861.691	5.42*	−76,271.907	−9.32*
88*Q*2	58,214.793	4.98*	−80,446.406	−12.52*
88*Q*3	78,069.787	6.55*	−84,507.914	−13.04*
88*Q*4	70,340.838	5.91*	−85,895.956	−13.76*
*AREA*1	−10,461.407	−1.27	−9,031.589	−1.88***
*AREA*2	−30,184.312	−3.92*	−6,472.300	−1.45
*AREA*3	−32,171.560	−10.66*	−28,197.658	−5.25*
*AREA*4	−28,198.233	−4.90*	−3,851.199	−1.14
*AREA*5	−29,415.305	−4.15*	−6,568.645	−1.72***
FIN	−4,101.653	−.78	1,844.029	.53
Adjusted R^2	.736		.793	
F-statistic	50.033*		48.031*	

*significance at 1%; **significance at 5%; ***significance at 10%
Source: Authors

For the Baton Rouge sample, *LA* is significant at the 1% level and of the anticipated sign, while *DOM* is insignificantly positive. All areas' MRH sold for about $4,000 to $9,000 less than those in the base location, with the exception of those located in *AREA*3, where average MRH sold for about $28,000 less. Every quarterly dummy variable after 86*Q*2 is significantly negative at the 1% level, as expected.[9] The adjusted *R*-squared statistic is .793, and the *F*-statistic of 48.031 is significant at the 1% level.

Constant-Quality Index Values

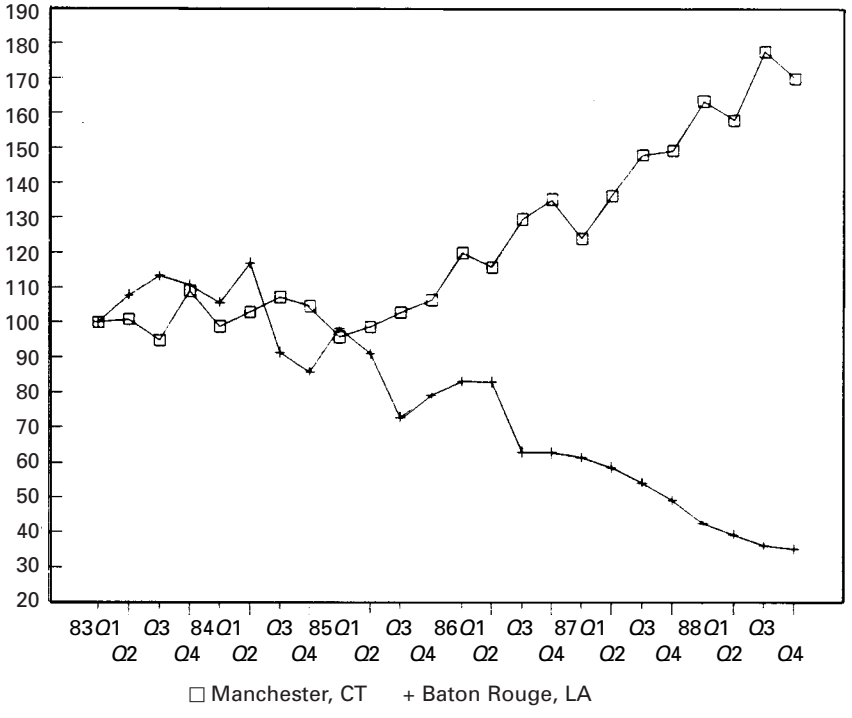
Equation 2 is used to create the price of an average, constant-quality MRH property over the sample period, which in turn is used to create the scaled CQIs. Exhibit 3 reports both the constant-quality prices and the CQIs for CT and BR, while Exhibit 4 depicts the CQIs graphically. The constant-quality price of a MRH property in the first quarter of 1983 equals $100,406 for CT and $132,932 for BR, but by the fourth quarter of 1988, CT's MRH property increases over 70% to $170,745, while BR's decreases nearly 65% to

Exhibit 3
Constant-Quality Index for Small Multifamily Residential Properties in Greater Manchester, Connecticut and Baton Rouge, Louisiana

