Do Real Estate Ownership and Leasing Decisions Affect a Retail Firm's Stock Market Risk and Return?

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Despite real estate's importance in the production processes of many non-real estate firms, very little is known about the effects of real estate assets on the stock return characteristics of these firms. To address this gap in the literature, we examine the risk-return characteristics of publicly traded firms in the retail industry, which includes restaurants. This industry is selected because commercial real estate is a significant component of the production functions of firms in this industry. We examine whether the mean returns, volatilities, and systematic risk of these property intensive retail firms are consistent with their real estate exposure. In particular, we estimate the extent to which these firms are exposed (i.e., sensitive) to a commercial real estate factor. If the returns of property intensive retail firms are sensitive to a real estate factor, it suggests that stock market participants understand and value the real estate position of the firm. In the second stage of our analysis, we examine whether investors value retail and restaurant stocks in a manner consistent with the real estate intensity and leasing propensities of the firms.

Despite real estate's importance, empirical investigations into the effects of owning versus leasing corporate real estate are limited (e.g., Rutheford, 1990; Alvayay, Rutherford, & Smith, 1995; Seiler, Chatrath, & Webb, 2001). Moreover, the existing literature has focused on the effects of special events such as large real estate sales or sale-leasebacks of real estate assets. However, as Deng and Gyourko (1999) point out, it is difficult to generalize from these "event study" papers because of possible sample selection biases.

Our approach to the lease versus buy issue is to examine whether a firm's risk exposure to real estate is consistent with the leasing profile of a firm. If investors understand the firm's real estate exposure, the firm's stock returns should correlate more closely with real estate indices the greater real estate exposure the firm has (i.e., if it owns more than it leases).¹

The issue of investor sophistication also arises when practitioners argue that leasing is preferred to owning because operating leases take debt "off-balance sheet." The implication is that investors will underestimate the risk of leasing orientated firms because they do not understand the leverage inherent in the operating leases. To test this hypothesis directly, we estimate whether a retail firm's stock market beta and/or sensitivity to a real estate factor is affected in a similar manner by on- and off-balance sheet debt levels. In other words, does a dollar increase in a firm's balance sheet debt have a similar impact on risk measures (betas) as a dollar increase in capitalized operating lease commitments?

¹ Of course, firms with substantial long dated leases still have considerable real estate exposure. We allow for this in our measure of real estate exposure of the firm.

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Our evidence is mixed. We do, in fact, find that the mean level of retail stock returns is more similar to that of equity REITs than it is to the return of the aggregate stock market over the 1994 to 2003 time period. In addition, we find that retail stocks have non-trivial exposure to real estate risk factors, even after controlling for exposure to aggregate stock market risk. We find some evidence to suggest that off-balance sheet debt (operating leases) do influence the market risk (beta) of retail stocks, even more so than on-balance sheet debt. However, we are unable to find any consistent link between how sensitive retail stocks are to real estate risk factors and how property intensive the firm is. This may be due to the statistical noisiness of our estimates of real estate risk sensitivity or, alternatively, it may be that our proxy for a firm's exposure to real estate assets is limited.

The remainder of the paper is organized as follows. First, we describe our empirical model of retail stock returns and real estate sensitivities. Second, we describe the data used in the first stage return regressions and present the empirical results. Third, we describe our approach to examining whether the risk sensitivities of retail stocks are affected by each firm's real estate intensity and leasing propensity. Finally, we describe the data used in these second stage risk sensitivity regressions and discuss the results, and summarize the evidence and conclude.

Measuring Risk Exposures for Property Intensive Firms

For firms in the retail industry (SIC codes 5200 to 5900), we employ an asset pricing framework, based on Jorion (1990), to estimate a firm's risk sensitivities. The statistical model, estimated in excess return form, is as follows for firm i over a given period of time:

$$R_{it} - R_{ft} = \alpha_i + \beta_{i'MKT} [R_{MKT,t} - R_{ft}] + \beta_{i,RE} [R^{RE}_{t} - R_{ft}] + e_{it}$$
(1)

Where:

 R_{it} = the total return of firm i in time period t;

 R_{ff} = the U.S. risk free rate in time period t;

 $\alpha_i = a \text{ constant};$

 $\beta_{i_{2MKT}}$ = the sensitivity (exposure) of firm i's excess returns to returns on the market portfolio;

 $R_{MKT,t}$ = the total return on the U.S. market portfolio in time period t;

 $R_{MKT,t} - R_{ft}$ = the period t excess return associated with an investment in the market portfolio;

 $\beta_{i,RE}$ = the exposure of firm i's excess returns to returns on U.S. commercial real estate returns;

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 $R_{t}^{\text{RE}}-R_{t}^{}$ = the period t excess return associated with an investment in real estate assets; and

 $e_{it} = a$ standard error term.

The coefficient β_{iRE} (the real estate beta) represents the exposure or sensitivity of stock i's excess return to the real estate risk factor, after controlling for movements in the broad stock market that affect the return on retail stocks, independent of real estate price movements.

