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A TEST OF THE CAPITALIZATION HYPOTHESIS

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A TEST OF THE CAPITALIZATION HYPOTHESIS

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I. INTRODUCTION. It is widely accepted by economists that the value of a capital asset is based on the income it produces over its productive life.[1] The underlying relationship, known as the Capitalization Hypothesis, states that the present (market) value of an asset will equal the sum of discounted future net income streams. An opportunity arose in the context of a recent study of residential income properties to craft a test of the capitalization hypothesis.[2]

The study concerned the effects of rent controls on the market value of apartment buildings. Data was collected on rents and capital values over two decades in a county containing several municipalities with no rent control and three municipalities with rent controls of differing severity.[3] A hedonic regression analysis was performed to eliminate possible distortions due to market influences other than rent control. It was then possible to make meaningful comparisons among municipalities as to the effect of rent controls of varying severity on the value of residential income property.

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[1] For example, Samuleson (1967), p. 587. See Roulac (1976) or McKensie & Betts (1980) for application of the capitalization hypothesis to real estate markets. See Smith & Tomlinson (1981) for empirical applications in Canada.

[2] St. John (1989) and St. John (1990).

[3] Berkeley, Hayward, and Oakland in Alameda County, California.

It was found that restrictive rent control had a major impact on property value, but that moderate rent control had insignificant impacts on property value, leading to the conclusion that moderate rent controls of certain types are not binding and do not affect net income significantly. It was therefore recommended that those who frame public policy should pay keen attention to the restrictiveness of rent control programs, since only restrictive programs (those not allowing rents to return to market levels on vacancy and not allowing inflation-rate rent increases) had the power to create the negative side effects usually associated with rent control.

II. THE CAPITALIZATION HYPOTHESIS. The capitalization hypothesis, as applied in the field of housing, suggests that the value of apartment properties should equal the discounted value of expected future net income plus expected future discounted net sale value. This concept is expressed in the following formula:

$$PV = \sum_t \frac{GR_t - OE_t - Tx_t}{(1 + d_t)^t} + \frac{SV_T - CC_T - ST_T}{(1 + d_T)^T} \qquad (1)$$

where PV = Present Value, or market price
GR = Gross Rent expected in each future period t
OE = Operating Expenses in each future period t
Tx = Income tax effect of property in each period t
SV = Sale Value at time T
CC = Closing Costs associated with Sale at T

ST = Taxes associated with sale at T
d = discount rate
t = time variable, ranging from 0 to T-1
T = date of future sale

The first term at the right in (1) gives the expected net after-tax income stream from the present to the time of expected sale. The second term at the right gives the expected net gain from sale at time T. Both terms are discounted to give present value. The discount rate depends on rates of return in alternative investments and the perceived riskiness of investments in rental housing. The sum of the two terms should, if investors are rational, equal present market value.

Equation (1) has a simpler form. Imagine that the property is expected to be held into the indefinite future, without sale.[4] Alternatively, consider that SV_T is itself a function of more distant net income and a yet more distant future net sales value. Formula (1) would then be composed of the first term (with the t's extending past T to a second sales event T') plus closing costs and tax effects upon sale at T plus net sale value at T'. If T and T' are sufficiently large, and if closing costs and tax effects at T are relatively minor compared to SV_T, the contribution of the sales terms to present value would be small and the relation would not be severely

[4] This assumption may be realistic. There are many investors in real estate whose investment strategy is to buy and not sell, holding property for its long run income potential.

distorted if it were simplified to express value as a function of net income extending into the indefinite future, ignoring the effect on present value of the net value on sale. The simplified form of (1), with the time variable extending in this case into the indefinite future, would then be:

$$PV = \sum_{t} \frac{GR_t - OE_t - Tx_t}{(1 + d_t)^t} \qquad (2)$$

If both net income and the discount rate are constant over time (2) becomes yet simpler:

$$PV = \frac{NI}{d} \qquad (3)$$

where NI (net income) = GR - OE - Tx.

