The Adjustment of Stock Prices to the Announcement of a Product Liability Suit: A Test of Market Efficiency

By

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I. Introduction

One of the most studied areas in finance is the efficiency of capital markets in adjusting to new information. In an efficient market, any information that changes expectations of future cash flows will cause a change in asset prices as soon as the information is anticipated by the market. An event study provides a direct test of market efficiency by analyzing return behavior around an event which signals new information to the market. Event studies have been done with stock splits, earnings announcements, and other publically available information. In this paper, I will examine the market's reaction to the announcement of a product liability suit against a firm. I expect that upon announcement of a suit the market will use the new information to revise its expectations of future firm performance, and any change in expectations will be instantaneously reflected in stock prices. Due to the costs of defending a lawsuit, possible monetary settlements or awards, and likely negative impact on firm reputation, I expect security prices to be adjusted downward to reflect expectations of lower future cash flows.

Event studies focus on the extent to which firm returns on announcement day deviate from equilibrium expected returns generated by the market model. Insofar as the new information is unanticipated, the magnitude of the abnormal returns at event time is an unbiased estimator of the cost to the firm's shareholders. However, this assumes certainty of the date when market expectations change. Identifying this date is the main difficulty with event studies, where announcement dates are typically inferred to be the first reporting of an event in standard sources such as

the Wall Street Journal.

I have some concern as to whether a well-defined announcement date can be identified for the event of a product liability suit against a firm. I found that product liability suits reported on in the Wall Street Journal were not necessarily the first news the market received in regard to a firm producing faulty products. Rather a suit in some cases can be seen as the culmination of a series of events such as consumer complaints, FTC investigations, and product recalls. To the extent that the market efficiently evaluates the information implicit in these events, a subsequent suit announcement may result in only a small adjustment to reflect the unanticipated costs to shareholders. Daily return data will be analyzed for defendant firms for twenty days preceding and twenty days following the announcement of a suit to determine the speed and magnitude of price adjustment. This pattern of adjustment will provide a measure of the efficiency of the market in processing new information.

II. Sample and announcement date selection

The sample of firms in this study were collected from the Wall Street Journal for the period 1970-1986. I use the first date a product liability suit was reported against a firm as my "announcement" date. The sample consists of 30 reported suits against firms whose shares are traded on the New York Stock Exchange. Return data for these firm's stocks are available on the University of Chicago Center for Research in Security Prices (CRSP) Daily Stock Returns File.

Data on investigations, settlements, and decisions was also collected from the Wall Street Journal for the period

1970-1986 for use in future analysis. Table 1 summarizes the number of suits, settlements, decisions, and investigations by year. Information about charging party was available from the Wall Street Journal. The amounts of monetary awards sought by charging parties were available for 18 out of the 30 suits in the sample. These amounts ranged from $2,000. to $2.4 billion, with an average value of $245.6 million. Table 2 summarizes type of suit and dollar amount involved (in millions) for each of the 30 firms.

III. The Market Model and CAPM

Efficient market theory posits that all available relevant information is fully reflected in asset prices. When the market efficiently processes information, price adjustment occurs without a lag. The major implication of this is that no speculative profits can be made from trading in mispriced securities. In equilibrium, any given asset will be priced such that its expected return is equal to the expected return on the market portfolio consisting of all risky assets in the economy. Efficient market theory is based on the assumptions of equal and costless access to information, and zero transaction costs. It has been shown that even if these assumptions are not strictly true, speculative profits cannot be realized in the long run.

The market model relates return on security i during time t to the return on the market or some market index during time t. The model is the basis for measuring abnormal returns to securities and is stated as follows

$$R_{it} = \alpha_i + \beta_i R_{mt} + \epsilon_{it}$$

where

R_{it}- continuously compounded daily rate of return for firm i over

period t,

R_{mt}- continuously compounded daily equal weighted market rate of return over period t,

α_i and β_i are parameters that vary from security to security, and

ϵ_{it} is a random disturbance term of security i over period t.

The Capital Asset Pricing Model further specifies the model of equilibrium expected returns by stating how these returns are generated. The model predicts that the expected return to asset i in period t is linearly related to the risk of the asset in the portfolio of all assets, (the market portfolio). The model is expressed as

$$E(R_{it}) = RF + \beta_i (E(R_{mt}) - RF)$$

where

$E(R_{it})$- expected rate of return on asset i over period t,

RF- rate of return on a riskless asset, i.e. compensation for delayed consumption,

$E(R_{mt})$- expected rate of return on the market portfolio.