Time Series Data and First-stage Regression Results

Weekly total returns for firms in the retail industry were obtained from the Center for Research in Security Pricing (CRSP) databases.² The weekly risk free total return was obtained from the CRSP bond files, and the broad-based market return is proxied for by the weekly total return on the CRSP NYSE/AMEX/AMEX/Nasdaq composite value-weighted index. Our proxy for commercial real estate returns is the weekly total return on the NAREIT All Equity Index.³ Table 1 provides descriptive statistics for our excess return data. Our sample period runs from 1994 through October of 2003 and contains 513 weeks of return data.⁴ The mean annualized weekly return on the market portfolio, in excess of the risk free rate, was 2.90% with a standard deviation of 17.30%.⁵ Real estate excess returns averaged 12.60% with a standard deviation of 12.00%. For all retail stocks and each retail subgroup, we formed equalweighted portfolios each year. The 10.00% mean excess return during 1994 to 2003 for the retail portfolios was more consistent with the return on real estate stocks than the aggregate market. The corresponding annualized standard deviation of retail portfolio returns was 17.30%. There was, however, a significant amount of variation in average excess returns across the eight two-digit SIC retail trade subcategories.

For example, SIC Group 52 (building materials, hardware, garden supply, and mobile home dealers) produced an average excess return of just 3.50%. At 4.80%, the mean excess return provided by eating and drinking establishments was also relatively low. In contrast, firms engaged in the ownership of apparel and accessory stores (SIC 56), provided investors with average excess returns of 16.50%.

² The following two-digit SIC codes constitute the retail trade division: Group 52, building materials, hardware, garden supply, and mobile home dealers; Group 53, general merchandise stores; Group 54, food stores; Group 55, automotive dealers and gasoline service stations; Group 56; apparel and accessory stores; Group 57, home furniture, furnishings, and equipment stores; Group 58, eating and drinking places; and Group 59, miscellaneous retail.

³ The NAREIT All Equity Index is produced by the National Association of Real Estate Investment Trusts (NAREIT), Washington, D.C.and is available on the NAREIT website: www.nareit.com.

⁴ The end date of October 2003 corresponds to the most recent available data at the time the data were collected for this study.

⁵ Returns are annualized by multiplying the mean weekly return by 52 and the standard deviation of returns by the square root of 52.

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As a group, retail firms provided investors with a 6.60% return during the 1994 to 1998 subperiod and an 13.50% return during 1999 to 2003, again much more in line with the real estate portfolio. In both subperiods, however, there is significant variation in mean returns across the eight retail subcategories. For example, firms providing building materials (SIC Group 52) and eating and drinking places (SIC Group 58) produced mean excess returns of -3.80% and -3.30%, respectively, between 1994 to 1998. In contrast, food stores (SIC Group 54) and miscellaneous retail (SIC Group 59) produced 12.10% and 12.20% returns, respectively. Similar variability across the subgroups is evident in the 1999 to 2003 subperiod.

	1994 to $(n = 5)$	2003 13)	1994 to (n = 1	0 1998 261)	1999 to $(n = 2)$	2003* 252)
Sector/retail subgroup	М	SD	М	SD	М	SD
U.S. equity market	2.90%	17.30%	10.40%	12.80%	-4.90%	21.00%
Commercial real estate	12.60%	12.00%	10.40%	11.20%	14.90%	12.80%
Composite retail (SIC 52-59)	10.00%	17.30%	6.60%	14.90%	13.50%	19.50%
Building materials, hardware (SIC 52)	3.50%	24.70%	-3.80%	20.30%	11.00%	28.60%
General merchandise stores (SIC 53)	9.00%	20.00%	10.10%	17.50%	7.90%	22.40%
Food stores (SIC 54)	6.40%	14.90%	12.10%	13.00%	0.50%	16.70%
Auto dealers and gas stations (SIC 55)	8.20%	22.70%	1.90%	18.10%	14.70%	26.70%
Apparel and accessory stores (SIC 56)	16.50%	23.70%	11.20%	20.50%	22.10%	26.70%
Home furniture, furnishings (SIC 57)	15.00%	28.70%	9.90%	25.40%	20.40%	31.80%
Eating and drinking places (SIC 58)	4.80%	15.80%	-3.30%	14.10%	13.10%	17.30%
Miscellaneous retail (SIC 59)	13.30%	20.60%	12.20%	18.10%	14.30%	22.90%

 Table 1

 Summary Statistics for Excess Returns: Annualized from Weekly Data

Note. Weekly total returns for retail firms were obtained from the CRSP databases. Returns for firms in the broad-based equities market are proxied for by the weekly return on the CRSP NYSE/AMEX/AMEX/AMEX/Nasdaq composite value-weighted index. Our proxy for commercial real estate returns is the weekly total return on the NAREIT All Equity Index. The industry portfolios are formed by equally weighting the corresponding firm stock returns each year.

* Sample period runs through October of 2003.