The discount rate in (3) is known in the real estate industry as the "capitalization rate" (cap rate, or CR). Knowing the prevailing cap rate and the net income of a particular property, appraisers use (3) to estimate value, PV.[5]

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[5] Appraisers in fact use three approaches in virtually all appraisals: the comparable sales approach, the income capitalization approach, and the replacement cost approach. In the appraisal of single family homes the comparable sales approach is usually afforded the most weight. In the appraisal of industrial property, the replacement cost approach is usually given the greatest weight. In the appraisal of apartment buildings, the income capitalization approach gets the greatest weight, with the cap rate itself depending on histori-

If it is further assumed that the ratio of operating expenses to gross rent (OE/GR) is constant, and ignoring income tax effects, one additional transformation is possible. (In real estate parlance, the ratio OE/GR is termed the "expense ratio", or ER.) From (3),

$$PV = (GR - OE) / d$$

$$= GR\ (1 - OE/GR) / d$$

$$= GR * \frac{1 - ER}{d} \qquad (4)$$

The expression (1-ER)/d is known as the gross rent multiplier (GRM) and is commonly used by real estate professionals and appraisers in estimating property value. It is accepted that the GRM is a cruder tool than the cap rate because properties do differ in expense ratios, and these differences are important in estimating value. On the other hand, expense ratios have been found empirically by the Institute of Real Estate Management to range within fairly narrow bands and to be consistent over time in most sub-markets.[6] Therefore the GRM is accepted as a proxy for the cap rate. The GRM is often used in appraisals in place of the cap rate because while rents are

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cal experience with sales of comparable properties.

[6] Institute of Real Estate Management (1989), Trend Analysis, p. 16.

readily discovered in most circumstances, reliable data on expenses is often unavailable.

The gross rent multiplier is a less accurate proxy for the capitalization rate in restrictively controlled jurisdictions than in non-controlled jurisdictions. In a free market, the GRM and the CR for any community should have a fixed relationship over time, because of the stability of the expense ratio. Restrictive rent control, on the other hand, forces the expense ratio to increase steadily over time. (Expense increases are compensated by pass-through provisions, but net income is maintained at historic levels without full CPI increases.) In restrictively controlled jurisdictions, therefore, the relationship between GRM and CR will slowly change. Assuming that the cap rate is constant, GRMs will fall as expense ratios rise. For these reasons the GRM is not a perfect proxy for CR, especially in restrictively controlled jurisdictions.

III. RESULTS. Data was gathered on rents and value, but reliable data on operating expenses was not available. Therefore it was possible to compute gross rent multipliers, not cap rates. Results for gross rent multipliers are shown in Table 1 and Figure 1. Estimated gross rent multipliers over the study period are given for controlled communities (Berkeley, Hayward, and Oakland) and for non-controlled communities (summed and

