THE JOURNAL OF FINANCE • VOL. XXXIX, NO. 2 • JUNE 1984

Investigating the Valuation Effects of Announcements of Voluntary Corporate Selloffs

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ABSTRACT

While there has been an abundance of empirical research on the subject of mergers and acquisitions, little research exists on a closely related topic—voluntary corporate selloffs. This study examines the effect on shareholder wealth of the announcement by management of an investment decision to voluntarily sell part of its operations to another firm. Positive abnormal returns are found to occur on the announcement date. However, it is found that such selloffs generally occur after a period of abnormally negative returns, suggesting the announcement is preceded by the release of negative information about the firm.

THE ABUNDANCE OF EMPIRICAL RESEARCH on the subject of mergers and acquisitions in the U.S. economy during the past ten years suggests a high level of interest in the study of corporate growth and development.[1] However, no such abundance of research exists on a closely related topic—that of corporate divestitures. For the purpose of this study, divestitures are categorized as either selloffs or spinoffs. Selloffs are defined as the selling of some of the assets of a parent firm, such as a subsidiary, division, or product line, to another firm. Payment is generally in the form of cash and securities, where the latter generally consists of liabilities of the purchaser, and is not (at least initially) distributed to the stockholders. Spinoffs, in comparison, involve the deposition of a subsidiary of the parent firm and occur "... when a company distributes all of the common shares it owns in a controlled subsidiary to its existing shareholders" [23, p. 1].

Divestitures may occur voluntarily or involuntarily. Involuntary divestitures, whether selloffs or spinoffs, are typically due to a governmental antitrust ruling issued by either the Federal Trade Commission or the U.S. Department of Justice in connection with a violation of Section 7 of the Clayton Act.[2] Voluntary divestitures can be viewed as the result of decisions willingly made by management for the benefit of the stockholders of the parent firm (hereafter simply

* University of Minnesota, University of Minnesota, and Jostens, Inc., respectively. We wish to thank Kevin Hunter for his assistance in data collection and the participants in finance workshops at the University of North Carolina and the University of Missouri for their helpful comments on an earlier version of this paper. The authors have benefited from discussions on this topic with Timothy Nantell and John McConnell. This research was supported by a McKnight Research Grant from the School of Management of the University of Minnesota.

[1] A review of this literature is presented in Copeland and Weston [11, Ch. 17–18] and Jensen and Ruback [18].

[2] Section 7 of the Clayton Act prohibits the acquisition of the stock of a competing firm if the effect of the acquisition is to substantially reduce competition. Under the Act, previously consummated acquisitions can be the subject of divestiture orders.

referred to as the firm). Voluntary selloffs can be viewed as the result of a positive-net-present-value investment decision and voluntary spinoffs can be viewed as a bondholders-to-stockholders wealth transfer decision [14]. Other motivations for spinoffs include eliminating "negative synergies" (i.e., realizing favorable cash flow consequences arising from the spinoff due to changes in, for example, labor contracts, tax status, or price regulation) and expanding the opportunity set of securities available to investors [14, 27]. For either kind of voluntary divestiture, the announcement of such a decision should result, *ceteris paribus*, in an upward movement in the price of the common stock of the firm.

This paper investigates the announcement effect on the common stock returns of a sample of firms that have made voluntary selloffs.[3] Positive abnormal returns are found to occur on the announcement date of a voluntary selloff. However, it is found that such selloffs generally occur after a period of abnormally negative returns, suggesting that voluntary selloffs typically take place after negative information about the firm has been revealed.

Section I presents a brief review of the Mean Adjusted Returns technique. Sections II and III describe the valuation hypotheses to be investigated and the sample that is employed in the investigation, respectively, while Section IV presents the study's results. The conclusions of the study are presented in Section V.

I. Use of the Mean Adjusted Returns Technique in Event Studies

A. Estimation of Residuals and Statistical Tests

In event studies the typical methodology utilized has been some form of residual analysis. Brown and Warner [8, 9] found that, in the absence of clustering of event dates, the Mean Adjusted Returns technique detected abnormal performance at least as often as other frequently employed techniques.[4,5] The Mean Adjusted Returns technique assumes that the expected return for a security is constant, but can differ across any set of N firms. The *ex ante* return of security i in period t can be characterized as:

$$\tilde{R}_{it} = \bar{R}_i + \tilde{\epsilon}_{it} \qquad i = 1, \cdots, N \tag{1}$$

where $\bar{R}_i$ is the expected return and $\tilde{\epsilon}_{it}$ is the residual (or abnormal) return of

[3] For an in-depth investigation of involuntary corporate divestitures, see Eckbo [12], Stillman [29], and Weir [30].