The difference between the return on the market and the risk free rate of return is the risk premium required by risk-averse investors for investing in the market portfolio rather than a riskless asset. β_i is the risk of asset i relative to the risk of the market portfolio. A beta of 1.0 indicates an asset of average risk which will therefore earn the equilibrium expected market return. According to the CAPM, the only differences among equilibrium expected returns to securities are attributable to differences in their betas.

IV. Methodology

The Market Adjusted Returns model is used to measure abnormal performance of firms around event time. The model assumes that security returns change over time, but at a given time expected

returns are equal across securities. Since the market portfolio is a linear combination of all securities, in equilibrium the $E(\tilde{R}_{it}) = E(\tilde{R}_{mt}) = K_t$ for any security i. If this relationship does not hold for any security i, forces of supply and demand for the security will lead to price adjustments which will equilibrate its return with that of the market.

The measure for abnormal returns to any security i is given by the difference between its return and the return on the market portfolio, and is expressed as

$$\epsilon_{it} = R_{it} - R_{mt}$$

where R_{mt} is represented by the return on the New York Stock Exchange equally weighted index. The residuals are calculated for each firm on each of the 41 days in the sample interval, day 21 being the "announcement" day. The average residuals for each day are calculated across the 30 firms, and abnormal returns are tested for significance using a t-statistic. The average residual is calculated for each day in the event interval as follows:

$$\bar{\epsilon}_t = \frac{1}{N} \sum_{i=1}^{N} \epsilon_{it} \qquad t = AD-20, \ldots, AD+20$$

where N is the number of firms in the sample. Averaging is used because we are interested in the effects of a suit in general on return behavior, not in the effects on individual firms.

The Market Adjusted Returns Model is consistent with the Capital Asset Pricing Model if all securities have a beta of 1.0. It has been shown that on average this holds true, and that it is unlikely to get estimates of beta significantly different from one, especially in large samples. To the extent that the firms in the sample are large, diversified companies from a range of different

industries, I assume a beta that is not significantly different from that of the market portfolio.

The Market and Risk Adjusted Returns Model developed by Fama (1969), is the methodology generally used in event studies. The model uses time series data to estimate the market model, which is the basis for calculating abnormal returns (or prediction errors). Extensive tests examining the power of various methodologies for measuring abnormal returns have been done by Brown and Warner (1980) using simulation techniques. In general, they find that simpler methodologies, such as the Market Adjusted Returns Model, are no less likely than more sophisticated models to detect abnormal performance when it is present. They note that a more precise model of asset pricing is not sufficient for that model to generate a more powerful test for abnormal returns, and that there are considerable measurement errors in each of the variables in the CAPM. However, when announcement day is uncertain, they find that the power of the test for abnormal returns is greatly reduced, regardless of the methodology used. In these cases they find frequent acceptance of the null hypothesis even at high levels of abnormal performance.

V. Results

Table 3 presents the average residuals for each of the 41 days in the event period. On announcement day, average abnormal returns are -.017 percent with a t-statistic of -1.65. These results are statistically significant at the .055 level in a one-sided test. The returns on event day are negative as expected, reflecting the market's estimate of the total costs associated with a product liability suit against a firm, such as costs of

defense and damage to a firm's reputation.

Additionally, significant negative abnormal returns appear 15 days prior to the announcement day and two days after the announcement. Significant positive abnormal returns are found five days after the announcement day. These results are not explainable with the available data.

VI. Conclusion

This study examines the efficiency of the market in adjusting to the information implicit in a product liability suit against a firm. To the extent that a suit negatively affects future firm performance, stock prices are expected to fall on the day a suit is announced.

The results of this study support the Efficient Market Theory in that significant negative abnormal returns occur on event day. Since the results are downward-biased due to the methodology used and the small sample size, the true magnitude of the price adjustment is understated. Further research should be done using the Market and Risk Adjusted Returns Model developed by Fama. This method calculates each firm's beta instead of assuming beta to be equal to one, and therefore gives a more precise estimate of the abnormal returns to firms during the event period.