TABLE 1

MOVING AVERAGES OF GROSS RENT MULTIPLIERS - p 1

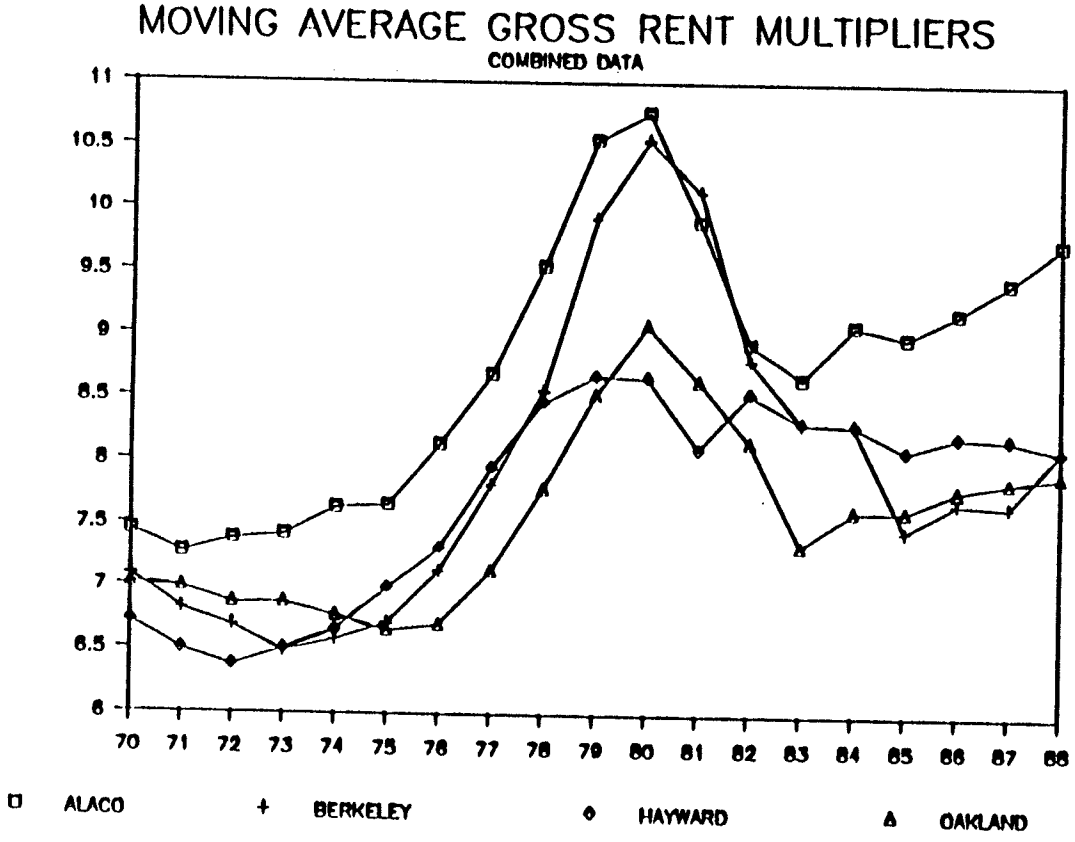
	ALACO:		BERKELEY:			
YEAR	MEASURED GRM	MOVING AVERAGE	MEASURED GRM	MOVING AVERAGE	BERK TO ALACO	DECADE AVERAGE
70	7.44	7.44	6.97	7.08	0.95	
71	7.44	7.27	7.19	6.81	0.94	
72	6.91	7.38	6.27	6.68	0.91	
73	7.77	7.41	6.59	6.48	0.87	
74	7.55	7.63	6.59	6.58	0.86	
75	7.57	7.66	6.55	6.70	0.88	
76	7.84	8.13	6.96	7.12	0.88	
77	8.97	8.69	7.84	7.82	0.90	
78	9.24	9.54	8.65	8.55	0.90	
79	10.40	10.55	9.17	9.91	0.94	0.90
80	11.99	10.76	11.92	10.55	0.98	
81	9.89	9.89		10.13	1.02	
82	7.79	8.93	8.35	8.80	0.99	
83	9.11	8.65	9.26	8.30	0.96	
84	9.08	9.08	7.31	8.28	0.91	
85	9.05	8.98	8.28	7.46	0.83	
86	8.83	9.18	6.78	7.69	0.84	
87	9.66	9.43	8.00	7.66	0.81	
88	9.78	9.72	8.20	8.10	0.83	0.91