[4] Brown and Warner cite clustering of announcement dates as a potential problem with the Mean Adjusted Returns technique. Examination of the announcement dates indicates that this problem does not exist in the present study.

[5] In an earlier study, Brenner [6] examined the effect of model misspecification on the calculation of residual returns. While Brown and Warner's [8, 9] studies suggest model misspecification is not a problem when the Mean Adjusted Returns technique is used to calculate residual returns, a control sample can be used to investigate the possibility that it is a problem. This control sample should match the test sample in terms of numbers of firms (actually, the control could contain a multiple of the number of test sample firms or even be a market index). Each control firm would be matched with a test sample firm in the sense that daily returns are collected for both firms over a calendar period surrounding the test sample firm's event of interest. If the average residuals of the control sample display random behavior, the effect of model misspecification can safely be ignored. However, if nonrandom behavior is observed, then the use of the Mean Adjusted Return technique to examine the test sample will be of questionable value.

security i in period t. The actual return in period t, R_{it}, can be expressed as the sum of an estimate of the expected return, $\hat{\bar{R}}_i$, and an estimate of the residual return, $\hat{\epsilon}_{it}$. Thus, if an estimate of $\bar{R}_i$ is available, $\hat{\epsilon}_{it}$ can be calculated as follows:

$$\hat{\epsilon}_{it} = R_{it} - \hat{\bar{R}}_i. \tag{2}$$

The issue of what approach should be used in estimating $\bar{R}_i$ is discussed later.

For each firm in an event-study sample, $2M + 1$ daily residual returns typically are estimated—from M days before the announcement date (usually defined as the date of the *Wall Street Journal* issue in which the event was announced) through M days after the announcement date. Hereafter this period is called the observation period. These residuals are averaged across companies in event time. Thus, a vector of $2M + 1$ average residuals (ARs) is generated:

$$\mathrm{AR}_t = (1/N) \sum_{i=1}^{N} \hat{\epsilon}_{it} \qquad t = -M, \cdots, +M \tag{3}$$

where N = the number of companies in the sample and t indexes days in event time. The average residuals are then summed over particular time intervals to obtain cumulative average residuals (CARs). If the beginning day, b, of the sum is $t = -M$ and the ending day, e, is incremented in steps of one from $t = -M$ to $t = +M$, the result is a vector of $2M + 1$ CARs:

$$\mathrm{CAR}_{b,e} = \sum_{t=b}^{e} \mathrm{AR}_t \qquad b = -M \quad \text{and} \quad e = -M, \cdots, +M. \tag{4}$$

CARs over any time interval from b to e can be tested using a simple t-test to see if they are statistically significantly different from zero. This technique has been supported by the simulation study of Brown and Warner. The procedure requires that the standard deviation of security i's returns, σ_i, be estimated in order that standardized residuals can be obtained. Letting $\hat{\sigma}_i$ denote the estimate of σ_i, standardized residuals are estimated as follows:

$$\hat{u}_{it} = (R_{it} - \hat{\bar{R}}_i)/\hat{\sigma}_i. \tag{5}$$

Standardized mean-adjusted residuals are employed rather than simple mean-adjusted residuals since t-statistics developed from the former (e.g., Equation (8)) tend to follow more closely a t distribution (see Brown and Warner [8, pp. 218, 219, and 250]). Average standardized residuals (ASRs) and cumulative average standardized residuals (CASRs) are calculated in a manner analogous to average residuals and cumulative average residuals, respectively:

$$\mathrm{ASR}_t = (1/N) \sum_{i=1}^{N} \hat{u}_{it} \qquad t = -M, \cdots, +M \tag{6}$$

$$\mathrm{CASR}_{b,e} = \sum_{t=b}^{e} \mathrm{ASR}_t \qquad -M \le b \le e \quad \text{and} \quad e = b, \cdots, +M. \tag{7}$$

Then, following Brown and Warner, the t-statistic (degrees of freedom $= N - 1$) used to test the significance of a particular CASR can be calculated as:

$$t = \mathrm{CASR}_{b,e}[N/(e - b + 1)]^{1/2}. \tag{8}$$

B. Estimating $\bar{R}_i$ and σ_i

Brown and Warner were concerned with detecting abnormal returns, using monthly data, in the interval from ten months before through ten months after a simulated announcement date. They utilized the 79 monthly returns immedi-

ately preceding month −10 in estimating $\bar{R}_i$ and σ_i. Similarly, when using daily data, they were concerned with detecting abnormal returns in the interval from five days before through five days after a simulated announcement date, and utilized the 239 daily returns immediately preceding day −5 in estimating $\bar{R}_i$ and σ_i. Hereafter, the period used to estimate $\bar{R}_i$ and σ_i is referred to as the estimation period, and the estimation procedure whereby estimates for $\bar{R}_i$ and σ_i are calculated using data from only the pre-event estimation period is referred to as the "pre-only" procedure. A second estimation procedure, used by Masulis [22], whereby estimates for $\bar{R}_i$ and σ_i are calculated after combining a pre-event and a post-event estimation period, is referred to as the "both-combined" procedure.