Table 2 contains correlation matrices of weekly excess returns for our various market sectors and retail subgroup portfolios. During the 513 weeks in the 1994 to 2003 sample, the correlation between excess market returns and NAREIT real estate returns was .48. Though significant, this positive correlation was less than the .75 correlation between the market and the composite return for retail firms. Although excess returns have varied significantly across the retail trade subcategories (see Table 1), returns for the eight retail subcategories, with the exception of building materials, have displayed relatively uniform correlations across time with returns on the market portfolio. The correlation between commercial real estate returns and the composite return for retail firms is .55. The correlations between real estate returns and returns in the retail subcategories ranged from .42 to .55. These positive and significant univariate correlations suggest that the returns of retail firms may be associated with a real estate risk factor.

The excess return correlations between the market portfolio and retail firms were remarkably stable across the two subperiods, as were the correlations between commercial real estate and retail firms. However, the real estate risk factor was more highly correlated with the market from 1994 to 1998 ($\rho = .61$) than from 1999 to 2003 ($\rho = .42$). Table 3 provides the market betas obtained from estimating equation (1) with weekly data. Rather than estimating one market and one real estate beta per retail firm over the entire sample period, betas are estimated for each firm in each year using weekly data to allow for nonstationarity over time. There are a total of 2,979 firm-year observations in the 10-year sample.

During the full 1994 to 2003 sample period, the mean market beta ($\beta_{i,MKT}$), aggregated across all retail firms and years, was .69. The market betas for the eight retail subgroups ranged from .49 (food stores) to .92 (home furniture, furnishings, and equipment stores). Thirty-eight percent of the market betas are positive and significantly different from zero at the 10% significance level. The percent of positive and significant market betas ranged from 31% to 53% across the eight retail subgroups. Two percent or less of the estimated market betas are negative and significant at the 10% level.

The magnitude of the estimated market betas are fairly consistent across the two subperiods, although retail firms were somewhat less exposed to general market risk in the 1999 to 2003 subperiod (with the exception of the home furniture group) than in the 1994 to 1998 period. It is interesting to note that the market betas were estimated with noticeably more precision in the latter subperiod, as evidenced by the lower standard deviations and the increased percentage of positive and statistically significant betas.

Table 4 provides descriptive statistics on the real estate betas ($\beta_{i, RE}$) obtained from estimating equation (1), which also controls for market exposure. As with our market betas, the real estate betas are estimated for each firm in each year using weekly data. This provides us with ten yearly cross-sections and the ability to control for nonstationarity.

Table 2 Correlation Matrix of Weekly Exce.	ss Returns										
Panel A: 1994-2003 ($n = 513$) Sector/Retail subgroup	Market	Real estate	Comp. retail	Group 52	Group 53	Group 54	Group 55	Group 56	Group 57	Group 58	Group 59
Market	1										
Real estate	.48	1									
Composite retail	.75	.55	1								
Building materials, hardware (52)	.49	.42	.61	1							
General merchandise stores (53)	.68	.47	.85	.51	1						
Food stores (54)	.59	.47	.73	.45	.61	1					
Auto dealers and gas stations (55)	.59	.45	.80	.49	.63	.59	1				
Apparel and accessory stores (56)	.64	.42	.86	.48	.81	.58	.63	1			
Home furniture, furnishings (57)	.64	.44	.86	.47	.71	.59	.64	.72	1		
Eating and drinking places (58)	.63	.55	.87	.51	69.	.61	.72	.68	99.	1	
Miscellaneous retail (59)	.68	.47	.92	.54	.68	.62	.71	69.	67.	.74	1
Panel B: 1994-1998 ($n = 261$) Sector/Retail subgroup	Market	Real estate	Comp. retail	Group 52	Group 53	Group 54	Group 55	Group 56	Group 57	Group 58	Group 59
Market	1										
Real estate	.61	1									
Composite retail	.76	.56	1								
Building materials, hardware (52)	.43	.32	.56	1							
General merchandise stores (53)	.64	.39	.80	.48	1						
Food stores (54)	69.	.55	.73	.41	.57	1					
Auto dealers and gas stations (55)	.59	44.	.75	.36	.53	.54	1				
Apparel and accessory stores (56)	.59	.39	.84	.48	.78	.56	.59	1			
Home furniture, furnishings (57)	.60	.48	.86	.45	.62	.57	.60	99.	1		
Eating and drinking places (58)	69.	.55	.87	.46	99.	.61	.71	.68	69.	1	
Miscellaneous retail (59)	.68	.50	.92	.47	.62	.62	.67	.67	.81	.72	1