TABLE 1

MOVING AVERAGES OF GROSS RENT MULTIPLIERS - p 2

	HAYWARD:				OAKLAND:			
YEAR	MEASURED GRM	MOVING AVERAGE	HAY TO ALACO	DECADE AVERAGE	MEASURED GRM	MOVING AVERAGE	OAK TO ALACO	DECADE AVERAGE
70		6.71	0.90		7.19	7.01	0.94	
71	6.71	6.50	0.89		6.83	6.98	0.96	
72	6.28	6.37	0.86		6.93	6.86	0.93	
73	6.13	6.50	0.88		6.82	6.86	0.93	
74	7.08	6.65	0.87		6.84	6.76	0.89	
75	6.74	6.98	0.91		6.62	6.65	0.87	
76	7.13	7.31	0.90		6.48	6.69	0.82	
77	8.05	7.95	0.92		6.97	7.12	0.82	
78	8.68	8.46	0.89		7.91	7.78	0.82	
79	8.66	8.67	0.82	0.88	8.47	8.52	0.81	0.88
80		8.66	0.80		9.19	9.07	0.84	
81		8.10	0.82		9.56	8.63	0.87	
82	8.10	8.53	0.96		7.15	8.15	0.91	
83	8.97	8.31	0.96		7.74	7.33	0.85	
84	7.85	8.29	0.91		7.10	7.61	0.84	
85	8.05	8.09	0.90		8.00	7.61	0.85	
86	8.37	8.20	0.89		7.75	7.78	0.85	
87	8.19	8.19	0.87		7.59	7.85	0.83	
88	8.00	8.09	0.83	0.88	8.22	7.90	0.81	0.85

Figure 1


MOVING AVERAGE GROSS RENT MULTIPLIERS
COMBINED DATA
11
10.5
10
9.5
9
8.5
8
7.5
7
6.5
6
70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88
ALACO
BERKELEY
HAYWARD
OAKLAND

called Alaco, for Alameda County).

The gross rent multiplier results indicate that there have been no changes in gross rent multipliers in rent controlled communities that can be easily distinguished from changes occurring in non-controlled communities. The average ratio of Berkeley's GRM to Alaco's GRM rose from 0.90 in the 1970s (a decade without rent controls) to 0.91 in the 1980s (a decade with rent controls). The average ratio of Hayward's GRM to Alaco's GRM remained the same over the two decades, at 0.88. The average ratio of Oakland's GRM to Alaco's GRM fell from 0.88 in the 1970s to 0.85 in the 1980s. The ratios by 1988 had fallen to 0.83 in Berkeley, 0.83 in Hayward, and 0.81 in Oakland, suggesting a downward tendency, but it is not clear that these changes signify a trend. The ratios had been this low prior the introduction of rent controls in Oakland and Hayward. The figures do not allow any conclusions about differential GRM movements caused by rent control.[7] Indeed, it can be concluded that rent control caused no significant change in gross rent

[7] In the case of Berkeley, the apparent diminution in GRM in the late 1980s may be caused by the cummulative effect of restrictive rent control. As mentioned above, the gradual increase in the expense ratio will cause GRMs to decline slightly with constant cap rate. It can be shown that the rent increases allowed from 1980 to 1990, compensating owners for cost increases only, would be accompanied by an increase in the expense ratio. An increase in the expense ratio would cause GRMs to fall marginally if the cap rate was constant.

multipliers.[8] This being so, it appears that investors do not value property based on the presence or absence of rent control per se; they value property according to expected (net) income, irrespective of the controls that may be in place.

IV. A TEST OF THE CAPITALIZATION HYPOTHESIS. Meaningful hypotheses should allow accurate prediction of future events. Using known rents, we can test the validity of the capitalization hypothesis by comparing predicted results with actual results established in research described above.

Table 2 and Figures 2 and 3 show the rent history for Berkeley and for non-rent controlled cities in Alameda County from 1970 through 1988 in nominal and in real terms.[9] It is interesting to note that Alaco rents, in real terms, fell from 1971 to 1981, then rose sharply in the 1980s, regaining the lost real

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[8] Significance tests described in St. John (1989) showed that there were no significant differences between GRMs in the rent controlled cities and GRMs in non-controlled cities.