Problems may exist when standardized residuals are estimated using the Mean Adjusted Returns technique in conjunction with either the pre-only or both-combined estimation procedure. In particular, assume either or both $\bar{R}_i$ and σ_i shift to different levels on or near the announcement date.[6] In this case, it can be shown that if pre-event estimates of $\bar{R}_i$ and σ_i are used in the standardized-residual estimator (see Equation (5)), then it is an unbiased estimator of pre-event standardized residuals, but a biased estimator of post-event standardized residuals. Furthermore, pooling pre- and post-event estimation periods into one estimation period will yield a standardized-residual estimator that is biased with respect to both pre- and post-event standardized residuals. Thus, both the pre-only and both-combined approaches to estimating residuals will yield a biased residual pattern.

The bias problems described above can be avoided if two estimation periods are used in calculating two standardized-residual estimators. A pre-event estimation period can be used to calculate $\hat{u}_{it}$, an unbiased estimator of pre-event standardized residuals; a post-event estimation period can be used to calculate $\hat{u}^*_{it}$, an unbiased estimator of post-event standardized residuals. The resulting pattern of residuals will be free of the bias caused by using inappropriate estimation periods in calculating standardized-residual estimates. This approach for calculating residuals is referred to as the "both-but-separate" procedure, since it uses pre- and post-event estimation periods, but separately, in computing pre- and post-event standardized residuals.

In the case of a selloff, firm characteristics change following the announcement. Accordingly, it is likely that model parameters will also change. Therefore, *a priori*, the both-but-separate procedure is more appropriate than either the pre-only or both-combined procedure.

II. Valuation Hypotheses for Voluntary Corporate Divestitures

A. Comparing Selloffs and Spinoffs

Voluntary corporate selloffs can be viewed as the result of an investment decision by management. When such a decision is made, it is reasonable to

[6] It is likely that the true nature of the nonstationarity in the parameters is more complex than this (for example, see Perry [26]). However, the assumption that either or both of the parameters shift to different levels on or near the announcement date is felt to be more appropriate than the assumption of stationarity. Bar-Yosef and Brown [4], Brenner [6], and Larcker et al. [20], among others, have considered the effects on residual analysis of nonstationarity in the return-generating process.

assume it is because the decision has a positive net present value (NPV) and thus is motivated by its prospects for wealth creation. Accordingly, the announcement of a selloff should cause a positive change in investors' beliefs about the future of the firm and be reflected in an upward movement in the price of the firm's common stock, *ceteris paribus.*

In voluntary corporate spinoffs, management makes a decision to disburse the common stock of a subsidiary to the stockholders of the parent firm. As Galai and Masulis [14] have noted, this may create a wealth transfer from the firm's bondholders to the firm's stockholders since the latter have "stolen away" part of the collateral of the former. Accordingly, the announcement of such a spinoff should be reflected in an upward movement in the price of the firm's common stock, *ceteris paribus.* Furthermore, the magnitude of this upward movement should be positively related to both the size of the spinoff and the amount of financial leverage of the parent firm.[7] A second possible motive for spinoffs, referred to by Miles and Rosenfeld [23] and discussed in detail by Hakansson [17], is that such a spinoff will generally increase the opportunity set of securities available to investors and thereby benefit the initial investors. A third possible motive for spinoffs, discussed by Miles and Rosenfeld, is the desire to remove "negative synergies." For example, by spinning off a subsidiary a firm can rearrange its labor contracts, tax status, and/or its degree of price regulation [27]. In comparing voluntary corporate selloffs with voluntary corporate spinoffs, it should be noted that, while both of these decisions are made for the benefit of the stockholders of the parent firm, the motivation for these decisions may be distinctly different.

Previous empirical tests of voluntary corporate divestitures and voluntary corporate spinoffs have been conducted by Boudreaux [5], Miles and Rosenfeld [23], and Schipper and Smith [27]. All of these studies hypothesize that shareholder wealth should increase with the announcement of such divestitures and spinoffs. Using monthly data, Boudreaux analyzed the common stock of 138 firms that made voluntary divestitures in the period 1965–1970. However, he apparently did not distinguish between selloffs and spinoffs, and did not perform significance tests in analyzing the behavior of stock returns. He found that over the period from three months before the announcement to one month after the announcement there "... was an unusually positive price movement in a firm's common stock ..." [5, p. 621].