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Table 2. (continued)											
Panel C: 1999-2003* ($n = 252$) Sector/retail subgroup	Market	Real estate	Comp. retail	Group 52	Group 53	Group 54	Group 55	Group 56	Group 57	Group 58	Group 59
Market	1										
Real estate	.42	1									
Composite retail	.75	.55	1								
Building materials, hardware (52)	.52	.48	.63	1							
General merchandise stores (53)	.71	.53	.88	.53	1						
Food stores (54)	.54	.41	.74	.47	.64	1					
Auto dealers and gas stations (55)	.60	.46	.83	.56	.70	.62	1				
Apparel and accessory stores (56)	.67	.45	.87	.48	.83	.59	.66	1			
Home furniture, furnishings (57)	.68	.41	.86	.48	.78	.61	.67	.76	1		
Eating and drinking places (58)	.61	.55	.87	.55	.71	.62	.73	69.	.65	1	
Miscellaneous retail (59)	69.	.46	.92	.59	.72	.61	.74	.71	77.	.75	1
<i>Note.</i> Sample period runs through O Returns for firms in the broad-based proxy for commercial real estate returns	totober of 2003 equities marke rns is the weekl	Weekly t t are proxie ly total retu	total returns ed for by the rn on the N _v	for retail firr e weekly retu AREIT All Ed	ns were obta rn on the CF quity Index.	uined from tł tSP NYSE/A	the Center for MEX/AME	Research in X/Nasdaq co	Security Pri mposite valu	cing (CRSP) e-weighted	databases. index. Our

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Significance and Distribution of Market Betas of U.	5. Retail Fin	sm [*]							
Panel A: 1994-2003	Comp. Retail	Group 52	Group 53	Group 54	Group 55	Group 56	Group 57	Group 58	Group 59
Number of observations	2,979	87	355	284	146	406	225	677	799
Mean market beta	1	.61	.76	.49	.73	.82	.92	.53	.74
Standard deviation	1	0.79	0.81	0.72	0.73	06.0	0.95	0.79	0.99
Median	1	0.52	0.74	0.39	0.61	0.86	0.94	0.46	0.63
Positive & different from 0 at 10% significance level	0	.35	.52	.36	.38	.46	4.	.31	.34
Negative & different from 0 at 10% significance level	0	.02	.01	.02	00.	.01	.02	.01	.01
Panel B: 1994-1998	Comp. Retail	Group 52	Group 53	Group 54	Group 55	Group 56	Group 57	Group 58	Group 59
Number of observations	1,577	58	189	151	61	200	130	368	420
Mean market beta	1	.65	.81	.54	TT.	.85	.87	.64	.85
Standard deviation	1	0.86	0.98	0.77	0.71	1.11	1.11	06.0	1.15
Median	1	0.59	0.81	0.49	0.74	0.91	0.86	0.59	0.71
Positive & different from 0 at 10% significance level	0	.29	.45	.34	.38	.33	.32	.29	.31
Negative & different from 0 at 10% significance level	0	00.	.01	.02	00.	.02	.03	00 [.]	00 [.]
Panel C: 1999-2003	Comp. Retail	Group 52	Group 53	Group 54	Group 55	Group 56	Group 57	Group 58	Group 59
Number of observations	1,402	29	166	133	85	206	95	309	379
Mean market beta	1	.53	.71	.43	.70	67.	86.	.41	.61
Standard deviation	1	0.62	0.56	0.66	0.75	0.63	0.68	0.60	0.75
Median	1	0.51	0.69	0.32	0.57	0.85	0.96	0.37	0.54
Positive & different from 0 at 10% significance level	0	.45	.61	.38	.39	.58	09.	.34	.38
Negative & different from 0 at 10% significance level	0	.07	00 ⁻	.02	00.	00 ⁻	.01	.02	.01

Note: The data for 2003 run through October. The following two-digit SIC codes constitute the retail trade division: Group 52, building materials, hardware, garden supply, and mobile home dealers; Group 53, general merchandise stores; Group 54, food stores; Group 55, automotive dealers and gasoline service stations; Group 56; apparel and accessory stores; Group 57, Home furniture, furnishings, and equipment stores; Group 58, eating and drinking places; and Group 59, miscellaneous retail.

During the full sample period, the mean real estate beta, aggregated across all firms and years, was .20 with a standard deviation of 1.02. Real estate betas for the eight retail subgroups ranged from .12 (apparel and accessory stores) to .27 (auto dealers and gas stations, as well as building materials).

A striking result in Table 4 is the increasing exposure of retail firms to real estate risk, as measured by the increasing magnitude of the real estate betas through time. During the 1994 to 1998 subperiod, the mean real estate beta for all retail firms was only .06, with the mean for the eight subgroups ranging from -.12 to .16. In sharp contrast, however, the mean real estate beta for all firms and years during 1999 to 2003 was .36, with the subgroup means ranging from .23 to .68. Clearly, a real estate risk factor has been much more prevalent in the variability of retail stocks returns in more recent years. In addition to the time variation in the real estate betas, another important feature of these beta estimates is that they are far from precise. Even though the cross-sectional averages for both periods are significantly different from zero at high levels of statistical confidence, the number of firm level real estate betas that are statistically significant and positive at the 10% confidence interval is substantially less than the corresponding market betas, though the significance of the real estate betas and their magnitudes increases substantially in the 1999 to 2003 subperiod.⁶

⁶ In our two-factor asset pricing framework, we measure the marginal exposure to real estate risk after controlling for market risk. To the extent that our NAREIT real estate proxy measures the performance of private real estate with error, our real estate betas (exposure) are also mismeasured and, in fact, biased toward zero. This mismeasurement may be especially problematic during the stock market bubble of the late 1990s when NAREIT returns diverged significantly from private real estate returns.

