Impact of Mergers and Acquisitions on the Forest Products Industry:

An Event Study of Stock Market Returns

Bin Mei and Changyou Sun[1]

Abstract

The forest products industry in the U.S. has witnessed an unprecedented period of mergers and acquisitions (M&A) in the past decades. In this study, 57 major M&A events in the forest products industry were assessed by event analysis. By focusing on firm-level performance, financial data from the capital market were used to measure the impact of M&A events on the performance of firms. The abnormal returns implied capital market reacted positively to M&As in U.S. forest products industry as a whole, leading to a significant enhancement of the firms' market value. However, the acquiring firms experienced no significant response from the capital market. The results from cross-sectional regressions indicated that the position of a firm in the M&A event explained most of the variations of the cumulative abnormal return. The risk analyses for the acquiring firms in the selected 14 M&A events showed that the risk for most of them has experienced limited changes after the M&A events.

Keywords: abnormal return; Capital Asset Pricing Model; risk

[1] The authors are, respectively, Graduate Research Assistant and Assistant Professor, Department of Forestry, Mississippi State University, Box 9681, Mississippi State, MS 39762. The authors can be reached at csun@cfr.msstate.edu, (662) 325-727(phone), and 325-8726 (fax).

1. Introduction

Mergers and acquisitions (M&A) have been occurring frequently in the forest products industry over the last few years. M&A increased from 1995 to 1997, 26.9 to 36.9 percent based on an annual dollar increase (Diamond, et al. 1999). A widespread concern has been whether these changes of ownerships have improved their financial performance.

Event analysis (event study) is a standard methodology in financial economics to determine the impact of specific financial decisions on shareholder returns and expected firm profitability. The theoretical basis for the event analysis is based on the assumption that individual stock returns over time can be predicted to some degree. Researchers then observe the actual stock returns over the period of interest and compute the difference between the returns predicted and observed. Though stock returns are subject to some degree of "noise" or random statistical fluctuation, the event analysis is looking for returns that exceed this normal level of variation. If the difference is determined to be statistically different from zero, it may be concluded that the event under study did impact stock returns and reflect an investor reaction to the event (Wells 2004).

Event analysis methodology provides management researchers a powerful technique to explore the strength of the link between managerial actions and the creation of value for the firm (McWilliams and Siegel 1997). It has been applied to a variety of events such as corporate acquisitions (Knapp 1990), food safety issues (Salin and Hooker 2001), and forest policy and regulation (Zhang and Binkley 1995).

2. Methodology

2.1 Abnormal returns

To calculate the abnormal returns, first, it is necessary to evaluate the "normal" stock returns for those firms, had the event not occurred. Several methods are available for estimating returns, including mean-adjusted model, the market–adjusted model, and the market model. Because the market model incorporates a risk adjustment component to the estimate of returns, researchers usually rely on this model to refine their predicted returns over the event window in question. A market model assumes a stable linear relation between the market return for security *i* as follow,

(1) $$R_{it} = \alpha_i + \beta_i R_{mt} + \varepsilon_{it}$$

where R_{it} and R_{mt} are the rate of returns on security *i* and the market portfolio over the estimation window, respectively, and ε_{it} is the zero mean disturbance term. In this study value weighted S&P 500 Index is chosen as the proxy of the market portfolio.

Using estimation window (i.e., nonevent period) data (Figure 1), we get the estimate of the regression parameters of (1), i.e., $\hat{\alpha}$ and $\hat{\beta}$. Then, for a firm *i* and event window *t*, $t = T_1+1, \ldots, T_2$, the abnormal return is:

(2) $$AR_{it} = R_{it} - \hat{\alpha}_i - \hat{\beta}_i R_{mt}$$

Since the daily returns are in continuous form, for a individual stock *i* through the window period T_1 to T_2, the cumulative abnormal returns (CAR_{it}) can be constructed as,

(3) $$CAR_{it} = \sum_{t=T1}^{T2_t} AR_{it}$$

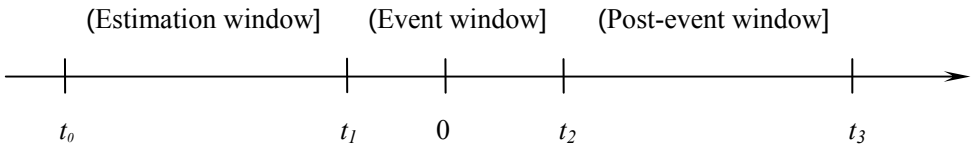

Figure 1. A comparison of estimation window, event window, and post-event window along a time line for event analysis
Source: MacKinlay (1997).

