

Property Type, Size and REIT Value

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Abstract. This study documents the wide deviation of securitized real estate assets in equity REITs from the value of the underlying commercial properties. A procedure for estimating the net asset value of REITs is developed and the estimates are used to investigate the sources of premiums/discounts from net asset value in a large sample of equity REITs. To avoid measurement error bias, two-way analysis of variance is used to test for differences among size and property-type categories. The results indicate that retail REITs trade at significant premiums relative to the average REIT while warehouse/industrial REITs trade at discounts and small REITs trade at significant discounts while large REITs trade at premiums. The discounts and premiums from net asset value do not translate into higher cash flow yields.

Introduction

The most dramatic change in the real estate industry in the last few years is the rapid increase in the securitization of real estate through real estate investment trusts (REITs). Many factors have contributed to the explosive growth of REIT initial and secondary public offerings. Often cited factors include changes in the capital requirements for commercial lenders that have made mortgage loans more costly, and changes in tax laws that reduced the tax-favored status of other ownership forms like real estate limited partnerships.¹

It is often argued that REITs trade at discounts to the net asset value of the underlying properties. Despite the importance for valuation and management issues, the only evidence available is indirect (Corgel, McIntosh and Ott, 1995; Goebel and Ma, 1993; Shilling, Sirmans and Wansley, 1986).² This paper provides the first direct evidence on premiums and discounts by developing a procedure for estimating net asset values for REITs and applying the procedure to a large sample of equity REITs from 1985–92.

Descriptive statistics on the sample are reported in three ways. First is a summary of the size, property types, income, expenses, and diversification of the equity REITs for each year from 1985–92. The sample consists of seventy-five REITs but not for every year. The sample grows from thirty-three to seventy-two REITs during this period. The data is then segmented by property type and size class. Each REIT is classified as an apartment, warehouse, retail or office REIT if more than 50% of the properties owned are of one type. The size segmentation uses quartiles derived from total assets. In each segmentation we investigate differences in expenses, cash flow yield, diversification, and capital structure.

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To preview the conclusions, the stock market valuations of REITs as measured by premiums above the values of the underlying properties declined during the period. Wall Street (i.e., the stock markets) placed higher values on retail REITs and lower values on warehouse REITs relative to Main Street (the local property markets). In the size quartiles, small REITs trade at much larger discounts than large REITs. The differences are highly statistically significant.

While discounts from net asset value are significantly below average for small REITs, cash flow yields are not significantly higher than those of larger firms. That is, there is no evidence that discounts from net asset value are being translated into higher cash flow yields. This suggests that when portfolios of properties are securitized into equity REITs, considerable value can be added or subtracted from the underlying properties.

The next section describes the data and our procedure for estimating net asset values. The third section characterizes the sample. The fourth and fifth sections analyze the REITs by property-type and size categories. The final section concludes.

The Data

Criteria for Inclusion in the Sample

The National Association of Real Estate Investment Trusts (NAREIT) provides a list of all publicly traded REITs each year in the NAREIT Sourcebook. To focus on commercial property, all mortgage, hotel, restaurant, and hospital REITs are excluded. REITs that do not trade on NYSE, AMEX and NASDAQ or for which property information is not available are also excluded from our database. With these exclusions the sample consists of seventy-five REITs. The included REITs are listed in Exhibit 1.

Sample Size

The seventy-five equity REITs appear in the sample for at least one year. Four hundred and sixteen total observations are available to study. Thirty-two of the REITs appear in all eight years. Each REIT is classified into a property type when more than 50% of the property held is of one type (apartment, warehouse, retail, office). If no one property type is more than 50%, the REIT is classified as "Diversified." Retail REITs are the most common with thirteen to twenty in each year. Apartment REITs are the least common with only three to six in each year. There is an increase in warehouse REITs in 1991 because eighteen Public Storage Equities partnerships converted to REIT status.