Table 4 Significance and Distribution of Real Estate Betas (of U.S. Re	tail Firms							
Panel A: 1994-2003	Comp. retail	Group 52	Group 53	Group 54	Group 55	Group 56	Group 57	Group 58	Group 59
Number of observations	2,979	87	355	284	146	406	225	677	66L
Mean real estate beta	.20	.27	.16	.14	.27	.12	.23	.26	.20
Standard deviation	1.02	1.10	0.92	0.74	0.95	1.09	1.31	06.0	1.10
Median	0.21	0.17	0.17	0.11	0.28	0.19	0.20	0.25	0.23
5th percentile	-1.42	-1.36	-1.27	-1.04	-1.32	-1.79	-1.69	-1.01	-1.77
95th percentile	1.77	2.14	1.45	1.24	1.87	1.79	2.18	1.64	1.85
Positive & different from 0 at 10% significance level	13%	17%	16%	13%	14%	9%6	11%	14%	12%
Negative & different from 0 at 10% significance level	3%	2%	4%	4%	2%	5%	3%	3%	3%
Panel B: 1994-1998	Comp. retail	Group 52	Group 53	Group 54	Group 55	Group 56	Group 57	Group 58	Group 59
Number of observations	1,577	58	189	151	61	200	130	368	420
Mean real estate beta	90.	.07	06	.07	.05	12	.10	.16	60.
Standard deviation	1.11	1.13	0.98	0.81	0.89	1.27	1.51	0.95	1.18
Median	0.10	0.02	-0.02	0.06	-0.06	-0.02	0.07	0.17	0.15
5th percentile	-1.80	-1.85	-1.71	-1.24	-1.32	-2.50	-2.52	-1.35	-2.02
95th percentile	1.69	1.81	1.11	1.28	1.37	1.81	2.68	1.57	1.92
Positive & different from 0 at 10% significance level	8%	10%	8%	10%	8%	4%	9%6	10%	8%
Negative & different from 0 at 10% significance level	4%	0%0	5%	5%	2%	7%	4%	4%	4%

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Panel C: 1999-2003	Comp. retail	Group 52	Group 53	Group 54	Group 55	Group 56	Group 57	Group 58	Group 59
Number of observations	1,402	29	166	133	85	206	95	309	379
Mean real estate beta	.36	.68	.42	.23	.43	.35	.40	.39	.32
Standard deviation	0.88	0.94	0.78	0.64	0.98	0.84	0.97	0.82	0.99
Median	0.32	0.38	0.32	0.21	0.48	0.35	0.40	0.30	0.33
5th percentile	-0.96	-0.49	-0.71	-0.68	-0.82	-1.07	-1.29	-0.87	-1.35
95th percentile	1.81	2.35	1.76	1.24	1.89	1.68	1.99	1.87	1.81
Positive & different from 0 at 10% significance level	18%	31%	24%	16%	19%	14%	14%	19%	16%
Negative & different from 0 at 10% significance level	2%	7%	2%	2%	2%	3%	2%	2%	2%

Note. The following two-digit SIC codes constitute the retail trade division: Group 52, building materials, hardware, garden supply, and mobile home dealers; Group 53, general merchandise stores; Group 54, food stores; Group 55, automotive dealers and gasoline service stations; Group 56; apparel and accessory stores; Group 57, home furniture, furnishings, and equipment stores; Group 58, eating and drinking places; and Group 59, miscellaneous retail.

Explaining Cross-sectional Variation in Real Estate Risk Exposures

We next examine whether the generally positive real estate betas estimated in our first stage regressions are affected by the firm's intensity of real estate usage or leasing propensity. More specifically, for each year in our 10-year study period, we take the estimated market and real estate betas for each firm in our sample and estimate the following pair of cross-sectional regressions:

$$\beta_{i,MKT} = \lambda_{0,MKT} + \lambda_{1,MKT} \operatorname{REPER}_{i} + \lambda_{2,MKT} (D/E)_{i} + \lambda_{3,MKT} \operatorname{LEASE}_{i} + \lambda_{4,MKT} Q_{i} + e_{i}$$
(2)
$$\beta_{i,RE} = \lambda_{0,RE} + \lambda_{1,RE} \operatorname{REPER}_{i} + \lambda_{2,RE} (D/E)_{i} + \lambda_{3,RE} \operatorname{LEASE}_{i} + \lambda_{4,MKT} Q_{i} + e_{i}$$
(3)