If the event had no impact on the returns for the security, then the expected value of CAR_{it} should be zero. When the estimation window is large (so that CAR_{it} has a normal distribution), the test statistic for the hypothesis that $CAR_{it} = 0$ is a familiar Student's *t*-statistic. The variance of CAR_{it} is generally assumed to be the same as that of the estimation window and asymptotically calculated as (MacKinlay 1997)

(4) $$Var(CAR_{it}) = (T_2 - T_1 + 1)\sigma^2_{\varepsilon_i}$$

where $T_2 - T_1 + 1$ is the total number of days in the event window.

As tests with one event are unlikely to be useful researchers then aggregate CAR_{it} across firms to obtain the average cumulative abnormal returns,

(5) $$\overline{CAR}_t = \frac{1}{N}\sum_{i=1}^{N} CAR_{it}$$ [2]

where N is the number of observations included in the sample. This aggregation assumes that there is no overlap in the event windows of the firms included in the aggregation, i.e., there is no clustering. With the assumption that $\overline{CAR}_t$ is asymptotically normally distributed, the variance of the average cumulative abnormal returns for the sample firms can be expressed as follows:

(6) $$Var(\overline{CAR}_t) = \frac{1}{N^2}\sum_{i=1}^{N} Var(CAR_{it})$$

Finally, the statistical significance of the average effect of an event on the market value of firms is tested by calculating the *z*-statistic as

(7) $$z = \frac{\overline{CAR}_t}{\sqrt{Var(\overline{CAR}_t)}} \sim N(0, 1)$$

This distributional result is asymptotic with respect to the number of securities and the length of the estimation window (Campbell, et al. 1997). Parametric tests and nonparametric tests are used to check the robustness of the conclusions (MacKinlay 1997). In this study, model (1) is estimated on a 300-day estimation window. Then, *CAR* are evaluated over four different event window, i.e., (-3, 3), (-7, 7), (-10, 10), and (-15, 15), respectively. The choices are consistent with prior studies of capital market responses (Lepetit, et al. 2004).

---

[2] Equation (5) is equivalent to $\overline{CAR}_t = \sum_{t=T1}^{T2} \overline{AR}_t$, since $\sum_{t=T1}^{T2} \overline{AR}_t = \sum_{t=T1}^{T2} \frac{1}{N}\sum_{i=1}^{N} AR_{it} = \frac{1}{N}\sum_{i=1}^{N}\sum_{t=T1}^{T2} AR_{it} = \frac{1}{N}\sum_{i=1}^{N} CAR_{it}$.

2.2 Cross-sectional regression

In cross-sectional regression, multiple factors are considered collectively. Insights can be gained by examining the association between the magnitude of the abnormal returns and the characteristics specific to the event observations. The basic approach is to run a cross-sectional regression of the abnormal returns on the characteristics of interest.

Given a sample of *N* abnormal return observations and *M* characteristics, the regression model is:

(8) $$CAR_j = \delta_0 + \delta_1 x_{1j} + ... + \delta_M x_{Mj} + \eta_j$$

where *x's* are factors specific to the event observations, $\delta's$ are coefficients correspondingly, and η_j is the mean zero error term.

By avoiding cluster when identifying M&A's, the η_j's are assumed to be cross-sectionally uncorrelated and homoskedastic, and inferences can be conducted using the usual OLS standard errors. In this study, the cumulative abnormal returns (CAR_{it}) for M&A's were regressed on the return of assets (ROA), the scale of the company (Scale) with a value equal to 1 if the total assets were larger than 100 million US dollars and 0 otherwise, the transaction size (SOT) as the natural logarithmic value of the ratio of the transaction cost divided by the total assets, and the status in M&A's (BS) with value 1 indicating the acquiring side, while 0 on the target side.

2.3 Risk analysis

Risk is the other side of the coin of market reaction to M&A's in forest products industry. Investors require higher expected returns in exchange for bearing risk. Statistical estimates of systematic risk (or the volatility of returns) before and after the events can evaluate M&A's impacts from another perspective.

Financial market measure of systematic risk is derived from the Capital Asset Pricing Model (CAPM). Using the CAPM, two regressions will be estimated for each firm: one before the M&A event and the other after the M&A event. A Chow test can be used to determine if there are statistically significant changes (Salin and Hooker 2001).