Sources of the Data

The data for each REIT was compiled from 10-K reports, annual reports to shareholders, proxy statements, and the CRSP daily return file. Metro- and regional-level property information was obtained from the National Real Estate Index (NREI), Market History Reports.³

Variables in the Database

The database includes balance sheet, income statement and property variables from the 10-K reports. The property data are classified by region using the eight economic regions

Exhibit 1 Included REITs

<ul style="list-style-type: none"> *B.R.E. Properties Inc. Berkshire Realty Co. Inc. *Bradley Real Estate Trust Burnham Pacific Properties Inc. *California Real Estate Invt Tr. Cedar Income Fund Ltd. Cedar Income Fund 2 Ltd. Chicago Dock and Canal Trust *Clevetrust Realty Investors *Continental Mortgage & Eqty Tr. Copley Property Inc. Cousins Properties Inc. Dial REIT Inc. Duke Realty Investments Inc. *E.Q.K. Realty Investors 1 *Eastgroup Properties *Federal Realty Investment Trust *First Union Real Est. E.O.&M.G. Invts Grubb & Ellis Realty Inc. Trust *H.R.E. Properties *I.C.M. Property Investors Inc. *I.R.T. Property Co. Income Opportunity Realty Trust Koger Equity Inc. Lansing Pacific Fund Linpro Specified Ppty *M.G.I. Properties Inc. *M.S.A. Realty Corp. *Meridian Point Realty Tr. 83 *Meridian Point Realty Tr. 84 Meridian Point Realty Tr. IV Meridian Point Realty Tr. VI Meridian Point Realty Tr. VII Meridian Point Realty Tr. VIII *Merry Land & Investment Inc. Monmouth Real Estate Invt Corp *New Plan Rlty Trust *Nooney Realty Trust Inc. 	<ul style="list-style-type: none"> *One Liberty Properties Inc. P.S. Business Parks Inc. Partners Preferred Yield Inc. Partners Preferred Yield II Partners Preferred Yield III *Pennsylvania Real Est. Invt Tr. *Property Trust Amer *Prudential Realty Trust Public Storage Properties VI Public Storage Properties VII Public Storage Properties VIII Public Storage Properties IX Inc. Public Storage Properties X Inc. Public Storage Properties XI Inc. Public Storage Properties XII Public Storage Properties XIV Public Storage Properties XV Inc. Public Storage Properties XVI Public Storage Properties XVII Public Storage Properties XVIII Public Storage Properties XIX Public Storage Properties XX *Real Estate Investment Trust Ca. Realty South Investors Inc. *Santa Anita Rlty Enterprises Sizeler Property Investors Inc. *Trammell Crow Real Estate Invs. *Transcontinental Rlty Invstrs *U.S.P. Real Estate Investment Trust *United Dominion Realty Tr. Inc. Vanguard Real Estate Fund I Vanguard Real Estate Fund II Vinland Property Trust *Washington Real Est. Invt Tr. *Weingarten Realty Investors *Western Investment Real Est. Tr. Wetterau Properties Inc.
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This table lists all the REITs in the data sample. Each REIT appears in at least one year. Starred REITs appear in all years.

as defined in Hartzell, Shulman and Wurtzebach (1987). Exhibit 2 provides descriptive statistics on the variables. Calculated variables are explained below.

Net Operating Income

Net operating income (NOI) or “property income” for each REIT is defined to be income from properties before interest, depreciation, and overhead expenses (G&A) and is calculated by taking rental income minus property expenses (property taxes, property management expenses, property operating expenses, etc.). To refine this measure, adjustments were made to reflect purchases and sales during the year and joint ventures where the REIT owns less than 100%.

Exhibit 2
Summary Statistics

Variable	Mean	Max.	Min.	Std Dev.
Total assets (\$ million)	127	604	2	110
Property assets (\$ million)	95	486	2	85
Prop. assets/market value of prop. (%)	85.2	201	14	33
Total book assets/total market assets (%)	87	166	20	26
Occupancy rate (%)	89.5	100	57	7
Weight cap. rate (%)	8.9	10.6	7.4	.5
Net income (\$ thousand)	3,963	49,446	(58,609)	9,209
General & administrative (\$ thousand)	1,390	15,418	0	1,478
Cash flow per share (\$)	1	5	0	.64
G&A/total assets (%)	1.1	7.5	0	1.1
Cash flow yield (%)	8	78	0	10
Leverage ratio (%)	35	96	0	26
Herfindahl index properties (%)	65.3	100	21	23.5
Herfindahl index region (%)	55.6	100	14.6	27.2
Value wt. premium (discount) (%)	-8.3	137.2	-93.6	38.5

This table provides summary statistics on selected variables from the equity REIT database. Total assets and property assets are book values. Total market assets are measured by (estimated market value of properties + other assets). The leverage ratio is defined as total liabilities / (total liabilities + market value of the equity).

Net Asset Value

Our procedure for estimating net asset value modifies standard appraisal methods by using a weighted capitalization rate approach. Property-level capitalization rates are used to derive a weighted capitalization rate for the property portfolio. This weighted capitalization rate is then applied to total property net operating income to obtain an estimate of the value of the property portfolio in each REIT.

