Real Estate Divestitures and Stock Price Performance: Using Alternative Event Study Variance Estimators

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Introduction

The question of pricing efficiency in securities markets is an important research topic that generates considerable interest. However, while many researchers have examined the general question of market efficiency, few have concentrated on the behavior of real estate markets. Recent empirical work has been done by Shilling, Sirmans and Benjamin [11], Guntermann and Smith [6], Gau ([4], [5]), and Skantz and Strickland [12]. Of particular interest to this research is a study by Hite, Owers and Rogers (HOR) [7] who examined the level and patterns of abnormal returns for firms separating real estate assets from their remaining operations through spinoffs.

One of the questions addressed by HOR was related to the claim by many managers of large publicly traded real estate firms that certain accounting restrictions cause their shares to be systemically undervalued in the stock market [8]. While HOR were unable to determine if real estate assets were really undervalued, they did find that the asset restructuring resulting from spinoff of real estate operations tended to increase the firms' aggregate market values.

The objective of this study is to investigate the impact of a firm's decision to divest real estate assets. The decision's impact is viewed from the perspective of the firm's owner, i.e., change in shareholder value. The study includes a sample of forty-three divestitures between 1971 and 1984. Event study methodology employed in this study is widely used in accounting and finance research and is becoming more common in the management literature [15].

The paper is outlined as follows. Section two discusses issues and motivations pertaining to real estate divestitures. Section three explains the event study methodology, describes the data sample, and compares the two variance estimators used in the study. Section four describes empirical results. A summary and conclusions are presented in the last section.

Background and Motivations for Selling Real Estate Holdings

While this study can neither value individual assets held by public firms, nor ascertain the exact selling prices for a majority of the transactions, the net gains/losses experienced by firms divesting real estate assets are analyzed by using security market price data. This methodology is explained in the next section. A brief discussion of why firms might dispose of real estate assets follows.

A firm's stock price response to the sale of a large real estate asset may be closely related to the reason for the sale. For example, if a firm is in financial difficulty its bargaining position for selling assets of any type may be impaired.

The firm may wish to earn an accounting profit thus increasing reported earnings per share. Some firms selling real estate for this reason may be be experiencing financial difficulties and are attempting to avoid disastrous drops in reported earnings. Also, the firm may be in need of cash for financing other projects when alternative financing sources are limited. These reasons could explain "forced sales" at prices below market.

Real estate sales may occur if previous plans for asset use have changed. Perhaps the assets have lost strategic value to the firm. Dispositions may also be due to the marginal tax benefits between the sellers and acquirers.

Likewise the sale may be an attempt by the firm to recognize the asset's "true value." Several real estate firms, in particular, have given this reason. They felt their holdings were not properly valued by analysts and investors in the firms' securities [8]. If this perception is correct it might imply market inefficiency because investors and analysts are ignoring factors that become clear when the real estate asset is isolated. This may be analogous to a company take-over situation, where the break-up value may be greater than that of the firm as a whole.

The actual reasons for selling real estate assets, however, are difficult to determine because the real motivations for asset disposition are often clouded by managements' vague and general statements. This research, therefore, tests only for the aggregate divestiture-related impact on shareholder wealth.

Methodology, Data and Experimental Design

The ideal approach to analyze real estate disposition decisions would be to compare asset selling prices to pre-disposition "fair market values." Unfortunately, this direct approach is precluded by one of the salient features of real estate markets — the dearth of publicly available financial data. With the exception of single-family residential homes, sales prices are extremely difficult and expensive, if not impossible, to obtain. Since neither sales prices nor "fair market values" can be directly observed for these real estate assets, another approach is required. This investigation compares the firm's market value before the sale with its post-divestiture value in order to measure shareholder gain or loss on each transaction. The methodology described below does just this.

Event study methodology, similar to that first used by Fama, Fisher, Jensen and Roll [3], measures the impact of a specific management decision on security market returns.

The management decision, i.e., "event," in this study is the divestiture or spinoff of a firm's real estate assets.