3. Data

M&A events in forest products industry were searched from major news service including PR Newswire, Business Newswire, the New York Times, Bizjournals and other major daily news outlets. Industry publications such as the *Pulp & Paper 2002 North American Fact Book* (Rudder 2002) were also used for reference. The date of event was defined as the first mention of the activity. Daily returns and S&P 500 index were collected from the Center for Research in Security Prices (*CRSP*). Total assets, return of assets were obtained from *COMPUSTAT* for each sample firm based on the fiscal year-end data preceding the event.

Initially a large number of M&A events were observed in the period between January 1, 1990, and December 31, 2004. According to the financial data availability several were dropped. In order to avoid clustering, another group of events that took place close in calendar with other events were also abandoned. Thus, the final sample comprised 57 events representing 50 unique participants, with 43 firms on the acquiring side and 41 firms on the target side[3] (table1). In cross-sectional regression, some observations were dropped due to no disclosure of the transaction cost. All the values of transactions in the sample exceed US$ 100 million. For risk analysis, 14 M&A events were chosen whose transaction costs are more than 1 billion US dollars. Risk 50, 100 and 150 days before and after the M&A event were compared respectively.

[3] Particular firms may be observed more than once in the 57 M&As, such as International Paper.

Table 1. The announcement dates, parties, and transaction payments for the major mergers and acquisitions in the U.S. forest products industry from 1990 to 2004

No.	Date	Acquiring side	Target side	Cost
1	3/1/1990	Georgia-Pacific	Great Northern Nekoosa	3.8
2	7/17/1995	Kimberly-Clark	Scott Paper	9.4
3	10/11/1995	Sappi Ltd	Scott Paper (S.D. Warren)	1.6
4	2/1/1996	International Paper	Federal Paper Board	3.6
5	2/28/1996	Weyerhaeuser	Cavenham Forest Industries	0.5
6	3/6/1996	R-H timber	IP Timberlands LTD	0.905
7	4/3/1996	Noranda Forest	Pentair (Pointe Paper)	0.2
8	5/1/1996	Willamette Industries	Cavenham Forest Industries	1.6
9	6/1/1996	Georgia-Pacific	Domtar of Canada	0.35
10	8/7/1996	Plum Creek	Riverwood International	0.54
11	10/1/1996	Mead	Boise Cascade	0.65
12	12/18/1996	Alliance Forest Product	Kimberly-Clark	0.6
13	5/5/1997	James River	Fort Howard	3.4
14	6/1/1997	St. Laurent Paperboard	Chesapeake (kraft mill & 4 box plants)	0.508
15	7/9/1997	Consolidated Papers	Repap Enterprises (coated paper mill)	0.674
16	7/18/1997	Rock-Tenn	Waldorf (two boxboard mills)	0.414
17	8/1/1997	Wausau Paper Mills	Mosinee Paper	0.442
18	1/30/1998	Plainwell	Pope & Talbot (tissue business)	0.147
19	3/23/1998	Donohue	Champion International (newsprint mills)	0.45
20	3/31/1998	Georgia-Pacific	CeCorr	0.282
21	4/9/1998	International Paper	Weston Paper and Manufacturing	0.232
22	4/29/1998	Bowater	Avenor	2.47
23	5/6/1998	Jefferson Smurfit	Stone Container	6.45
24	6/10/1998	Graphic Packaging	Fort James (boxboard mill & packaging)	0.83
25	6/18/1998	International Paper	Mead (Zellerbach distribution)	0.263
26	9/21/1998	Abitibi Consolidated	Stone Container (newsprint mill)	0.25
27	9/30/1998	Weyerhaeuser	Bowater (uncoated free-sheet mill)	0.52
28	2/13/1999	Chesapeake	Field Group	0.355
29	3/16/1999	International Paper	Union Camp	7.9
30	4/1/1999	Caraustar Industries	International Paper (boxboard mill)	0.108
31	4/27/1999	ACX Technologies Inc.	Fort James (paperboard packaging)	0.83
32	5/25/1999	Georgia-Pacific	Unisource Worldwide (paper distribution)	1.24

Table 1. The announcement dates, parties, and transaction payments for the major mergers and acquisitions in the U.S. forest products industry from 1990 to 2004 (continued)