Specifically, assume that value additivity holds so that

$$V = \sum_i V_i, \quad (1)$$

where V is the value of the portfolio and V_i is the value of property i . Using the definition of a capitalization rate gives

$$V = \frac{NOI}{PCR}, \quad (2)$$

where PCR is the portfolio cap rate, and NOI is the portfolio net operating income. Therefore

$$PCR = \frac{NOI}{V} = \frac{NOI}{\sum_i V_i}, \quad (3)$$

and

$$PCR = \frac{1}{\sum_i \left(\frac{NOI_i}{NOI} \right) \left(\frac{1}{CR_i} \right)}, \quad (4)$$

which can be approximated by⁴

$$PCR \cong \sum_i \left(\frac{NOI_i}{NOI} \right) CR_i, \quad (5)$$

where CR_i is the cap rate on the i th property. This can be rewritten as

$$PCR = \sum_i w_i CR_i, \quad (6)$$

where $w_i = \frac{NOI_i}{NOI}$ are the weights. That is, the portfolio cap rate is a weighted average of the cap rates on the individual properties.⁵

Since net operating income by property is rarely available for use in determining the weights, the choice of weights is problematic. One alternative would be to use the square footage as weights. The disadvantage of using square footage is that it ignores the wide variation in price per foot by location and property type. To improve on this, weights determined by metropolitan area averages of property values are used. The property values are roughly proportional to net operating income by definition. That is,

$$w_i = \frac{V_i}{V} = \frac{P_i SF_i}{\sum_i P_i SF_i}, \quad (7)$$

where P_i is the average price per square foot for property of the same type in the same city and SF_i is the square footage of the i th property.

To clarify, prices per square foot, as compiled by NREI, are used only to help determine the weights to place on the cap rates (see equation 7). Since the prices per square foot are metro area specific, error arises when the properties are above or below average in quality for that area and property type. If a property is below average in quality so that the actual price per square foot is below the NREI price/ SF then we overweight the cap rate of that property type and metro area in our calculation of the cap rate for the firm.

Each property is also assigned a property-type and location (metro area)-specific capitalization rate. These capitalization rates are then weighted as indicated above. The weighted average capitalization rate is then applied to the portfolio's current net operating income (property income) to derive a market value for the entire property portfolio using equation (2).

Each REIT's net asset value (NAV) is computed as follows:

$$NAV = \frac{\text{Market Value of the Properties} + \text{Other Assets} - \text{Total Liabilities}}{\text{Number of Shares Outstanding}}. \quad (8)$$

Liabilities with below or above market interest rates were adjusted to reflect market values. To further refine the estimates, additional adjustments were made to reflect occupancy rates and the quality of the properties when appropriate.

Since the data on net asset values are estimates, they are subject to measurement error. As a result, care must be taken if this variable is to be used in situations where measurement error bias can arise. One example would be using the estimated net asset values as an independent variable in an OLS regression equation.⁶ This paper uses two-way analysis of variance where grouping the data avoids the 'bias' problem.

Value-Weighted Premium

The premium of each REIT is measured by *(stock price-net asset value)/net asset value*. Value-weighted premium (*VWPREM*) is defined as follows:

$$VWPREM_t = \sum_{i=1}^{n_t} w_i prem_{it}, \quad (9)$$

where

$$w_i = \frac{NAV_{it}}{\sum_1^{n_t} NAV_i}$$

$$Prem_{it} = (SP_{it} - NAV_{it}) / NAV_{it},$$

NAV_{it} = net asset value of REIT i at end of period t ,

SP_{it} = stock price of REIT i at end of period t , and

n_t = the number of REITs with available $PREM_{it}$ and NAV_{it} data at the end of period t .

Concentration Indices

The measures of diversification/concentration are Hirschman-Herfindahl indices that are commonly used in industrial economics to measure monopoly power.⁷ Define:

Property Diversification Index ,

$$HHPROP = \sum_i S_i^2 \quad (10)$$

Regional Diversification Index ,

$$HHRGN = \sum_j S_j^2 \quad (11)$$

where

S_i = the proportion of a REIT's portfolio invested in property-type i , and

S_j = the proportion of a REIT's portfolio invested in region j .

The above indices measure how concentrated the properties in a REIT are, i.e., if the REIT is highly focused, the index is close to one, and if diversified, the index is close to zero.

Cash Flow Yield

Define cash flow as:

- net income
- + depreciation and amortization
- gain on property sales
- + extraordinary expenses.