	Greater Manchester		Baton Rouge	
	Price	Index	Price	Index
83*Q*1	$100,406	100.00	$132,932	100.00
83*Q*2	101,306	100.90	143,436	107.90
83*Q*3	95,266	94.88	150,818	113.46
83*Q*4	109,470	109.03	147,149	110.69
84*Q*1	99,186	98.79	140,369	105.59
84*Q*2*	103,453	103.03	155,357	116.87
84*Q*3	107,720	107.28	121,402	91.33
84*Q*4	105,079	104.65	113,922	85.70
85*Q*1	96,315	95.93	130,670	98.30
85*Q*2	99,140	98.74	121,075	91.08
85*Q*3	103,339	102.92	96,807	72.82
85*Q*4	106,931	106.50	105,402	79.29
86*Q*1	120,486	120.00	110,660	83.25
86*Q*2	116,427	115.96	110,388	83.04
86*Q*3	130,222	129.70	83,742	63.00
86*Q*4	135,858	135.31	83,613	62.90
87*Q*1	124,653	124.15	81,680	61.44
87*Q*2	136,885	136.33	77,943	58.63
87*Q*3	148,659	148.06	72,134	54.26
87*Q*4	150,015	149.41	65,505	49.28
88*Q*1	164,266	163.60	56,660	42.62
88*Q*2	158,619	157.98	52,486	39.48
88*Q*3	178,474	177.75	48,424	36.43
88*Q*4	170,745	170.06	47,036	35.38

*Because there were no MRH sales in Greater Manchester, CT during 84*Q*2, this quarter's index value is arbitrarily given a value of $103,453, the linearly interpolated mean of 84*Q*1 and 84*Q*3.
Source: Authors

Exhibit 4
Standardized Constant Quality Indices for Small Multifamily Residential Properties in Greater Manchester, Connecticut and Baton Rouge, Louisiana (January 1983 through December 1988)



Source: Authors

$47,036. In other words, a constant-quality two-to-four unit, multifamily rental property in CT that was valued at $100,000 in 83*Q*1 would be worth $170,060 by 88*Q*4, while the same property in BR would be worth only $35,380 by 88*Q*4. On a unit price basis (i.e., price per square foot of living area), the contrast is even more stark because the average living area is 2,560 square feet in CT, but 3,564 square feet in BR. Therefore, a $100,000 constant-quality MRH property in CT (BR) that was worth $39.06 ($28.06) per square foot in 83*Q*1 would be worth $66.43 ($9.93) per square foot in 88*Q*4.

The 1986 Tax Reform Act's Effect on Multifamily Housing Values

There has been much debate about TRA's impact on real estate values. On the one hand, increased depreciation recovery schedules from 19 years to 27.5 years for residential income property and 31.5 years (now 39 years) for nonresidential real estate, as well as adverse passive activity rules, likely depressed real estate values. On the other hand, because of smaller annual depreciation deductions, investor's adjusted bases at the time

of reversion increased, so capital gains tax burdens decreased; as well, most investors' marginal tax rates dropped, so smaller taxes from operations resulted each year (holding taxable income constant).

A casual observation of CT's mean number of transactions reported in Exhibit 1 suggests investors chose to take title to these properties prior to TRA's effective date, January 1, 1987. Over the period 83*Q*1 through 86*Q*2, the number of quarterly sales never exceeded sixteen; however, there were fifty-one sales during 86*Q*3 and eighty-seven sales during 86*Q*4. The following quarter, 87*Q*1, sales dropped to twenty-six. A difference-in-means test confirms at the 1% level ($z = -4.315$) that TRA had a significant impact on CT sales.[10] BR's mean number of transactions provides weaker evidence of investors choosing to acquire MRH prior to TRA's enactment, however, A z-value equal to -1.75 only marginally rejects the null hypothesis at the 10% level that the pre-86*Q*4 means were not significantly different than the post-86*Q*3 means.

Equation 3 tests whether TRA had a significantly adverse effect on MRH values: regression results are reported in Exhibit 5. The intercept terms and time-trend variables (*SQRTREND*) are significant at the 1% level and of the hypothesized signs for both samples. *TAX*86 is significantly negative at the 5% level for CT and marginally significant at the 10% level for BR, suggesting that the 1986 Tax Reform Act had a somewhat adverse affect on MRH values. While the signs of *TAX*86 for both samples are as expected, the magnitudes are greater than anticipated. *VOLUME*, the variable to control for increased demand prior to the beginning of 1987, is significantly positive at the 5% level for CT, but insignificantly positive for BR. Investors in Connecticut's rapidly appreciating market apparently were more motivated to invest in MRH prior to TRA's effective date that those in Baton Rouge's declining market. *TAXTREND*, the interaction term between *TAX*86 and *TREND*, is significantly positive at the 5% level for CT and marginally significant at the 10% level for the BR sample. The adjusted *R*-squared statistic for both samples indicate that the index values are well explained by equation 3; as well, the *F*-statistics are significant at the 1% level. These results suggest that while TRA affected MRH prices adversely, other factors contributed to price changes, also. Follain and Calhoun (1994) reach a similar conclusion about multifamily properties with more than four units.