Miles and Rosenfeld, using daily data, analyzed 55 voluntary spinoffs that occurred in the period 1963–1980. Like Boudreaux, they found that there were excess positive returns on and around the announcement date. Furthermore, these returns were statistically significant and the returns were greater for large spinoffs than for small spinoffs. Schipper and Smith, also using daily data, analyzed 91 voluntary spinoffs that occurred in the period 1962–1981, and observed announcement effects quite similar to those observed by Miles and Rosenfeld. Since Miles and Rosenfeld and Schipper and Smith only examined spinoffs and Boudreaux did not distinguish between selloffs and spinoffs, the

[7] Schipper and Smith [27] argue that the contractual arrangements of bondholders make this argument irrelevant, since these arrangements predate the spinoff and thus generally contain protective covenants regarding divestitures of any sort.

valuation effects of voluntary corporate selloffs have yet to be unambiguously examined.

B. The Primary and Secondary Hypotheses

The primary hypothesis to be examined in this study is that, in the case of voluntary corporate selloffs, the stock price of the firm will experience a positive abnormal movement on the date of the announcement of the selloff. Since Fama [13] and others have suggested that stock markets are efficient (at least in the semistrong form), the price reaction to the announcement should occur on the day the announcement is made. Accordingly, a secondary hypothesis is that no abnormal returns will occur either before or after the announcement date.

The primary and secondary hypotheses are based on, among others, a critical assumption—other information released shortly before or concurrently with the selloff announcement is generally not expected to have a systematic effect on the firm's stock price. As will be shown next, this assumption is tenuous and, if relaxed, would lead to different primary and secondary hypotheses.

Recent articles in the financial literature (e.g., see [2, 3, 10, 15, 21, 25, 31]) suggest that there are at least three motives for selloffs, including the following: (1) firms seek to sell nonprofitable ventures, (2) firms seek to concentrate on other parts of their businesses by becoming less diverse, or (3) firms seek to generate cash needed for other parts of the firm. All of these motives are associated with potentially unfavorable information. For example, selling nonprofitable ventures suggests management overestimated the cash flow stream such a venture would generate. Thus, an additional piece of information may be released on or before the date of the selloff announcement. This piece of information, management's information and perceptions regarding future cash flows of the firm, should result in an abnormal downward movement in stock prices, *ceteris paribus*. For example, at a point in time the public may perceive certain assets of the firm as being capable of generating a cash flow stream in the future of a magnitude larger than that perceived by management, which possesses more timely information. When management's information is conveyed to the public, the perceptions of the public and management will be brought in line, resulting in a downward movement in stock prices.[8] This is in contrast to the upward movement that should result from the information associated with the selloff announcement itself.

These two pieces of information, which can be viewed as "good news" and "bad news," may be released either sequentially or simultaneously. By the very nature of the information, it is unlikely the "good news" will be released before the "bad news." Accordingly, if the information is released sequentially—"bad news" then "good news"—the firm should experience negative abnormal returns when the "bad news" is released, followed by a period of normal returns and then positive abnormal returns when the "good news" is released. If both the "good news" and

[8] If this second piece of information is completely revealed at one point in time, then there would be a resulting one-shot abnormal negative return in an efficient market. If instead this information is gradually revealed over time, then a sequence of abnormal negative returns would occur. The explanation to follow is consistent with either firm.

"bad news" are released simultaneously, the net effect on returns is unknown.

A sample of firms that have announced selloffs may include some firms where these two pieces of information were released sequentially and some firms where they were released simultaneously. Remembering that residual analysis depicts what happens on average and not to each firm individually, under this scenario the cumulative average residuals would be observed to decline prior to the announcement date. The pattern on the announcement date would be unknown and the pattern thereafter should be relatively flat. Thus, the primary and secondary valuation hypotheses are different after relaxing the assumption that other information released shortly before or concurrently with the divestiture announcement is not expected to have a systematic effect on the firm's stock price.