The cash flow yield is measured by $CF_{it}/SP_{i,t-1}$, where CF_{it} =cash flow of REIT i at end of period t , and $SP_{i,t-1}$ =stock price of REIT i at end of period $t-1$.

Characteristics of the Sample

The Value of Property in REITs

Exhibit 3 describes the property assets held by equity REITs. Book value of property assets tripled from 1985 to 1992. The square footage of retail space held by REITs doubled while the square footage of warehouse space quadrupled. The large increase in warehouse space is partly due to the conversion to REIT status of the eighteen Public Storage Limited Partnerships in 1991.

The REITs in the sample are much more concentrated in retail property than the U.S. stock (see Exhibit 3). Over half the property in REITs was retail in 1992 while only about 25% was retail in the U.S. according to the RREEF national estimate. Warehouse/industrial is underweighted in the REIT sample. The reasons for these under/overweightings are an interesting open question on which some evidence is provided below.

Average REIT Size

Exhibit 4 outlines the average REIT size by property type and size quartile. The average REIT had \$127 million of total assets during the period. By property type, retail, apartment, and diversified REITs are above average in size while office and warehouse

Exhibit 3
Selected Characteristics by Year

Year	Total Number of REITs	Total Assets (\$ million)	Property Square Footage (000)				Property Value (\$ million)			
			Office	Ware-house	Retail	Apt.	Office	Ware-house	Retail	Apt.
1985	33	3,945	9,714	12,216	35,805	16,216	1,614	375	3,450	757
1986	36	4,483	11,015	17,337	44,219	16,306	1,796	552	4,294	778
1987	45	5,385	13,780	25,004	50,967	16,429	2,412	832	5,153	810
1988	52	6,474	17,650	27,389	57,911	18,740	3,044	971	6,113	939
1989	52	7,112	19,192	27,970	62,832	19,973	3,046	976	6,630	1,011
1990	53	7,284	20,812	31,963	67,240	23,366	2,999	1,106	7,264	1,193
1991	73	8,744	22,296	53,480	69,067	32,357	3,142	1,850	7,006	1,559
1992	72	9,300	23,401	51,921	75,142	45,751	2,916	1,668	7,104	1,936

These statistics are based upon 75 REITs and 416 observations. Total assets are book values.

Exhibit 4
Average Total Assets by Property Type and Size Quartile

Panel A: By Property Type

Average Total Assets by REIT Property Type (\$ million)					
Year	Office REITs	Warehouse REITs	Retail REITs	Apartment REITs	Diversified REITs
1985	121	101	117	99	121
1986	75	114	141	112	154
1987	84	69	144	163	134
1988	108	67	141	149	153
1989	109	78	168	203	130
1990	109	87	167	197	139
1991	98	56	185	193	144
1992	102	51	229	231	156
1985–1992 wt. avg.	102	64	162	173	142

Panel B: By Size Quartile

Average Total Assets by Size Quartile (\$ million)				
Year	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
1985	36	75	110	236
1986	31	76	134	258
1987	27	70	124	247
1988	29	79	133	257
1989	34	83	142	289
1990	31	81	128	298
1991	25	56	111	278
1992	24	55	116	323
1985–1992 wt. avg.	29	70	124	279

These statistics are based upon 75 REITs and 416 observations. Total assets are book values.

REITs are below average. The average small REIT (first quartile) has \$29 million in assets. The large REITs (fourth quartile) average \$279 million.

Property Characteristics

Total property assets average \$95 million per REIT over the period. The average occupancy rate of the properties, reflecting general market trends, falls from 92% in 1985 to 87% in 1991 before recovering to 89% in 1992. The average cap rate rises from 8.8% to 9.4% also reflecting market trends.

Concentration / Diversification

An important issue in the valuation of REITs by Wall Street is the degree of diversification. Our measures of diversification are the Hirschman-Hirfindahl indices

Exhibit 5
Value-Weighted Premiums

Year (Avg.)	Value-Weighted Premium (Discount) (%)
1985	.8
1986	13.4
1987	2.3
1988	1.0
1989	(4.7)
1990	(35.9)
1991	(23.4)
1992	(9.7)
1985–1992 Wt. Avg.	(8.3)

which show conflicting trends. While concentration by property type increased (61 to 70), concentration by region declined (60 to 46) during the period.

Wall Street vs. Main Street

Our data sample provides the first direct evidence on REIT valuations in public markets in Exhibit 5. Valuations of REIT stocks fluctuate widely from the value of the underlying properties during the sample period. On average REITs have traded at a discount of 8% from the net asset values of the properties; however the value-weighted premium by year varies from a high of 13% in 1986 to a low of -36% in 1990. Wall Street's willingness to pay for securitized property fell by over 40% in just four years before recovering in 1991–92.