Exhibit 5
Regression Results for Significance of the 1986 Tax Reform Act on Small Multifamily Residential Property Values in Greater Manchester, Connecticut and Baton Rouge, Louisiana

	Greater Manchester		Baton Rouge	
Variable	Coefficient	*T*-Stat.	Coefficient	*T*-Stat.
Intercept	97.255	40.33*	107.532	25.47*
*TAX*86	−61.090	−2.43**	−47.215	−1.66***
VOLUME	.220	2.08**	.065	.04
TAXTREND	3.708	2.58**	3.017	1.69***
SQRTREND	.078	3.22*	−.180	−6.47*
Adjusted R^2	.945		.926	
F-statistic	99.605*		72.737*	

*significant at the 1%; **significant at 5%; ***significant at 10%
Source: Authors

Conclusion

While constant-quality indices (CQIs) have been created for single-family residential properties, the small multifamily rental housing market (i.e., properties with two to four units) has been largely ignored. This paper creates CQIs for two samples of duplexes, triplexes and fourplexes in Greater Manchester, Connecticut and Baton Rouge, Louisiana over the period January 1983 through December 1988. These geographic locations and sample period are chosen because during the mid-1980s, Connecticut's economy boomed, while Baton Rouge's economy collapsed; as well, Congress debated and passed the 1986 Tax Reform Act (TRA).

The two locations' CQIs suggest small income-producing residential real estate appreciated over 70% in Connecticut, but depreciated nearly 65% in Baton Rouge. TRA affected both markets' multifamily housing values adversely, but other factors contributed to price changes, also. The two regions' MRH prices were quite volatile over the period 1985 through 1988. This study adds to the sparse evidence on price movements among regions, property types and areas within a geographic region.

Notes

[1]Follain and Calhoun (1994) suggest that "no widely available index of the price of multifamily rental housing properties exists." Though there are four multifamily price indices—the Department of Commerce Index, NACREIT Apartment Index, National Real Estate Index (NREI), and Freddie Mac Repeat Sales Index—each has limitations.

[2]See Clapp and Giaccotto (1992) for a discussion of the "assessed value" method of creating CQIs.

[3]While Jud and Seaks (1994) find that higher priced houses tend to *sell* more often than lower priced ones, Clapp and Giaccotto (1992) suggest that lower priced houses tend to *resell* more often.

[4]As is the case for most real estate data sets, there are not enough repeat sales in our samples to use the repeat-sales methodology.

[5]When alternative functional forms were run (i.e., the log of sale price), the index values for both samples were virtually unchanged. Therefore, the unlogged cases are reported for ease of interpretation.

[6]Both CT and BR are subdivided into six areas: the area with the highest income and/or lowest unemployment rate is the base case area to which other areas are compared. Also, 83Q1 is the base case quarter to which other quarters are compared. Below-market financing is defined as properties that were owner-financed, sold on assumption, or exchanged.

[7]On August 22, 1986, the House and Senate Conference Committee approved a compromise tax bill, and on September 26, 1986, the full House and Senate passed the Conference Committee Bill. Because 86Q3 was the quarter in which TRA was certain to pass Congress, 86Q4 was the first quarter in which pending sales likely would be subject to TRA. See Sanger, Sirmans and Turnbull (1991) for a more thorough description of the tax act.

[8]*Sources*: Bureau of Labor Statistics, Bureau of the Census, the University of Connecticut's Center for Real Estate and Urban Economic Studies, and Louisiana State University's Real Estate Research Institute.

[9]Neither the monthly rent received from each property nor the age of each property can be used as an explanatory variable for the CT sample because the Connecticut Multiple Listing Service does not keep records on rental income and age is generally unreported. When rent is included as an explanatory variable for the BR sample, it is highly significant (t=16.05); DOM and LA are both of the hypothesized signs, similar to the CT sample, though insignificant. Age is excluded as an additional RHS variable because BR's regression results are virtually unchanged; nearly all MRH properties are less than fifteen years old.

[10]The z-values for these difference-in-means tests are computed as: $z=(\bar{x}_1-\bar{x}_2)/(s_1^2/n_1+s_2^2/n_2)^{1/2}$, where $\bar{x}_1$ ($\bar{x}_2$) is the sample mean of the quarterly dummy variables over period t_1 (83Q1 through 86Q3) [t_2 (86Q4 through 88Q4)]; s_1^2 (s_2^2) is the sample variance of the quarterly dummy variables over period t_1 (t_2); and n_1 (n_2) is the number of observations over period t_1 (t_2).

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