C. Statistical Tests of the Hypotheses

The hypotheses previously described will be examined via tests of the cumulative average standardized residual returns, where the returns are calculated using the both-but-separate estimation procedure.[9] For purposes of comparison, the primary and secondary hypotheses will also be examined using the pre-only and both-combined estimation procedures.[10] First, a one-sided upper-tailed t-test will be employed to test the primary hypothesis that positive abnormal returns will be observed on the announcement date. Second, a two-sided t-test will be employed to examine the significance of the CASR calculated over the entire observation period, excluding the announcement date. Third, two-sided t-tests will be employed to examine the significance of the pre-event CASR and the

[9] In order to verify the appropriateness of employing the both-but-separate estimation procedure, tests for parameter shifts that occurred at or near the selloff announcement date were conducted. For each firm in the sample, the returns from a pre-event estimation period consisting of 120 daily returns from $t = -150$ through $t = -31$ were compared with a post-event estimation period consisting of 120 daily returns from $t = +31$ through $t = +150$. The procedure was repeated for the control sample (described in footnote 11) in order to see if any nonstationarity detected in the test sample was due to the selloff. First, an F-test was conducted to see if the standard deviations were different in the two estimation periods. Second, a t-test (assuming unequal standard deviations) was conducted to see if the means were different in the two estimation periods. All these tests are two-sided with the null hypothesis being no change in the parameter under investigation. In the test sample, 27 firms had nonstationary standard deviations, but only 4 had nonstationary mean returns at the 0.05 level. In the control sample, 28 firms had nonstationary standard deviations, but only 3 had nonstationary mean returns. This suggests that the selloff announcement had little relative impact on the means and standard deviations. Nevertheless, the differences observed in σ_i suggest that the both-but-separate estimation procedure be used for calculating standardized residual returns for each firm.

[10] In utilizing the both-combined procedure, estimates for $\bar{R}_i$ and σ_i were calculated after combining both pre- and post-event estimation periods (i.e., the data from $t = -150$ through $t = -31$ were combined with the data from $t = +31$ through $t = +150$). In utilizing the pre-only procedure, estimates for $\bar{R}_i$ and σ_i were calculated using only the pre-event estimation period (i.e., the data from $t = -150$ through $t = -31$).

A "post-only" procedure similar to that employed by Brenner [7] was also utilized in this study. In doing so estimates for $\bar{R}_i$ and σ_i were calculated using only the post-event estimation period (i.e., the data from $t = +31$ through $t = +150$). The results were predictable, given the results from the other estimation procedures and will not be discussed.

post-event CASR. The second and third tests are associated with the secondary hypothesis and thereby provide information about the behavior of firms' stock prices surrounding the announcement date of their selloffs.

III. Sample

A. Overall Sample

A sample of 53 selloffs, that were announced in the period 1964–1973, was used in this study. The announcement must have appeared in the *Wall Street Journal* and must have been the first announcement in regard to the selloff. Typically, the announcement was one where the parent firm either "agreed to sell" or "agreed in principle" with a potential purchaser. Selloffs where there were previous announcements of "looking for buyers" or "negotiations begun" were excluded. The parent firm (the seller) had to be continuously listed on the New York Stock Exchange for 301 days centered on the announcement date, and no announcements of other selloffs could have occurred within nine months of the announcement date. For each firm in this sample, called the test sample, 301 daily returns centered on the announcement date were taken from the CRSP tapes.[11]

B. Subsample

In a recent study of corporate mergers, Schipper and Thompson [28] differentiated between specific merger events and programs of acquisition activity in examining the value of the stock of acquiring firms. The motivation for their study was the belief that, in general, the announcement of an acquisition program is the time when changes in the value of an acquiring firm should take place, rather than when the announcements of subsequent specific mergers are made. While their empirical results support this hypothesis, conflicting empirical results have been reported by Asquith et al. [1].

An argument similar to Schipper and Thompson can be made in regard to selloffs. A firm may embark on a selloff program, and the impact of such a program should generally be felt when the program is announced, rather than when subsequent specific selloffs take place. Accordingly, the test sample of 53 firms was scrutinized (using the *Wall Street Journal*) to see if there were other selloffs announced over the period 1964–1973. Firms that had other announcements of selloffs were removed, resulting in a subsample of 39 firms. This subsample can be viewed as consisting of firms that have not embarked on a

[11] For comparison purposes a second sample of 53 firms, called the control sample, was drawn. This sample is used to examine the issue of model misspecification as previously discussed in footnote 5. The firms in the control sample were arbitrarily selected by generally choosing the next firm listed on the CRSP tapes after each test firm. These control firms were screened to be sure they did not announce a selloff over a time period comparable to the test sample. Each firm in the control sample was paired with a firm in the test sample. For each control firm, 301 daily returns were taken, being centered on the day corresponding to the announcement date of its companion firm in the test sample. The control sample results are described in footnote 14.

selloff program. Residual analysis was then applied to this subsample in order to see if it was notably different from the overall sample. Notable differences, if observed, would suggest that further analysis, in the spirit of Schipper and Thompson and Asquith et al., is warranted.