[9] The source for Alameda County rent figures is the San Francisco-Oakland Rent Index published by the Bureau of Labor Statistics. There exists no series for Alameda County specifically. We have assumed that Alameda County rent figures, on average, parallel figures for the San Francisco-Oakland SMSA. Berkeley rent figures were computed by using SMSA figures so long as Berkeley was in the free market and then applying known allowable increase factors for Berkeley rents under rent control. The average 1980 rent for Berkeley was computed from information available from the Berkeley Rent Stabilization Program.

TABLE 2

HISTORICAL RENTS BY LOCATION

YEAR	CPI (1970)	BERK RENTS	BERK RENT INDEX	REAL RENT INDEX	SMSA RENTS	SMSA RENT INDEX	REAL RENT INDEX
1970	100.0	186.27	100.0	100.0	186.27	100.0	100.0
1971	103.7	195.80	105.1	101.3	195.80	105.1	101.3
1972	107.3	201.73	108.3	100.9	201.73	108.3	100.9
1973	113.6	207.98	111.7	98.3	207.98	111.7	98.3
1974	124.7	216.57	116.3	93.2	216.57	116.3	93.2
1975	137.4	226.09	121.4	88.3	226.09	121.4	88.3
1976	145.1	239.36	128.5	88.6	239.36	128.5	88.6
1977	156.1	257.16	138.1	88.4	257.16	138.1	88.4
1978	170.8	266.93	143.3	83.9	276.84	148.6	87.0
1979	185.3	257.62	138.3	74.6	297.13	159.5	86.1
1980	213.6	264.51	142.0	66.5	334.61	179.6	84.1
1981	240.9	277.74	149.1	61.9	368.65	197.9	82.1
1982	259.1	302.73	162.5	62.7	404.09	216.9	83.7
1983	261.2	317.11	170.2	65.2	443.91	238.3	91.2
1984	276.2	317.11	170.2	61.6	481.22	258.3	93.5
1985	287.7	323.45	173.6	60.4	520.26	279.3	97.1
1986	296.7	333.48	179.0	60.3	563.66	302.6	102.0
1987	306.3	345.15	185.3	60.5	589.74	316.6	103.3
1988	319.9	369.66	198.4	62.0	611.44	328.2	102.6