Suppose the research question is, for example, to measure the single, one-day effect of an event. Three major steps are required for each firm in the sample. First, the actual return for a firm's stock is observed on the event day. Second, by utilizing the familiar security market "Beta" model, a prediction is made of what the stock's "normal" return should have been had the event not occurred. Third, the impact of the event, defined as abnormal return, is the difference between the stock's actual market return — presumably affected by the event's occurence — and its "normal" return. This difference, if any, measures the event's one-day impact on stockholder wealth. The Beta model and abnormal return are formally defined below in Equations (1) and (2), respectively.

Daily security return data from the Center for Research in Security Prices (CRSP) were obtained for the period 1963 through 1984. Value-weighted returns including dividends for all NYSE and AMEX stocks were used as the market index proxy.

The final data set of 43 transactions was selected from an original list of approximately 110 firms obtained from several sources. These included the National Newspaper Index, the Predicast Index, and the Wall Street Journal Index. The underlying assumption is that an event is material for a firm if it is reported and indexed in a major financial newspaper such as The Wall Street Journal, The New York Times, or The Los Angeles Times. The event date is defined as the time when the transaction's information was first made publicly available. This was determined in one of several ways. A newspaper index reference describing a firm's intent to enter into the transaction was considered the event. Otherwise the related article was used to verify the event. When a reference alluded to an earlier event, for example "...the firm had a gain of $ X million on sale of land ...", we looked for an earlier reference in the index. Finally, when several related references were discovered, a thorough search was conducted to determine whether the transaction had been made or not. If an actual event date could not be verified the potential event was not used. Table 1 lists information about each of the 43 events included in the final sample. The firm's name is followed by its Compustat industry number (approximately equivalent to 4-digit SIC categories) and calendar date of the event.

The return data for each divestiture was divided into three major periods based on event date: a Beta estimation period of 120 days, a settling period of 90 days, and an analysis period of 181 days. A total of 391 daily return observations are used for each event with day t = 0 designated as the event date.

Data from the 120-day estimation period were used to estimate each firm's Beta model. The model is,

$$\hat{R}_{i,t} = \hat{\alpha}_i + \hat{\beta}_i R_{m,t}, \tag{1}$$

where values of t range from -300 to -181 days relative to the event date; $\hat{R}_{i,t}$ is the expected return for security i on day t; $R_{m,t}$ is the return on the market index on day t; and $\hat{\alpha}_i$ and $\hat{\beta}_i$ are OLS coefficients from the estimation period.

The next 90 days of returns (day -180 through day -91) are excluded from the study to allow for a settling-down period between the Beta estimation and analysis periods. This is consistent with Reints and Vandenberg [9] and Sanger and McConnell [10], who suggest excluding time periods in which information concerning the event might influence the estimation of the $\hat{\alpha}_i$ and $\hat{\beta}_i$ coefficients.

The results are actually evaluated for the analysis period. For each firm i, and for each day t, each day's impact due to the event is the difference between the actual return and the "normal" return. This difference is defined as the abnormal return,

$$A_{i,t} = R_{i,t} - \hat{R}_{i,t}, \tag{2}$$

where t ranges 181 days from -90 to +90; $R_{i,t}$ is the security's actual daily return; and $\hat{R}_{i,t}$ is its "normal" return. "Normal" return is predicted using the estimators $\hat{\alpha}_i$ and $\hat{\beta}_i$ from the Beta model described in Eq. (1) in conjunction with the actual returns of the market index, $R_{m,t}$, during the analysis period. For each day in the analysis period, abnormal returns are averaged over all firms in the sample to obtain event-related impact results on a day by day basis. When the results for a cumulative effect of more than one day are desired, daily abnormal returns are summed over the relevant time window and designated Cumulative Abnormal Returns (CARs).

The t value statistics described by Brown and Warner (BW) [1], (equations 5,6,7,8 and A11) are calculated in two different ways. One uses the traditional variance estimator and one uses an alternative method. Following the BW equation 7, the standard error measure is the square root of the sum of squared excess return deviations over the 120-day estimation period. This provides the traditional variance estimator.