REPER_i measures the intensity of each firm's real estate usage, including the real estate controlled through leasing, relative to the total assets of the firm. More specifically, REPER_i is defined as:

$$REPER_i = (PPE_i + OPLEASES_i) / (TA_i + OPLEASES_i),$$

where PPE_i is the book value of the firm's property, plant, and equipment, $OPLEASES_i$ is the present value of the minimum rents on the firm's capitalized operating leases, and TA_i is the (depreciated) book value of the firm's total assets.⁷ The second right-hand-side explanatory variable in equations (2) and (3), D/E_i , measures the firm's total debt-to-market equity ratio. For each year, this is measured at the end of the prior fiscal year. D/E_i , is designed to measure the impact of leverage on stock market and real estate betas. $LEASE_i$ is equal to $OPLEASES_i / MVE_i$, where MVE_i is the market value of the firm's equity, and is constructed to measure off-balance sheet leverage. Finally, Q_i is defined as:

$$Q_i = (TA_i + MVE_i - BE_i) / TA_i,$$

⁷ The capitalization of operating leases is done as follows: OPLEASES = (Computer 1) discounted back 1-year) + (Compustat Item 164 discounted back 2-years) + (Compustat Item 165 discounted back 3-years) + (Compustat Item 166 discounted back 4-years) + (Compustat Item 167 discounted back 5-years) + adjustment factor. The discount rate for the discounting is the annual BAA rate from the H15 data (Fed Reserve Data). The adjustment factor requires multiple steps: 1. Take Compustat Item 389 and divide by Compustat Item 167. 2. Round this number up to next integer (so if ratio is 5.3, round up to 6). 3. Take Compustat Item 389 and divide by rounded up ratio. This gives the dollar value of leases that will persist for the next 6 years (in this example). 4. Take this annuity and discount it back for the adjustment factor. So, for example, if the rounded up integer is 6, the adjustment factor would equal: Adjustment factor = (Compustat Item 389 / 6) discounted back 6-years + (Compustat Item 389 / 6) discounted back 7-years + (Compustat Item 389 / 6) discounted back 8-years + (Compustat Item 389 / 6} discounted back 9-years + (Compustat Item 389 / 6} discounted back 10-years + (Compustat Item 389 / 6) discounted back 11-years. Note. Because Compustat Item 389 is missing for many firms, we also experimented with several variations of the adjustment factor, including setting it equal to zero if missing. Also note that if the rounded up integer is 8 in our above example, then discount Compustat Item 389/8 for years 6-13.

where MVE_i and BE_i are, respectively, the market value and book value of the firm's equity at the end of the prior fiscal year. Q_i is designed to capture the extent to which the market perceives growth opportunities for the firm. We expect greater sensitivity to market wide trends (higher market betas) for the high Q retail firms. We hypothesize that greater real estate ownership rights as a percentage of total assets (i.e., a larger REPER_i) will result in greater sensitivity to the real estate factor (i.e., a higher $\lambda_{1,RE}$ in the estimation of equation (3)).

The ability to test our hypothesis regarding the coefficient on REPER_i is dependent on how well REPER_i captures the real estate intensiveness of the retail firms in our sample. We conjecture that the book value of PP & E (property, plant, and equipment) proxies for the value of real estate assets owned by the firm. Obviously, retail and restaurant firms have some non-real estate assets (i.e., plant and equipment) in PP&E, but the relative magnitude of those assets should be smaller than in most industries and more uniform across firms. If the retail firm owns more land and buildings that should be reflected in higher levels of PP&E.⁸ The value of the leases is added to the firm's real estate usage in the numerator of the REPER_i calculation and also added to the total book value of assets in the denominator.

The coefficients $\lambda_{3,MKT}$ from equation (2) and $\lambda_{3,RE}$ from equation (3) measure the extent to which the present value of capitalized operating leases (as a percent of the firm's market value of equity) affect real estate betas and market betas via off-balance sheet leverage. If the market understands the nature of the leverage created by on and off-balance sheet leverage, we expect the coefficients on (D/E)_i and LEASE_i (i.e., $\lambda_{2,RE}$ and $\lambda_{3,RE}$) to be positive and equal to each other in the real estate beta equations. This, of course, assumes that the real estate risk is correlated with the firm risk. We would expect the same result for the coefficients (i.e., $\lambda_{2,MKT}$ and $\lambda_{3,MKT}$).

Cross-sectional Data and Second-stage Regression Results

The data required to estimate equations (2) and (3), including operating lease data, are available from Compustat. Summary statistics for the variables used in these cross-sectional beta regressions are reported in Table 5. In this second stage, we eliminate firms from the sample if the book value of their equity is negative or if the market value of their equity is less than \$30 million. This reduces the number of firm-year betas to 2,505 from 2,979. In addition, 66 firm-years are lost due to insufficient information from COMPUSTAT to calculate LEASE_i. Thus, our total regression sample contains 2,439 firm-years over the 1994 to 2003 study period.

The mean debt-to-equity ratio (D/E_i) over the 1994 to 2003 sample period is 1.02, although $(D/E)_i$ ranged from a low of zero to a high of 21.71. Q_i averaged 1.77 over the full sample period. The present value of capitalized operating leases, divided by the market value of the firm's equity $(LEASE_i)$, averaged 0.72. Thus, the average retail firm makes significant use of leasing to control real estate assets. Finally, our

⁸ We attempted to use Compustat items 155 and 159 that report the book value of buildings and land holdings. Unfortunately, over our sample period, these items are largely missing from the Compustat data fields.