No.	Date	Acquiring side	Target side	Cost
33	6/26/1999	Georgia-Pacific	Chesapeake (Wisconsin tissue mills)	0.73
34	7/1/1999	Weyerhaeuser	MacMillan Bloedel	2.45
35	8/18/1999	Sonoco Products	Graphic Packaging (flexible packaging)	0.105
36	8/24/1999	Rayonier	Smurfit-Stone Container (timberlands)	0.725
37	10/4/1999	Westvaco	Temple Inland (bleached board mill)	0.625
38	11/29/1999	Westvaco	Mebane Packaging	0.2
39	2/11/2000	Abitibi Consolidated	Donohue	4.9
40	2/22/2000	Stora Enso	Consolidated Papers	4.8
41	4/25/2000	International Paper	Champion International	9.6
42	7/18/2000	Plum Creek	Georgia-Pacific (Timber Co.)	4
43	8/30/2000	UPM Kymmene	Repap Enterprises	0.911
44	10/13/2000	Georgia-Pacific	Fort James	11
45	2/21/2001	Sweden's SCA	Georgia-Pacific (tissue division)	1.6
46	4/2/2001	Bowater	Alliance Forest Products	0.77
47	4/18/2001	FiberMark	Rexam Decorative Speciatis International	0.14
48	6/4/2001	Domtar	Georgia-Pacific (four paper mills)	1.65
49	7/5/2001	Premdor	Masonite	2.5
50	8/3/2001	Premdor	International Paper (wood panel division)	0.5
51	8/15/2001	Georgia-Pacific	Plum Creek Timber	4
52	8/29/2001	Westvaco	Mead	10
53	1/21/2002	Weyerhaeuser	Willamette Industries	7.8
54	5/13/2002	Sappi Ltd	Potlatch (coated papers business)	0.48
55	7/24/2002	Smurfit Stone	MeadWestvaco (container business)	0.375
56	8/14/2002	Bain Capital Inc	Georgia-Pacific (Unisource Worldwide)	0.825
57	4/21/2004	International Paper	Box USA	0.4

Unit: $ billion for transaction costs.
Source: Compiled by the authors from various publications.

4. Empirical Results

4.1 Results from abnormal returns

The $\overline{CAR_t}$ for the 84 observations as a group and the test for significance of the effect were presented in Table 2. The results indicated that the $\overline{CAR_t}$s to the firms involved in M&A announcements were positive and significant at the 5% level at the end of the 15-day event window. The $\overline{CAR_t}$s at the end of 21-day event window and 31-day event window were significantly positive at the 1% level as well. Thus, we should reject the null hypothesis that the aggregated abnormal return for the entire sample of firms during the event period equaled zero except for the 7-day event window. The sign tests were consistent with our results.

Table 2. The average cumulative abnormal returns for *N* observations as a group over an event window for the selected M&A events in the forest products industry from 1990 to 2004

Event window	Average cumulative abnormal returns	*z* statistic	*Sign test(θ)*
	All observations (*N* = 84)		
7 days: (-3, 3)	1.9%	1.19	0.87
15 days: (-7, 7)	5.2%	2.20[b]	2.62[a]
21 days: (-10, 10)	12.1%	4.36[a]	2.74[a]
31 days: (-15, 15)	17.9%	5.32[a]	3.93[a]
	Acquiring side (*N* = 43)		
7 days: (-3, 3)	1.0%	0.69	0.46
15 days: (-7, 7)	0.1%	0.03	0.15
21 days: (-10, 10)	0.2%	0.04	0.15
31 days: (-15, 15)	0.9%	0.16	0.15
	Target side (*N* = 41)		
7 days: (-3, 3)	2.9%	1.53	0.78
15 days: (-7, 7)	10.5%	3.83[a]	3.59[a]
21 days: (-10, 10)	24.6%	7.63[a]	4.53[a]
31 days: (-15, 15)	35.8%	9.14[a]	5.47[a]

Note: The *z* value reported is from the 2-tailed test; [a] significant at the 1% level; [b] significant at the 5% level.

For the 43 observations on the acquiring side as a sub-group, the $\overline{CAR_t}$s at the end of the event windows were slightly positive. However, none of the $\overline{CAR_t}$s from the four event windows was significantly different from zero at the 5% level. The sign tests showed the same results. We could not reject the null hypothesis that the aggregated abnormal return for the acquiring firms during the event period equaled zero. Our results were consistent with former studies about M&A (Dodd 1980; Halpern 1983; Choi and Russell 2004).

For the 41 observations on the target side as another sub-group, the $\overline{CAR_t}$ at the end of the event windows were significantly positive at 1% level except for the 7-day window. The sign tests showed similar results. We should reject the null hypothesis that the aggregated abnormal return for the target firms during the event period equaled zero. Our results were consistent with former studies about M&A (Halpern 1983).