IV. Results

A. Sample Results

Table I displays the cumulative average residuals for the 53 firms in the test sample using the three procedures for estimating $\bar{R}_i$ and σ_i. Over the observation period from $t = -30$ through $t = +30$ a general decline in the CARs can be

Table I

Cumulative Average Residual Returns of Voluntary Corporate Selloffs

	Overall Sample ($N = 53$)			Subsample ($N = 39$)
	Estimation Procedure			
Day	Both-but-Separate	Both-Combined	Pre-Only	Both-but-Separate
−30	−0.0014	−0.0013	−0.0014	−0.0012
−25	−0.0099	−0.0093	−0.0099	−0.0080
−20	−0.0127	−0.0116	−0.0127	−0.0149
−15	−0.0049	−0.0034	−0.0049	−0.0197
−10	−0.0136	−0.0116	−0.0136	−0.0325
−9	−0.0143	−0.0123	−0.0143	−0.0329
−8	−0.0175	−0.0153	−0.0175	−0.0330
−7	−0.0226	−0.0203	−0.0226	−0.0403
−6	−0.0230	−0.0206	−0.0230	−0.0407
−5	−0.0219	−0.0194	−0.0219	−0.0373
−4	−0.0266	−0.0240	−0.0266	−0.0418
−3	−0.0276	−0.0249	−0.0276	−0.0433
−2	−0.0254	−0.0226	−0.0254	−0.0425
−1	−0.0238	−0.0210	−0.0238	−0.0430
0	−0.0237	−0.0207	−0.0237	−0.0428
+1	−0.0220	−0.0191	−0.0222	−0.0410
+2	−0.0221	−0.0193	−0.0225	−0.0437
+3	−0.0207	−0.0181	−0.0213	−0.0432
+4	−0.0193	−0.0167	−0.0201	−0.0399
+5	−0.0190	−0.0165	−0.0200	−0.0395
+6	−0.0220	−0.0196	−0.0232	−0.0434
+7	−0.0207	−0.0184	−0.0221	−0.0440
+8	−0.0216	−0.0194	−0.0232	−0.0460
+9	−0.0224	−0.0203	−0.0241	−0.0472
+10	−0.0261	−0.0240	−0.0280	−0.0509
+15	−0.0384	−0.0369	−0.0414	−0.0582
+20	−0.0366	−0.0355	−0.0404	−0.0562
+25	−0.0501	−0.0495	−0.0549	−0.0748
+30	−0.0485	−0.0484	−0.0542	−0.0707

detected under all three estimation procedures.[12] Generally speaking, the pattern and magnitude of the CARs are similar regardless of the estimation procedure used. The decline is most evident when the pre-only procedure was used. This is not surprising, as the overall average daily return per firm in the period $t = -150$ through $t = -31$ was 0.00038, while the comparable value for $t = +31$ through $t = +150$ was 0.00019. From Equation (2) it can be seen that the larger $\hat{\bar{R}}_i$ is, the more negative $\hat{\epsilon}_{it}$ will be. Accordingly, since the $\hat{\bar{R}}_i$ obtained from the pre-event estimation period tended, on average, to be the larger, the observation that the most noticeable decline was associated with the pre-only procedure was expected.

Table II presents the results of the t-tests.[13] Since the date $t = 0$ is the date the *Wall Street Journal* published the announcement of the selloff, it is impossible to tell if the firm actually made the announcement before or after the close of trading on the New York Stock Exchange the previous day. Thus, the announcement effect could occur on either day $t = -1$ or day $t = 0$. As can be seen in Table II, the CASR over this two-day period is not statistically significant, regardless of the estimation procedure utilized. However, both the CAR and CASR for this period are positive. That the CASR is not statistically significant may be due to the relatively low power of the Mean-Adjusted-Returns-based t-test for small positive abnormal returns (see Brown and Warner [9]). To further examine the event-related abnormal returns, residuals were calculated as deviations from the CRSP equally-weighted index (i.e., $R_{it} - R_{mt}$) and the resulting CASR, estimated using the both-but-separate procedure, was tested as above. This approach is known as the Market Adjusted Returns technique and is slightly more powerful than the Mean Adjusted Returns technique (see Brown and Warner [9]). As can be seen in Table II, the CASR over the two-day announcement period is statistically significant at the 0.0715 level. Given this result and the fact that both the Mean Adjusted Returns technique and the Market Adjusted Returns technique yield positive sets of CASRs and CARs, the data can be interpreted as supporting the hypothesis that there is a positive abnormal stock price movement associated with the announcement of a selloff.