Figure 2

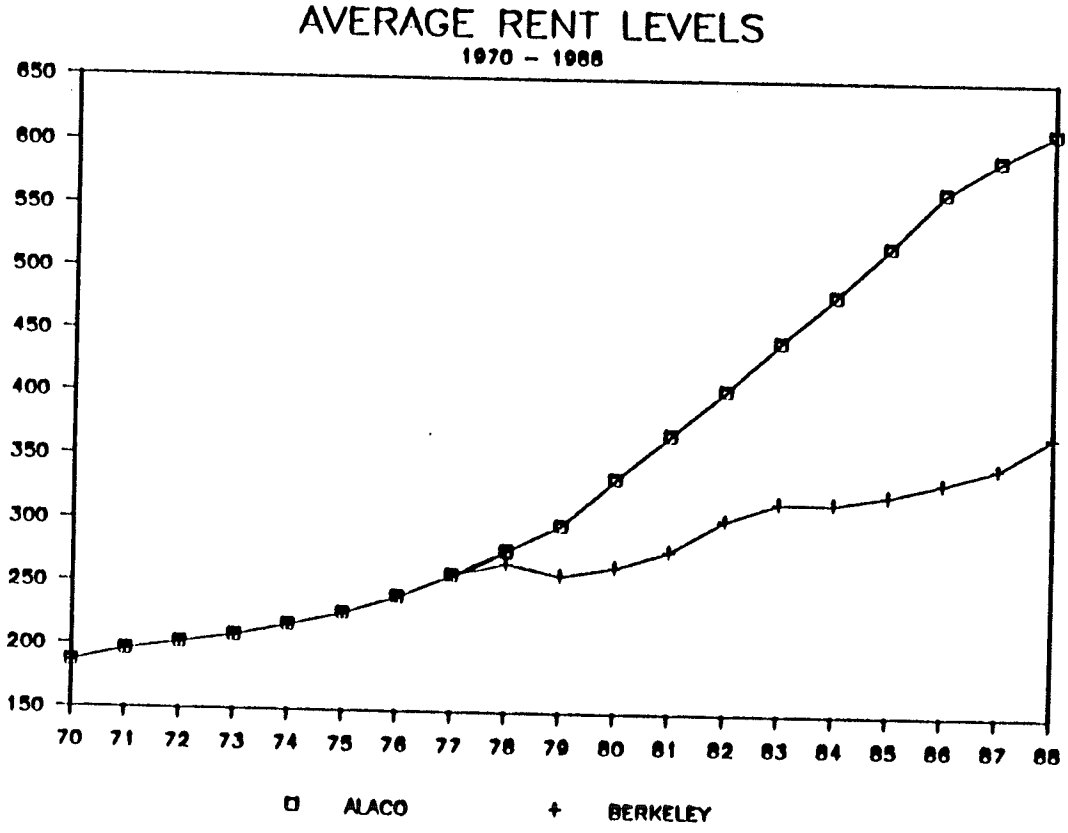
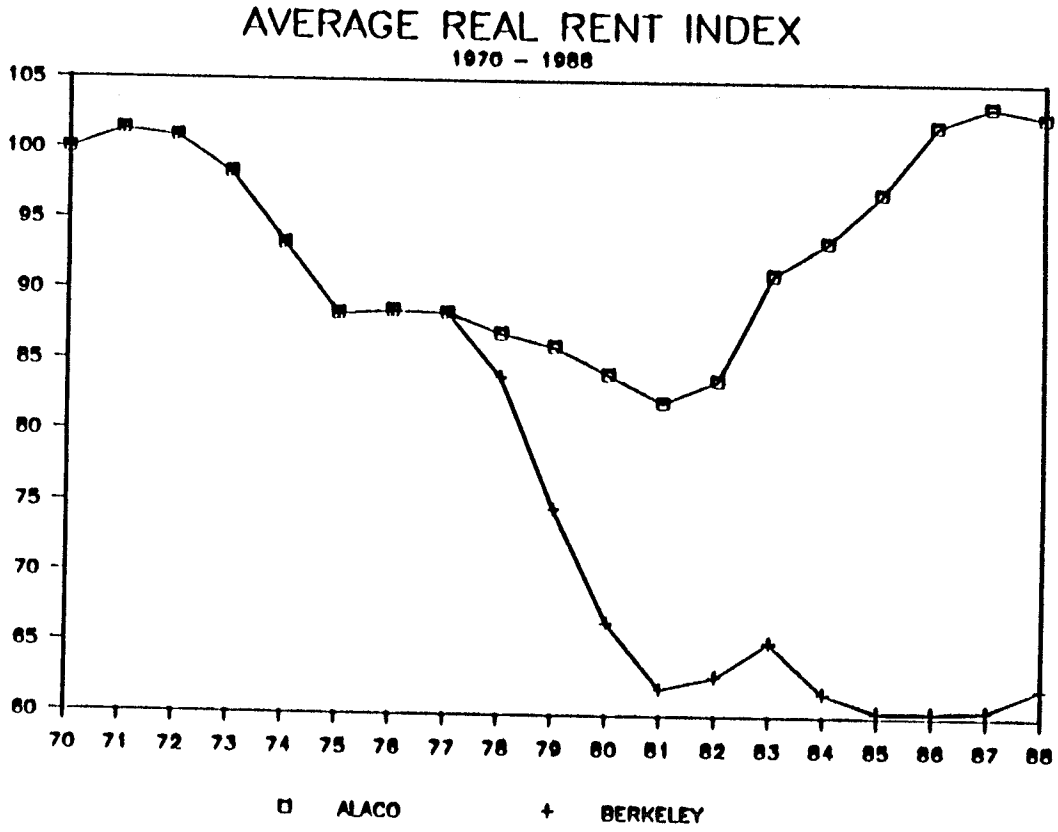