Table 5

measure of real estate usage intensity, $REPER_i$, averaged 0.56 over the full sample. However, $REPER_i$ displayed significant variability across firms, ranging from a low of 0.01 to a high of 0.97.

In Table 6, we report the results from estimating equation (2); our second-stage cross-sectional regressions with market betas as the dependent variable. To correct for heteroscedasticity problems, the regressions are estimated using weighted least squares, with the weights based on the standard errors of the initial beta estimates. The estimated coefficients on Qi are consistently positive and highly significant, implying that high growth retail firms are more exposed to market risk.

	Panel A: 1994-	-2003 (n = 2,439)		
Variable	M	SD	Min	Max
Debt-to-equity ratio (D/Ei)	1.02	1.58	0.00	21.71
Tobin's Q (Qi)	1.77	1.17	0.23	12.78
PV of Leases as % of stock mkt. cap. (LEASEi)	0.72	1.17	0.00	18.03
Real estate intensity (REPERi)	0.56	0.20	0.01	0.97
	Panel B. 1994-	-1998 (<i>n</i> = 1,299)		
Variable	M	SD	Min	Max
Debt-to-equity ratio (D/Ei)	0.99	1.59	0.00	20.67
Tobin's Q (Qi)	1.76	1.17	0.39	12.78
PV of Leases as % of stock mkt. cap. (LEASEi)	0.71	1.15	0.00	18.03
Real estate intensity (REPERi)	0.56	0.21	0.01	0.97
	Panel C. 1999-	-2003 (n = 1, 140)		
Variable	M	SD	Min	Max
Debt-to-equity ratio (D/Ei)	1.06	1.56	0.01	21.71
Tobin's Q (Qi)	1.79	1.18	0.23	8.73
PV of leases as % of stock mkt. cap. (LEASEi)	0.74	1.20	0.00	13.09
Real estate intensity (REPERi)	0.55	0.20	0.02	0.97

Summary Statistics for Independent Variables Used in Second Stage Regressions

Note. REPERi is equal to (PPEi + OPLEASESi) / (TAi + OPLEASESi), where PPEi is the book value of the firm's property, plant, and equipment, and OPLEASESi is the present value of minimum rents on the firm's capitalized operating leases, and TAi is the book value of the firm's total assets. D/Ei, is the firm's debt-to-equity ratio, and LEASEi is equal to OPLEASESi/MVEi, where MVEi is the market value of the firm's equity. Qi is equal to MVEi + (TAi – BEi) / TAi, where MVEi and BEi are, respectively, the market value and book value of the firm's equity.

In the latter years of the sample period, there is some evidence that higher debt-to-equity ratios are associated with lower market betas, which is inconsistent with the standard relation between leverage and risk. The estimated coefficients on LEASEi are positive (with one exception) and statistically significant in six of the ten years, including from 2000 to 2004. This suggests that leasing propensity increases the exposure of retail firms to market risk, all else equal. Surprisingly, the off-balance

sheet debt has more impact on risk than does the on-balance sheet debt. Finally, the estimated coefficients on REPER_i are uniformly negative and statistically significant in half of the years. Thus, we provide some evidence that greater real estate intensity among retail firms is negatively associated with market risk. The adjusted R²s from the cross-sectional market beta regressions average 0.13, and range from .04 in 1997 to .32 in 1999. Clearly, our ability to explain variability in market betas varies significantly over time.

Year	Qi	D/Ei	LEASEi	REPERi	const	Ν	Adj. R ²
1994	.31	.04	.14	36	.37	237	.13
	(6.01)	(0.83)	(0.95)	(-1.56)	(2.18)		
1995	.41	03	.27	70	.33	263	.12
	(5.35)	(-0.66)	(2.29)	(-2.55)	(1.54)		
1996	.21	02	.05	33	.44	258	.09
	(4.87)	(-0.72)	(1.13)	(-1.95)	(3.36)		
1997	.13	02	.04	13	.28	256	.04
	(3.27)	(-0.44)	(0.67)	(-0.74)	(1.90)		
1998	.20	14	.29	41	.51	263	.13
	(5.21)	(-2.41)	(3.62)	(-2.12)	(3.46)		
1999	.19	04	04	21	.14	259	.32
	(9.35)	(-1.12)	(-0.74)	(-1.36)	(1.36)		
2000	.16	08	.15	36	.31	243	.20
	(6.42)	(-2.82)	(3.90)	(-2.85)	(3.29)		
2001	.12	06	.14	43	.53	217	.14
	(4.72)	(-2.05)	(3.18)	(-2.72)	(4.47)		
2002	.09	12	.17	33	.62	229	.10
	(3.38)	(-2.89)	(2.90)	(-1.98)	(4.98)		
2003	.09	04	.13	04	.77	214	.02
	(1.88)	(-0.85)	(2.15)	(-0.16)	(4.67)		

Table 6

Note. REPERi is equal to (PPEi + OPLEASESi) / (TAi + OPLEASESi), where PPEi is the book value of the firm's property, plant, and equipment, OPLEASESi is the present value of minimum rents on the firm's capitalized operating leases, and TAi is the book value of the firm's total assets. D/Ei is the firm's debt-to-equity ratio, and LEASEi is equal to OPLEASESi/MVEi, where MVEi is the market value of the firm's equity. Qi is equal to MVEi + (TAi – BEi) / TAi, where MVEi and BEi are, respectively, the market value and book value of the firm's equity.