The next two sections test whether there are significant differences among the REIT property-type and size categories. In particular it is tested whether the premiums to net asset value differ significantly among types and if any differences in premiums to net asset value spill over into cash flow yields. If the premium differences are justified by the cost or other differences, cash flow yields should not differ significantly.

REITs by Property Type

Premium to Net Asset Value

To try to deepen our understanding of why REIT premiums vary, Exhibit 6 provides cross-tabs on some key variables by REIT property-type category. Each panel provides *F*-tests for significant variation in the relevant variable by year and by property type. In addition, tests for whether any of the category averages are significantly different from the overall sample mean are indicated by asterisks.

In Panel A the premiums and discounts from net asset value are listed. Warehouse REITs are discounted the most heavily while retail REITs are least discounted. The differences from the sample averages are significant for these two categories. Panels B to E explore possible sources for these differences in the data on leverage, concentration and overhead expenses.

Exhibit 6 REITs by Property Type

Panel A: Value-Weighted Premium (%)

(Avg.)	Office	Warehouse	Year Retail	Apartment	Diversified
1985	8.4	8.2	(1.6)	(23.6)	7.7
1986	(4.2)	18.9	21.7	(7.4)	16.4
1987	12.5	(4.2)	5.7	5.4	(9.9)
1988	10.9	(24.4)	2.6	4.7	(1.5)
1989	16.2	(37.1)	(1.7)	(1.8)	(12.5)
1990	(31.6)	(44.5)	(32.7)	(63.1)	(29.7)
1991	(34.1)	(54.7)	(8.1)	(26.4)	(30.0)
1992	(38.2)	(55.5)	5.5	26.4	(10.6)
1985–1992 Avg.	(7.5)	(24.2)(**)	(1.1)(*)	(10.7)	(8.7)
Yearly effect	F -value = 5.1		Prob. $>F$ = .00		
Property-type effect	F -value = 2.0		Prob. $>F$ = .12		

Panel B: Leverage Ratio (%)

Year (Avg.)	Office	Warehouse	Retail	Apartment	Diversified
1985	12	35	27	33	27
1986	18	35	30	45	17
1987	27	40	32	49	23
1988	31	44	29	57	28
1989	31	56	33	69	44
1990	42	62	44	76	34
1991	40	22	42	60	41
1992	45	23	36	46	39
1985–1992 Avg.	31(**)	39	34	54(***)	32(**)
Yearly effect	F -value = 4.57		Prob. $>F$ = .00		
Property-type effect	F -value = 9.82		Prob. $>F$ = .00		

Panel C: Property Concentration Index (%)

Year (Avg.)	Office	Warehouse	Retail	Apartment	Diversified
1985	75.9	58.3	65.9	53.5	34.4
1986	78.7	70.2	67.5	54.8	37.2
1987	70.3	65.8	71.3	51.6	34.1
1988	68.5	61.3	73.4	80.7	37.0
1989	67.5	65.5	72.9	82.6	35.0
1990	64.1	56.0	71.9	86.9	31.7
1991	63.9	86.0	72.1	60.9	33.3
1992	64.4	83.4	77.7	62.6	34.7
1985–1992 Avg.	69.2(***)	68.3(**)	71.6(***)	64.5	34.7(***)
Yearly effect	F -value = .65		Prob. $>F$ = .71		
Property-type effect	F -value = 27.72		Prob. $>F$ = .00		

Panel D: Regional Concentration Index (%)

Year (Avg.)	Office	Warehouse	Retail	Apartment	Diversified
1985	62.1	52.1	59.7	64.5	69.4
1986	57.7	34.9	60.5	86.1	58.4
1987	60.7	39.2	64.3	80.2	50.4
1988	57.1	44.0	66.4	98.2	45.6
1989	57.5	36.6	63.2	97.7	48.6
1990	55.1	34.8	62.8	79.8	59.3
1991	58.8	29.2	65.7	68.5	38.3
1992	56.0	32.3	57.5	66.7	48.0
1985–1992 Avg.	58.1	37.9(***)	62.5	80.2(***)	52.3(**)
Yearly effect	F -value = 1.23		Prob. $>F$ = .32		
Property-type effect	F -value = 29.48		Prob. $>F$ = .00		

Panel E: General and Administrative Expenses/Total Assets (%)