The alternative variance estimator is Tiku's [14] MMLE, which censors the smallest and largest values from the excess return deviations. In effect, the estimation period's series of 120 deviations (BWs equations 7 and 8) are arranged in order and the 10% lowest and highest deviations are dropped. The remaining 96 deviations are used in calculating the robust MMLE estimate of variance and the corresponding MMLE t values.

The MMLE standard deviation σ is defined as:

$$\sigma = \{B + (B^2 - 4AC)^{.5}\} / 2(A(A-1))^{.5} \tag{3}$$

where

$$A = n - 2, \; B = L(X_{n-1} - X_2)$$

and

$$C = \sum_{i=2}^{n-1} X^2_i + (X^2_2 + X^2_{n-1}) - \theta\, \mu^2 \;, \tag{4}$$

where X_i is the deviation of mean excess returns for period i, (X_2 and X_{n-1} being the new lowest and highest deviations, respectively, after MMLE censoring), and μ,L and θ are given in Tiku, Tan and Balakrishnan [14 pp. 74-75]. Tiku [13] investigated the efficiencies of MMLE's mean and variance for location and scale parameters of symmetric non-normal distributions. He found that the MMLE parameters are more efficient than other more prominent robust estimators. Also, the MMLE mean/variance statistics are explicit and simple functions of sample observations and are easy to compute.

Chu, Bubnys, and Lee [2] used simulation analysis to investigate the robustness of the MMLE for samples of daily stock returns. Their results show that the MMLE and traditional estimators yield similar estimates of stock market risk premium. However, the MMLE method produces a smaller variation over time because the censoring method reduces the sensitivity of the MMLE to extreme daily market returns. Results using these two different t value calculation methods are described in the next section.

Empirical Results

Selected results for the total sample of forty-three events are presented in Tables 2 and 3. Table 2 shows daily abnormal returns and corresponding t values for individual days -10 through +10 using the traditional and MMLE methods while Table 3 presents the same information for different cumulative time windows.

Table 2 shows that the daily abnormal return for day -1 is +2.01%. Traditional and MMLE t values are, respectively, 4.5940 and 4.3685, both significant at the .001 level. Test statistic values are also significant for both estimators in day 2 after the event. Interestingly the abnormal returns are not significant in day 0 or +1 after the event, nor are they of consequence during any other single day shown. The higher MMLE Variance estimate is reflected in MMLE t values, which are about 5 percent lower than the traditional t values.

Cumulative abnormal return results presented in Table 3 indicate that CARs are not significantly different from zero during the period from day -90 to two days before the event (t values are 1.3061 and 1.2417). The event apparently was not anticipated by the market.

There is a positive price response, however, for cumulative time windows starting at day -1. For the time window from -1 to +90 days, the event-related CARs are +17.64%, significant at the 0.001 level. Sample firms did well for approximately 90 trading days after the event. Other time windows starting at day -1 show positive CARs and significance levels at least at the 0.05 level. For the 4-day window, from -1 to +2, share prices increased by 3.5%, significant at the 0.001 level. These results suggest that the impact of real estate divestitures on stock prices was positive.

The effect of using the robust MMLE standard deviations was to reduce the test statistic values compared to the traditional approach. However, the t values were virtually the same. The MMLE standard deviation for the estimation period was 0.004605 (from Eq. (3)), about 5% larger than the traditional estimate of 0.004378. Nevertheless, use of the MMLE approach may be a correct response to one of Brown and Warner's [1] points about variance increases during the event period.