Overall, capital market reacted positively to M&A in U.S. forest products industry as a whole, leading to a significant enhancement of the firms' market value. Considering the results of acquiring firms, the evidence appeared to be broadly consistent with value maximization strategies. First, in many of the M&A the acquiring firm had already had some share ownership of the target firm. Any gains from the merger may had already been reflected in the acquiring firm's stock price when the prior share ownership was obtained; hence non-positive gains in the current merger could still be consistent with value maximizing merger theories. Second, if the target firm was very small relative to the bidder, which was most the case in our study, the impact on the abnormal performance of the latter of a profitable merger may be swamped by random noise over the measurement period. Yet, target firms experienced positive response from the capital market during the period of M&A announcements in U.S. forest products industry. That was possibly because the target firms' shareholders had been given an enticement

to accept the acquisition, so they earned abnormal returns regardless of the motivation for the acquisition.

4.2 Results from cross-sectional regression

The performance of M&A transactions was a set of complex matrices that consisted of various factors. In implementing M&A transactions, there was no single important factor with respect to achieving the best performance. Rather, multiple factors in general were inter-correlated, and the existence of one factor may result in different outcomes. Thus, the outcomes obtained from the examination of several factors simultaneously will benefit future M&A leaders in the forest products industry.

Table 3 reported the OLS regression results for four event window CAR measurements. The status of the company in the M&A transaction was the factor that contributed most to explaining the variations of the CAR except for 7-day event window. This was consistent with previous abnormal return analysis. The negative sign proved our results in the analysis of the abnormal returns that the stock market responses more positively to the target firms than the acquiring firms. The coefficients of return of assets were negative for each event window, yet none of them was significantly different from zero. The relative transaction size was not significant except for 7-day event window. The coefficients of scale were positive for 7-day and 15-day event window, while negative for 21-day and 31-day event window, but not significant either.

Given the complication of these M&A events and the equity market, the model had a relatively good fit. For 7-day, 15-day, 21-day, and 31-day event windows, the R^2 ranged from 0.082 to 0.484, while the value around 0.10 was reported in previous studies (Asquith, et al. 1983). The *F*-statistics were also significant at the 5% level for 7-day event window and significant at the 1% level for the other three event windows.

4.3 Results from risk analysis

By comparing beta 50 days prior and after the M&A event, 2 out of the 14 observations in our study had experienced significant risk changes at the 5% level, and 3 significant at the

Table 3. Results from the cross-sectional regressions of cumulative abnormal returns on the characteristics of selected firms by different event windows

	7-day CAR		15-day CAR		21-day CAR		31-day CAR	
	Coeff.	*t*-value	Coeff.	*t*-value	Coeff.	*t*-value	Coeff.	*t*-value
Constant	-0.017	-0.55	0.110[a]	3.01	0.322[a]	6.79	0.412[a]	6.46
ROA	-0.001	-0.55	-0.001	-0.41	-0.002	-0.56	-0.005	-0.81
Ln (SOT)	0.014[a]	2.71	0.008	1.22	-0.010	-1.17	-0.009	-0.45
Scale	0.045	1.65	0.001	0.12	-0.063	-1.47	-0.041	-0.71
BS	-0.020	-0.99	-0.122[a]	-5.01	-0.264[a]	-8.38	-0.352[a]	-8.33
Adj. R^2	0.082		0.257		0.479		0.484	
F-statistic	2.83[b]		8.07[a]		19.82[a]		20.21[a]	
Obs. No.	83		83		83		83	

Note: [a] significant at the 1% level; [b] significant at the 5% level; [c] significant at the 10% level.

Table 4. A comparison of firms' risk and beta values before and after the M&A event using the Capital Asset Pricing Model and Chow test