Year (Avg.)	Office	Warehouse	Retail	Apartment	Diversified
1985	.9	.6	1.0	.9	1.2
1986	.8	1.0	.8	.6	2.4
1987	1.4	1.3	1.0	.5	1.6
1988	1.1	1.2	1.1	.7	1.7
1989	1.1	1.3	.0	.6	2.1
1990	.8	2.3	1.0	1.3	1.4
1991	1.2	.9	.9	1.1	1.2
1992	1.5	1.1	.7	.8	1.2
1985–1992 Avg.	1.1	1.2	.9(**)	.8(***)	1.6(***)
Yearly effect	F -value = .53		Prob. $>F$ = .80		
Property-type effect	F -value = 6.04		Prob. $>F$ = .00		

Panel F: Cash Flow Yield (%)

Year (Avg.)	Office	Warehouse	Retail	Apartment	Diversified
1985	8.2		7.9	7.2	9.0
1986	6.2	4.7	7.6	7.6	8.3
1987	5.9	3.3	6.3	5.8	7.2
1988	5.9	6.5	7.2	7.0	7.1
1989	5.7	8.9	7.1	5.8	6.4
1990	7.4	9.0	8.4	10.6	8.4
1991	9.9	15.5	10.1	13.2	12.1
1992	10.3	12.8	8.4	8.2	9.7
1985–1992 Avg.	7.5	8.7	7.9	8.2	8.5
Yearly effect	F -value = 9.99		Prob. $>F$ = .00		
Property-type effect	F -value = .83		Prob. $>F$ = .52		

We classify each REIT by property type when more than 50% of the property held is of one type. If no one property type is more than 50% of the REIT it is classified as "diversified".

Value-weighted premium is defined in the paper. Leverage ratio is defined as total liability/(total liability+market value of the equity). The indices are Hirschman-Herfindahl indices. We implement two-way analysis of variance (without interaction terms) procedure to see if there exist yearly effects or property-type effects, and then test if each property-type's mean is different from the overall mean.

*, **, *** denotes two-tailed significance at the 10%, 5%, 1% level, respectively.

Leverage

Panel B shows that apartment REITs are significantly more highly levered than average while diversified and office REITs are below average during the sample period. The *F*-statistics for both the yearly effect and the property-type effect are significant.

Concentration

Panels C and D provide the concentration ratios. As might be expected diversified REITs show low concentration levels by property type. Office, warehouse and retail REITs are significantly more concentrated by property type than the average REIT. The yearly differences are not significant.

By region the pattern is quite different. Warehouse and diversified REITs have low focus by region while apartment REITs are highly focused. Again the yearly differences are not significant.

Expenses

Panel E finds that expense levels are high for diversified REITs and low for retail and apartment REITs. The yearly differences are not significant.

Cash Flow Yield

While some REIT types are more heavily discounted from the value of the underlying property, one might expect that in efficient markets these discounts would reflect lower earnings potential. Cash flow is one measure of earnings potential. Cash flow yields, however, might also reflect higher risk levels. The previous panels show that apartment REITs are more highly leveraged and that diversified REITs have higher expenses. Apartment REITs are also less diversified and carry more local market risk in addition to the higher financial risk. Therefore one might expect to see higher cash flow yields on apartment REITs.

Panel F displays the cash flow yields by type. The differences among types are not significant. Therefore there is no evidence that *NAV* premiums or risk levels are affecting the cash flow yields. However, the yearly variation is significant.

To summarize this section, retail REITs sell at a premium while warehouse REITs trade at discounts relative to the average REIT and these differences are statistically significant. Retail REITs are significantly more focused by property type and carry significantly less overhead expense. Warehouse REITs are also focused by property type but are significantly more diversified by region. Warehouse REITs also have above average expenses but not significantly so. None of the REIT types have significantly different cash flow yields.

Size Quartiles

It is well known that many equity market anomalies are related to size. For example Banz (1981) showed that returns from buying very small firms are 20% higher than for very large firms. Roll (1981) and Reinganum (1981) present evidence that the small firm

effect is partly due to errors in estimating the risk (*beta*) of small firms; but the effect remains even when the estimation problems are corrected. Stoll and Whaley (1983) argue that, given the differences in transactions costs between small and large firms, a round-trip transactions cost every three months is enough to eliminate the small firm effect. Keim (1983) provides evidence that 25% of the size effect occurs during the first five trading days in January. This section investigates whether size is related to other REIT characteristics.

Premium to Net Asset Value

Panel A of Exhibit 7 illustrates the dramatic effect of size on the premium to net asset value of the properties. There is a monotonic increase in the premium in the larger size quartiles. Small REITs (first quartile, average \$29 million) are discounted 33% more than large REITs (fourth quartile, average \$279 million). Both the size effect and the yearly effect are highly significant.