The magnitude of price adjustment may also be understated due to uncertainty of the event day itself, in which case the estimated results will be biased downward even when a more sophisticated model is used.

Simulation studies have shown that when announcement day is not precisely known, the power of tests to identify abnormal performance is greatly reduced. It is difficult to identify the

announcement day for a product liability suit, especially if the market anticipates the likelihood of a suit given previous information about firms producing substandard products. If the market anticipates the effects of a suit, subsequent price adjustments will be made prior to "announcement" day. In this case, no specific date exists where the full effects of a suit on firm value can be measured.

Table 1

Number of Suits, Settlements, Decisions, and Investigations by year

Year	Suits	Settlements	Decisions	Investigations
1970	1	2	1	0
1971	3	3	0	0
1972	4	3	2	0
1973	1	2	0	0
1974	1	0	1	1
1975	3	0	2	0
1976	5	2	2	3
1977	3	3	0	1
1978	1	1	2	0
1979	2	0	1	0
1980	0	1	1	0
1981	1	1	0	0
1982	2	0	1	1
1983	2	0	1	0
1984	0	1	1	0
1985	1	1	1	0
1986	0	0	0	0
Total	30	20	16	6

Table 2

Firm, Charging Party, and amount involved
(in millions of dollars)

Name	Type	Amount
American Can	Private	.
Beech Aircraft	Class Action	60.00
Bristol Meyers	Private	.
Congoleum Industries	FTC	.
Eastman Kodak	Class Action	0.10
Ford Motor Co. of Canada	Class Action	371.00
Ford Motor Co.	Private	0.50
General Tire and Rubber	Justice Dept.	0.01
General Motors	Govt	0.40
General Motors	Class Action	1000.00
General Motors	Govt	0.40
Heinz (Star Kist)	Govt	.
Her Majesty Industries	Private	5.00
Hooker Chemical	Private	108.80
Johnson and Johnson (Technicare)	Private	.
Johnson and Johnson (McNeil Labs)	Private	.
Eli Lilly	Private	.
M. Lowenstein and Sons	FTC	.
McDonnell Douglas	Private	.
Mobil (Montgomery Ward)	Govt	.
Northwest Industries	Govt	119.20
Penn Central Transportation	Govt	14.10
Pullman Inc.	Govt	112.30
A.H. Robins	Private	.
A.H. Robins	Private	.
A.H. Robins	Private	.
Rockwell International	Govt	112.30
GD Searle	Private	.
Syntex Agribusiness	Private	2400.00
Westinghouse Electric	Private	17.00

Table 3

Daily Average Residuals for the 41 Day Event Period
(t-statistics in Absolute Value in Parentheses)

Period	Avg. Residuals	Period	Avg. Residuals
AD-20	-.003 (1.02)	AD-3	.004 (1.07)
AD-19	-.001 (.29)	AD-2	.002 (.96)
AD-18	.003 (1.17)	AD-1	-.000 (.06)
AD-17	-.001 (.53)	AD	-.017 (1.65)
AD-16	-.002 (.90)	AD+1	.000 (.06)
AD-15	-.005 (2.29)	AD+2	-.007 (2.00)
AD-14	.001 (.34)	AD+3	-.008 (1.68)
AD-13	-.001 (.45)	AD+4	-.001 (.30)
AD-12	.003 (.78)	AD+5	.007 (2.16)
AD-11	.002 (.76)	AD+6	.008 (1.20)
AD-10	.000 (.13)	AD+7	.006 (1.74)
AD-9	-.006 (1.62)	AD+8	.004 (1.21)
AD-8	.001 (.25)	AD+9	-.000 (.07)
AD-7	-.000 (.11)	AD+10	.003 (.78)
AD-6	-.003 (1.17)	AD+11	-.001 (.18)
AD-5	-.004 (1.30)	AD+12	.001 (.45)
AD-4	-.003 (1.41)		

Table 3 (continued)

Period	Avg. Residuals	Period	Avg. Residuals
AD+13	-.002 (.45)	AD+17	-.002 (1.08)
AD+14	.000 (.16)	AD+18	.001 (.30)
AD+15	.006 (2.52)	AD+19	-.002 (.78)
AD+16	-.001 (.49)	AD+20	.002 (.71)

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