Table 1

Sample Firm Names, Industry Number, and Events

Firm Name	Industry Number	Event Date Month	Day	Year
U.S. Steel	2911	02	17	83
First Union Republic	6798	02	27	81
Oxford First	6150	05	28	80
San Diego Gas & Electric	4931	07	01	80
American Standard Inc.	3580	06	23	71
Newhall	6552	01	06	72
Buttes Gas & Oil	1311	01	03	79
Delmarva Power Company	4931	08	05	83
Fairchild Industries	3721	12	27	83
AT&T	4811	05	18	83
Arlen Corp.	6512	08	22	79
Citicorp	6025	07	05	83
Fluor	1600	06	29	83
Texas Pacific Light	6798	06	21	83
American Century	6199	05	17	83
Martin Marietta	3760	05	04	83
Koger Properties Inc.	6552	04	18	83
First City Properties	6552	04	05	83
Sears	5311	12	20	82
AMOCO	2911	04	20	82
Playboy	2721	03	25	82
H.F. Ahmanson	6120	11	05	81
Pearce Urstadt	6199	03	19	81
U.S. Home Corp.	6552	01	09	81
Del E. Webb	1540	05	31	83
Western Union	4890	09	25	81
City Investing	6199	10	23	80
Loews	6199	03	14	83
Oxford First	6150	08	29	79
Bay Financial	6513	05	16	83
First Union Republic	6798	02	10	83
Aetna Life Insurance	6312	12	31	82
Federal Realty Investment	6798	12	09	82
Aluminum Co. of America	3330	01	04	71
McGraw-Hill	2731	10	12	70
Holiday Inn	7011	01	06	71
Chrysler	3711	08	23	79
General Growth	6798	08	22	79
General Motors	3711	01	05	82
Horizon Corp.	6532	04	15	83
Arlen Corp.	1700	05	25	84
Dunlop	3000	11	26	84
Aetna Life Insurance	6312	11	13	84

Table 2

Abnormal Daily Returns and T Values for Traditional and MMLE Variance Estimators

		Traditional		MMLE	
Day	Abnormal Return	T Value	Signf[1] Level	T Value	Signf[1] Level
-10	0.0077	1.7616		1.6751	
-9	-0.0012	-0.2656		-0.2526	
-8	-0.0039	-0.8898		-0.8461	
-7	0.0026	0.5931		0.5640	
-6	-0.0044	-0.9944		-0.9456	
-5	0.0012	0.2642		0.2513	
-4	-0.0052	-1.1847		-1.1265	
-3	-0.0032	-0.7324		-0.6965	
-2	-0.0043	-0.9860		-0.9375	
-1	0.0201	4.5940	***	4.3685	***
0	0.0025	0.5778		0.5495	
1	-0.0007	-0.1649		-0.1568	
2	0.0131	2.9958	***	2.8487	***
3	-0.0070	-1.5996		-1.5211	
4	0.0003	0.0605		0.0576	
5	-0.0031	-0.7178		-0.6826	
6	0.0061	1.3822		1.3143	
7	0.0009	0.2113		0.2009	
8	0.0020	0.4488		0.4267	
9	-0.0007	-0.1590		-0.1512	
10	-0.0015	-0.3410		-0.3242	

[1]Significance levels:
* = 0.05; ** = 0.01; *** = .001

Conclusions

The main question addressed in this study is whether or not the divestiture of substantial real estate assets by publicly traded firms has a significant impact on shareholder value. Forty-three divestitures over a fourteen year period are analyzed using event study methodology.

The results show that shareholder wealth increases by economically and statistically significant amounts. In a four-day period surrounding the event date, for example, the event-related shareholder wealth increase was 3.5%, significant at the 0.001 level. Although no definitive conclusions regarding real estate market efficiency or variance estimator improvement can be reached, the results do provide some insight into effects ofreal estate divestitures.

Table 3

Cumulative Abnormal Returns and T Values for Traditional and MMLE Variance Estimators

Cumulative Time-Window In Days	Cumulative Abnormal Returns	Traditional T Value	Traditional Signf[1] Level	MMLE T Value	MMLE Signf[1] Level
-90 to -2	0.0539	1.3061		1.2417	
-1 to +90	0.1764	4.1998	***	3.9927	***
-1 to 0	0.0226	3.6575	***	3.4772	***
-1 to +1	0.0219	2.8911	**	2.7486	**
-1 to +2	0.0350	4.0018	***	3.8046	***
-1 to +3	0.0280	2.8639	***	2.7227	***
-1 to +8	0.0341	2.4631	*	2.3417	*

[1]Significance levels:
* = 0.05; ** = 0.01; *** = .001

While results in this study strictly hold for the sample used and the time period analyzed, management's ability to dispose of property at relatively favorable prices increased total wealth of shareholders. The question of presumably higher real estate project values to the buyer than to the seller, while interesting, is beyond the scope of this research. It can be the focus of further research.

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