* Market betas are dependent variable, and *t*-statistics are in parentheses.

In Table 7 we report the results from estimating our second-stage crosssectional regressions using real estate betas as the dependent variable [equation (3)]. Again, the regressions employ weighted least squares with the weighting based on the standard errors of the initial retail beta estimates.

Year	Qi	D/Ei	LEASEi	REPERi	const	Ν	Adj. <i>R</i> ²
1994	02 (-0.36)	.00 (0.03)	04 (-0.30)	.09 (0.45)	.12 (0.82)	237	02
1995	18 (-2.77)	.03 (0.83)	24 (-2.48)	41 (-1.77)	.63 (3.47)	263	.05
1996	09 (-1.31)	.04 (1.01)	22 (-3.25)	.41 (1.54)	23 (-1.12)	258	.03
1997	07 (-1.31)	06 (-1.01)	.06 (0.76)	20 (-0.84)	.58 (3.01)	256	01
1998	07 (-2.16)	01 (-0.22)	.05 (0.84)	.08 (0.51)	.25 (2.08)	263	.01
1999	09 (-3.12)	.00 (-0.09)	.07 (0.86)	05 (-0.23)	.52 (3.54)	259	.04
2000	.11 (-2.31)	.05 (0.95)	07 (-0.98)	.07 (0.31)	.08 (0.44)	243	.01
2001	04 (-1.13)	.00 (-0.01)	.03 (0.51)	23 (-1.01)	.68 (3.93)	217	-
2002	04 (-1.53)	03 (-0.77)	.13 (2.20)	.22 (1.25)	.31 (2.38)	229	.04
2003	06 (-1.51)	.01 (0.41)	03 (-0.65)	.06 (0.34)	.07 (0.60)	214	01

Table 7 Second Stage Cross-sectional Regressions.*

Note. REPERi is equal to (PPEi + OPLEASESi) / (TAi + OPLEASESi), where PPEi is the book value of the firm's property, plant, and equipment. OPLEASESi is the present value of minimum rents on the firm's capitalized operating leases. TAi is the book value of the firm's total assets. D/Ei, is the firm's debt-to-equity ratio, and LEASEi is equal to OPLEASESi/MVEi, where MVEi is the market value of the firm's equity. Qi is equal to MVEi + (TAi – BEi) / TAi, where MVEi and BEi are, respectively, the market value and book value of the firm's equity.

* Market betas are dependent variable, and *t*-statistics are in parentheses.

In short, the results do not conform to expectations. First, the amount of real estate owned or leased on a long-term basis (REPER_i) has no detectable impact on real estate betas. Our expectation was that real estate intensive retail firms would display greater sensitivity to a real estate risk factor. Second, the propensity of firms to lease, as measured by LEASE_i , has no consistent effect on real estate betas. That is, the present value of capitalized operating leases does not affect real estate risk exposures, all else equal.

Further inspection of Table 7 reveals that firm debt-to-equity ratios are strikingly insignificant in their ability to explain cross-sectional variation in real estate betas. Given that there is no consistent real estate beta risk to leverage up, perhaps the mostly insignificant coefficients on the leasing and debt variables are not that surprising. Finally, the estimated coefficient on Q_i is negative and statistically significant in several of the annual cross-sections, but positive and significant in 2000. Thus, we uncover no consistent evidence that high growth firms are more exposed to real estate risk. Since we would expect growth options to be more susceptible to market wide risk, this result is not inconsistent with our priors. The adjusted R²s from the cross-sectional real estate beta regressions range from -.02 to .05. Overall, the low adjusted R²s suggest that we can only account for very little of the variation in the cross sectional real estate betas with our chosen set of explanatory variables.

Summary and Conclusion

In this study, we examine the returns to retail stocks over the period 1994 to 2003. This set of firms was chosen because of the high use of real estate in a retail firm's "production function." Consistent with our expectations, the mean level of retail firm stock returns is closer to the returns of real estate firms as opposed to the aggregate market level of returns. Also, retail stocks do show positive real estate risk exposure, on average. This is true even after controlling for sensitivity to general market risk. The second part of our analysis examines whether property ownership and use of offbalance sheet leverage to finance real estate holdings are reflected in the risk measures of retail stocks. With respect to market betas, greater use of off-balance sheet leasing is associated with higher market betas. In fact, the use of operating leases appears to have a larger impact on sensitivity to market risk than does the use of on-balance sheet debt. As for real estate betas, the results are much weaker. The proportion of the firms' total assets that are real estate based does not appear to be related to real estate betas. This may reflect the imprecision with which the real estate betas are estimated or, alternatively, it may result from the limitations associated with using equity REIT returns as a proxy for the returns earned by private market investors who own real estate assets similar to those of our sample of retail firms.

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