Leverage

Panel B shows that large REITs (fourth quartile) are more highly leveraged than the small REITs (first quartile). The yearly effect is also significant.

Concentration

Panel C: Small REITs (quartile 1) are significantly more highly concentrated by property type. The next two quartiles are less concentrated than the sample. There are no significant differences either by size or year in the regional concentration indices (Panel D).

Expenses

Panel E: Small REITs are almost twice as costly to administer as large REITs. The G&A ratio for small REITs is 1.7% while for large REITs it falls to .9%. This may account for some of the large discount from net asset value for small REITs. The yearly differences are not significant.

Cash Flow Yield

Panel F: Since small REITs have lower financial risk (less leverage) and less local market risk (more diversified by region), one might expect lower cash flow yields. Instead, cash flow yields for small REITs are higher than for other REITs but not significantly so. The yearly differences, on the other hand, are significant.

To summarize this section, small REITs are heavily discounted (33%) relative to large REITs. These small REITs are less levered, more focused by property type, and have much higher overhead expenses ratios than large REITs. Thus, a consistent pattern in both the analysis by property type and by size is that highly discounted categories are also categories with high expense ratios.

Exhibit 7 REITs by Size Quartiles

Panel A: Value-Weighted Premium (%)

Year (Avg.)	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
1985	4.1	(13.7)	(4.7)	20.0
1986	(1.8)	(1.3)	17.2	37.4
1987	(9.9)	3.3	(1.6)	18.3
1988	(14.9)	7.3	.7	5.7
1989	(31.0)	(7.1)	6.5	3.4
1990	(42.9)	(42.7)	(28.1)	(32.1)
1991	(51.5)	(34.4)	(20.4)	(3.6)
1992	(49.9)	(26.4)	.5	18.4
1985–1992 Avg.	(24.7)(***)	(14.4)(**)	(3.7)	8.4(***)
Yearly effect	F -value = 9.22		Prob. $>F$ = .00	
Size effect	F -value = 13.60		Prob. $>F$ = .00	

Panel B: Leverage Ratio (%)

Year (Avg.)	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
1985	16	24	29	30
1986	23	22	26	35
1987	29	27	22	44
1988	34	29	36	35
1989	45	36	40	35
1990	44	53	46	47
1991	25	30	46	44
1992	25	29	52	33
1985–1992 Avg.	30(**)	31	37	38(**)
Yearly effect	F -value = 4.36		Prob. $>F$ = .00	
Size effect	F -value = 2.71		Prob. $>F$ = .07	

Panel C: Property Concentration Index (%)

Year (Avg.)	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
1985	69.9	43.6	70.0	60.0
1986	70.5	52.1	61.0	64.3
1987	66.7	57.9	58.9	62.7
1988	74.0	61.2	57.2	72.2
1989	69.7	58.4	58.9	68.5
1990	67.5	61.0	53.6	67.7
1991	81.4	76.3	58.7	63.2
1992	83.1	74.5	55.3	65.2
1985–1992 Avg.	72.8(***)	60.6(**)	59.2(**)	65.5
Yearly effect	F -value = 1.08		Prob. $>F$ = .41	
Size effect	F -value = 6.41		Prob. $>F$ = .00	

Panel D: Regional Concentration Index (%)

Year (Avg.)	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
1985	59.7	75.8	67.7	44.3
1986	56.3	81.7	59.5	45.9
1987	50.4	73.1	58.2	52.6
1988	62.7	59.5	56.4	63.7
1989	52.2	55.3	54.3	69.3
1990	55.1	54.9	52.0	66.4
1991	48.7	37.5	50.9	62.6
1992	46.4	30.1	47.5	67.4
1985–1992 Avg.	53.9	58.5	55.8	59.0
Yearly effect	F-value = .82	Prob. >F = .58		
Size effect	F-value = .35	Prob. >F = .79		

Panel E: General and Administrative Expenses/Total Assets (%)

Year (Avg.)	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
1985	1.6	1.6	.7	.8
1986	1.7	1.3	.8	1.4
1987	1.5	1.7	1.3	1.0
1988	2.2	1.4	1.4	.8
1989	2.1	1.4	1.7	.7
1990	1.8	1.3	1.4	.9
1991	1.3	1.0	1.2	.9
1992	1.3	1.3	1.0	1.0
1985–1992 Avg.	1.7(***)	1.4	1.2	.9(***)
Yearly effect	F-value = .99	Prob. >F = .46		
Size effect	F-value = 10.46	Prob. >F = .00		