AVERAGE RENT LEVELS
1970 - 1988
650
600
550
500
450
400
350
300
250
200
150
70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88
ALACO
BERKELEY

Figure 3


AVERAGE REAL RENT INDEX
1970 - 1988
105
100
95
90
85
80
75
70
65
60
70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88
ALACO
BERKELEY

value by 1986. Berkeley rents also declined in the 1970s, so that at the inception of rent control rents were already low in real terms. Berkeley rents lost real value sharply during the high inflation years of 1979 through 1981 (the first three years of restrictive rent control in Berkeley) but maintained real value, on average, from 1981 through 1988.[10]

For Alaco in the 1970s the average gross rent multiplier was 8.1. For Berkeley, it was 7.3. Assuming no change in the cap rates (or gross rent multipliers), the capitalization hypothesis would predict 1988 Alaco unit values of $59,432 and 1988 Berkeley unit values of $32,382.

These estimates are remarkably accurate. Actual average 1988 values for Alaco were $67,734, and for Berkeley were $35,044.[11] In the case of Alaco, the estimate was off (low) by 12% of the actual value. In the case of Berkeley, the estimate was off (low) by 8%. Taking proportions, the estimate predicted that Berkeley values would be 0.54 of Alaco values, while in fact it has developed that Berkeley values in 1988 were 0.52 of Alaco's values.

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[10] The sudden loss of real value for Berkeley rents between 1978 and 1981 was due to the combined effects of high inflation and the major rent roll-backs which occurred in 1978 and 1979 under the first of three sequential rent control ordinances, Measure I.

[11] See St. John (1989) Figure 4.22.

The estimates would be more accurate if we allowed the GRMs (cap rates) to vary over time. The average GRM for Alaco properties in the 1970s of 8.1 increased in the 1980s to 9.4. The average GRM for Berkeley properties in the 1970s of 7.3 increased in the 1980s to 8.5. In each locality the gross rent multiplier increased by 16%, suggesting that the changes were determined by macroeconomic forces, not the presence or absence of rent control.

Using the average gross rent multiplier for the 1980s, we can test the capitalization hypothesis again. The capitalization hypothesis would now predict 1988 Alaco unit values of $68,970, and 1988 Berkeley values of $37,705, while actual values were $67,734 and $35,044. The Alaco estimate is now off (high) by less than 2% and the Berkeley estimate is now off (high) by under 8%. Taking proportions, the estimated values for Berkeley are (again) 0.54 of Alaco values, while in fact, using actual values, the ratio is 0.52.

Finally, using the measured 1988 GRM values of 9.72 for Alaco and 8.10 for Berkeley, we find predicted values of $70,040 and $35,931, high for Alaco by 3.4% and for Berkeley by 2.5%.

V. CONCLUSION. The study results confirm the applicability of the capitalization hypothesis to the determination of property value in the case of residential income property. Even under rent control, property value is determined by the achievable future rental income, underlying utility value or replacement cost notwithstanding. Investors, therefore, can be said to be rational in the sense that they value property according to its expected net income, rent control notwithstanding. There is no measurable "chilling effect" of rent control other than the expected effect of net income on value.

It is also demonstrated that there is no intrinsic value to income property other than the value derived from the income produced. If rents fail to rise along with inflation, buildings will lose real value. If rents rise at rates greater than inflation, buildings increase in value at rates greater than inflation. Otherwise identical properties standing next eachother but on different sides of the Berkeley/Oakland border can be reliably expected to have widely differing market values because of widely differing allowable rents. The market values can be expected to differ in the same proportion as the rents differ between the two properties. And although it is commonly understood that most people would prefer to live, other things equal, on the Berkeley side, the Oakland building, having higher rents, will unquestionably have a higher market value.

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