The CASR from $t = -30$ to $t = +30$, excluding $t = -1$ and $t = 0$, and its associated t-statistic are hereafter referred to as the overall CASR and overall t-statistic, respectively. They are displayed in Table II for all three estimation procedures. Regardless of the estimation procedure used, the decline in the test CASRs is statistically significant at approximately the 0.05 level.[14]

The pre-event CASR, measured for the period $t = -30$ through $t = -2$, is

[12] Actually, the residuals from roughly $t = -30$ to $t = -15$ and from roughly $t = +23$ to $t = +30$ appear to exhibit random behavior. Thus, the problem of contaminated data in the estimation periods is not particularly worrisome here.

[13] Some of the cases displayed in Table II indicate a t-statistic with sign opposite that of the cumulative average residual. This can occur since the t-test is performed on the cumulative average standardized residual, not the cumulative average residual.

[14] The control sample returns exhibited generally random behavior throughout the observation period. The t-tests of the control sample CASRs were not statistically significant for any of the three estimation procedures over any of the intervals examined. This confirms the usefulness of the Mean Adjusted Returns technique and suggests that the negative abnormal returns of the test sample were associated with the selloff announcements and were not the result of model misspecification.

Table II

Significance Tests of Cumulative Average Standardized Residuals of Voluntary Corporate Selloffs

Interval and Estimation Procedure[a]	CASR[b]	t-statistic	p-value[c]
A. $t = -1$ to $t = 0$:			
Both-but-separate[d]			
Mean Adjusted Returns	+0.1320	+0.6795	0.2499
	(+0.0017)		
Market Adjusted Returns	+0.2888	+1.4868	0.0715
	(+0.0040)		
Both-combined	+0.0842	+0.4334	0.3333
	(+0.0019)		
B. $t = -30$ to $t = +30$, excluding $t = -1$ and $t = 0$:			
Both-but-separate	−2.1099	−1.9997	0.0508
	(−0.0501)		
Both-combined	−2.0948	−1.9854	0.0524
	(−0.0502)		
Pre-only	−2.7033	−2.5622	0.0133
	(−0.0559)		
C. $t = -30$ to $t = -2$:			
Both-but-separate[a]	−1.2387	−1.6746	0.1000
	(−0.0254)		
Both-combined	−0.9252	−1.2508	0.2166
	(−0.0226)		
D. $t = +1$ to $t = +30$:			
Both-but-separate	−0.8712	−1.1580	0.2522
	(−0.0247)		
Both-combined	−1.1696	−1.5546	0.1261
	(−0.0276)		
Pre-only	−1.4646	−1.9467	0.0570
	(−0.0305)		

[a] Except where noted, all tests involve the Mean Ajusted Returns technique.

[b] Cumulative Average Residuals are shown in parentheses.

[c] The test associated with interval A is one-sided; the tests associated with intervals B, C, and D are two-sided.

[d] Over this interval the both-but-separate and pre-only procedures produce identical values.

displayed in Table II for only the both-but-separate and both-combined procedures (the pre-only procedure is identical to the both-but-separate procedure for this part of the observation period, and therefore is not displayed in Table II for this part of the observation period). The table shows that the decline in the CASRs for the test sample over this period is significant at the 0.1000 level for the both-but-separate procedure, but only at the 0.2166 level for the both-combined procedure. Again, this is not surprising since, on average, a smaller estimate of $\hat{\bar{R}}_i$ was used in the latter estimation procedure.

The post-event CASRs, measured for the period $t = +1$ through $t = +30$, is displayed in Table II for all three estimation procedures. As expected, the largest decline in the test sample was associated with the pre-only procedure, since this

Table III

Significance Tests of Cumulative Average Standardized Residuals for Subsample[a]

Interval[b]	CASR[c]	t-statistic	p-value[d]
A. $t = -1$ to $t = 0$:			
Mean Adjusted Returns	+0.0499	+0.2204	0.4134
	(−0.0003)		
Market Adjusted Returns	+0.2440	+1.0775	0.1440
	(+0.0031)		
B. $t = -30$ to $t = 30$, excluding $t = -1$ and $t = 0$:	−2.9690	−2.4139	0.0207
	(−0.0704)		
C. $t = -30$ to $t = -2$:	−1.7337	−2.0105	0.0515
	(−0.0425)		
D. $t = +1$ to $t = +30$:	−1.2353	−1.4085	0.1671
	(−0.0279)		

[a] The both-but-separate procedure was used.

[b] Except where noted, all tests involve the Mean Adjusted Returns technique.

[c] Cumulative Average Residuals are shown in parentheses.