Panel F: Cash Flow Yield (%)

Year (Avg.)	First Quartile	Second Quartile	Third Quartile	Fourth Quartile
1985	8.6	7.1	8.4	8.9
1986	6.0	7.6	8.4	7.1
1987	6.2	6.0	6.0	6.6
1988	6.2	6.3	7.1	7.5
1989	7.9	6.1	6.0	7.0
1990	9.8	8.6	7.6	7.9
1991	11.4	9.0	12.2	10.2
1992	12.4	10.9	12.2	7.7
1985–1992 Avg.	8.6	7.7	8.5	7.9
Yearly effect	F-value = 9.85	Prob. >F = .00		
Size effect	F-value = 1.20	Prob. >F = .33		

The size segmentation uses quartiles derived from total assets. Value-weighted premium, Hirschman-Herfindahl index and cash flow yield are defined in the paper. Leverage ratio is defined as total liability/(total liability+market value of equity).

We implement two-way analysis of variance (without interaction terms) procedure to see if there exist yearly effects or size effects, and then test if each quartile's mean is different from the overall mean.

*, **, *** denotes two-tailed significance at the 10%, 5%, 1% level, respectively.

Conclusions

This paper develops an equity REIT database and provides descriptive statistics on REIT property holdings. It then categorizes REITs by property type and size to explore sources of differences in valuation. Leverage, diversification and overhead expenses are investigated as possible causes of discounts to net asset value. Other possible causes of discounts such as external/internal advisor, type of debt (fixed versus variable), or dividend yield have not been examined.

It is shown that expenses as measured by the ratio of G&A to total assets, remained constant during the period; but as might be expected, diversified REITs and small REITs have above average expense ratios. Leverage rose during the period. Large REITs and apartment REITs supported more leverage than average. By property type, apartment REITs are the most concentrated by location. Small REITs are more focused by property type.

The stock market valuations as measured by premiums above the values of the underlying properties declined during the period. Warehouse REITs and small REITs sell at significant discounts from net asset value relative to the average REIT. Retail REITs sell at premiums relative to the average REIT. Cash flow yields, on the other hand, are not significantly different among REITs. Therefore there is no evidence that differences in premiums to net asset value affect cash flow yields. If we take cash flow to be a coarse measure of expected return to shareholders,⁸ then the evidence in this sample suggests that Wall Street is correctly processing the information that leads to the discounts/premiums. As indicated above, other variables not included in this study could affect the results.

These results may help to explain why retail property is overrepresented and warehouse/industrial is underrepresented in REITs. Retail property, once securitized, often sells at a premium while the opposite is the case for warehouse/industrial. The discounts/premiums do not affect cash flow yields at statistically significant levels. Therefore, securitization adds value to retail property but destroys value for warehouse/industrial property. This suggests that either Wall Street disagrees with the valuations on Main Street or the synergies that arise in a retail portfolio are greater than those in an industrial portfolio.

Notes

¹The "look through" provision in the 1993 OBRA tax revision which effectively eliminates the "five or fewer" rule for pension fund investors has also contributed to the growth of REITs.

²The literature in the excellent review of REIT research by Corgel, McIntosh and Ott (1995) is voluminous but overlooks this important issue, undoubtedly because of lack of data. A frequent thread in the literature is return and performance, e.g., Kuhle (1987), Kuhle, Walther and Wurtz bach (1986), Myer and Webb (1993, 1994). Unlike the closed-end fund literature where discounts/premiums have been carefully studied, the issue is overlooked with REITs.

³These data are explained in detail in the Market History Reports. Briefly, the NREI data, unlike the NCREIF data, are based on actual sales rather than appraisals. Cap rates are derived from pro forma net operating income. Property transactions are standardized to meet prespecified property "norms" in order to ensure that transaction trends of comparable quality property transactions are being reported. The index reports average values for each property type analyzed.

⁴The approximation works well for cap rates in the typical 8%–10% range that is observed.

⁵Note that the property portfolio cap rate is not the same as the capitalization for the common stock. The capitalization rate for equality can be quite different, e.g., because of leverage or other factors.

⁶Notice that using net asset values as a dependent variable does not violate the assumptions of OLS and does not introduce a bias.

⁷The index first acquired the name of Orris Herfindahl from work on energy in the 1950s and that of Albert Hirschman from work on foreign trade patterns. See Hirschman (1964).

⁸This is a coarse measure because it ignores differences in expected growth rates.

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