Year	Acquiring firm	Days prior to event			Days after event		
		50	100	150	50	100	150
1995	Kimberly Clark	0.993	0.935	0.936	1.681	0.750	0.544
1996	International Paper	0.294	0.988	1.168	0.200	0.422	0.467
1997	James River	0.829	0.745	0.575	1.160	0.730	0.888
1998	Jefferson Smurfit	0.293	1.061	1.075	1.542[b]	1.505	1.400
1999	International Paper	1.000	0.284	0.617	-0.055	-0.291	0.074[b]
1999	Georgia Pacific	0.357	0.434	0.447	-1.431[c]	-0.249	0.127
2000	International Paper	1.013	0.973	0.900	0.024[c]	0.084[b]	0.199[b]
2000	Georgia Pacific	0.392	0.371	0.532	0.568	0.706	0.730
2000	Weyerhaeuser	0.358	0.379	0.469	0.201	0.460	0.345
2000	Plum Creek	0.035	0.225	0.236	0.179	0.123	0.247
2001	Georgia Pacific	0.612	0.726	0.770	1.357[b]	1.302[a]	1.266[c]
2001	Domtar	0.600	0.339	0.341	1.960	0.687	0.647
2002	Weyerhaeuser	0.821	1.113	1.045	0.915	0.823[b]	0.820
2002	Westvaco	0.736	0.812	0.721	1.418[c]	1.328[b]	1.196[b]

Note: [a] significant at the 1% level; [b] significant at the 5% level; [c] significant at the 10% level.

10% level. For 100 days prior and after M&A event, 3 out of 14 had risk changed significantly at the 5% level, and 1 significant at the 10% level. For 150 days prior and after the M&A event, also 3 out of 14 had risk changed significantly at the 5% level, and 1 significant at the 10% level (Table 4). Overall, the risk for most of the forest products firms under consideration had not changed much after the M&A events, especially in the short run. Part of the reasons might be that these individual firms have been large and mature.

5. Conclusions

The M&A trends have maintained in the forest products industry in the last few years. This study examined the response of the stock market to these M&A events and the relationship between the stock market response and the characteristics of the M&A observations by event analysis. The results suggested that these M&A events were associated with significant increases in market valuation of firms and, at least temporarily, created value for the firms' stockholders. This, therefore, indicated a perception among investors that M&A initiatives announced were likely to be associated with future benefit streams for firms. Yet, it should also be noted that the analyses in this study focused on the average cumulative abnormal returns on these selected firms as a group. It is always possible that an individual firm might lose its value because of the M&A event involved.

It could be concluded from the cross-sectional regressions that the relative transaction size and the firm's position in the M&A are significantly positive-related to *CAR* measurements. Considering the complex structure of the equity market, other factors beyond the specification in this study may be worthy of more analysis in the future. In addition, the risk analysis for the acquiring firms in the selected 14 M&A events revealed that the risk for most of them had experienced limited changes after the M&A events.

References

Asquith, P., R. F. Bruner and D. W. Mullins, Jr., 1983. The gains to bidding firms from merger. Journal of Financial Economics 11(1), 121-139.

Campbell, J. Y., A. W. Lo and A. C. MacKinlay, 1997. Chapter 4. Event study analysis. 149-180 in The Econometrics of Financial Markets. Princeton University Press, Princeton, NJ

Choi, J. and J. S. Russell, 2004. Economic gains around mergers and acquisitions in the construction industry of the United States of America. Canadian Journal of Civil & Engineering 31(3), 513-525.

Diamond, J., D. E. Chappelle and J. D. Edwords, 1999. Mergers and Acquisitions in the Forest products Industry. Forest Products Journal 49(4), 24-36.

Dodd, P., 1980. Merger proposals, management discretion and stockholder wealth. Journal of Financial Economics 8(1), 105-138.

Halpern, P., 1983. Mergers and Acquisitions. The Journal of Finance 8, 297-315.

Knapp, W., 1990. Event analysis of air carrier mergers and acquisitions. The Review of Economics and Statistics 72(4), 703-707.

Lepetit, L., S. Party and P. Rous, 2004. Diversification versus specialization: an event study of M&As in the European banking industry. Applied Financial Economics 14(9), 663-669.

MacKinlay, A. C., 1997. Event studies in economics and finance. Journal of Economic Literature 35(1), 13-19.

McWilliams, A. and D. Siegel, 1997. Event studies in management research: theoretical and empirical issues. Academic Management Journal 40(3), 626-657.

Rudder, G., 2002. Pulp & paper 2002 North American fact book. Paperloop.com, Inc. 430p.

Salin, V. and N. H. Hooker, 2001. Stock market reaction to food recalls. Review of Agricultural Economics 23(1), 33-46.

Wells, W. H., 2004. A beginner's guide to event studies. Journal of Insurance Regulation 22(4), 61-70.

Zhang, D. and C. S. Binkley, 1995. The economic effect of forest policy changes in British Columbia: an event study of stock-market returns. Canadian Journal Forest Research 25(6), 978-986.