[d] The test associated with interval A is one-sided; the tests associated with intervals B, C, and D are two-sided.

method utilized, on average, the largest estimate for $\hat{\hat{R}}_i$ in computing post-event residuals. This decline was significant at the 0.0570 level, whereas the both-but-separate procedure, using the smallest estimate of $\hat{\hat{R}}_i$, yielded a much larger p-value, indicating the decline to be insignificant. The p-value of the both-combined procedure fell between those of the other two procedures and indicated the decline to be insignificant.

Since the t-tests yield different results in both the pre-event and post-event observation periods, the question arises as to which estimation procedure to trust.[15] It has been argued here that the both-but-separate procedure should yield better results, since there is evidence of parameter nonstationarity. Accordingly, it can be concluded that the pre-event decline is significant while the post-event decline is not.

B. Subsample Results

Table I displays the cumulative average residuals for the subsample of 39 firms in the test sample. The both-but-separate procedure was utilized in the analysis of the subsample. The decline in the residuals over the observation period (excluding $t = -1$ and $t = 0$) is slightly greater for the subsample than the overall sample, equaling 7.04% for the former and 5.01% for the latter. Also, in both the pre-event observation period ($t = -30$ through $t = -2$) and the post-event observation period ($t = +1$ through $t = +30$) the decline is slightly greater for the subsample. In the announcement period ($t = -1$ through $t = 0$) the residuals are slightly smaller for the subsample.

[15] In this situation, it is tempting to expand the analysis by comparing the t-test results associated with these procedures over "interesting" subintervals of the pre-event and post-event observation periods. However, to do so involves what is known as "data snooping" and could yield misleading conclusions about the estimation procedures. See Neter and Wasserman [24, pp. 472–73] for a discussion of data snooping.

Table III presents the significance tests for the subsample. The announcement period residuals are not significantly different from zero and the decline in the overall period residuals is statistically significant at the 0.0207 level. The pre-event decline is also significant and the post-event decline is still not significant at even the 0.15 level.

V. Conclusions

The results of this study can be summarized in three principal points. First, the announcement of a voluntary corporate selloff has a slightly positive impact on the stock returns of the firm. One explanation for this observation is that selloffs are sometimes announced simultaneously with other negative information about the firm, thereby muting the positive impact that the selloff should have by itself. An alternative explanation follows from the assumption that the market for selloffs is perfectly competitive. Schipper and Thompson [28] have noted that if the acquisitions market for mergers is perfectly competitive, the net present value to acquirers would be zero. The same would be true for sellers in a perfect market for selloffs. In such a situation, a selloff would typically have no notable impact on the firm's stock price. More realistically, the net present value of selloffs may typically be positive but relatively small in comparison to the present value of all the other cash flows of the firm, meaning that for valuation purposes it essentially can be viewed as equal to zero.[16]

Second, selloffs appear to be announced after a period of generally negative abnormal returns. This suggests that selloffs are sometimes announced after other negative information about the firm is released.

Third, in performing event studies using the Mean Adjusted Returns technique, it is recommended that the both-but-separate procedure for estimating the necessary parameters be utilized. In separate examinations of the pre-event and the post-event residuals for the sample of selloffs, the t-statistic was found to be sensitive to the estimation procedure utilized. However, it has been argued here that, *a priori*, more reliable test results can be obtained using the both-but-separate procedure.

The results of this study for voluntary corporate selloffs can be compared with those observed by Miles and Rosenfeld [23] and Schipper and Smith [27] in regard to voluntary corporate spinoffs. Like selloffs, the announcement of such spinoffs was found in both studies to result in positive abnormal returns. However, in contrast to selloffs, Miles and Rosenfeld observed that spinoffs took place after a period of generally positive abnormal returns, suggesting they occur after other favorable information about the firm has been released. Thus, the net effect on shareholder wealth appears to be quite different for selloffs and spinoffs over the entire observation period. Future research comparing the financial

[16] An example of an exception to this assertion is the recent selloff by General Electric of its Utah International mining unit to an Australian firm for $2.4 billion. GE's average daily return for the 15 trading days preceding the *Wall Street Journal* announcement date (January 28, 1983) was −0.0001. The two-day announcement period return was 0.0730 (or 0.0365 per day), and the average daily return for the 15 trading days afterwards was 0.0028. It appears that, in this instance, the market has interpreted GE's selloff as having a large positive net present value. A potentially interesting avenue for future research would be to compare the valuation effects of large and small selloffs.

characteristics of firms announcing selloffs and spinoffs, perhaps in a manner analogous to Griffin and Sanvicente [16], is necessary in order to more fully examine this issue.

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