An Assessment of Event Study Methodologies Using Daily Stock Returns

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Abstract

This paper examines Multinational Stock Price reactions to foreign currency translation, using three alternative residual methodologies. The results reveal that when a crude measure such as Mean Adjusted Return, which makes no explicit risk adjustments is used, the null hypothesis of zero abnormal return is rejected in three out of six events. However, market and risk adjusted residual returns reveal that the null hypothesis of zero abnormal return cannot be rejected.

1. Introduction

Many firm specific events such as changes in accounting methods, earnings and dividends announcements have been studied by evaluating their effects upon security prices. These studies were pioneered by Fama and et. al. [1969] and are often known as event studies. Several studies utilizing different residual analysis techniques have investigated the security price behavior of firms directly affected by the implications of such events (1). Simulation studies by Brown and Warner [1980 and 1985], hereafter B&W, and Dyrkman, Philbrick and Stephens [1984], hereafter DPS, investigated alternative methodologies used to evaluate event studies. Employing a research design based on the residual analysis technique, B&W and DPS focused their simulation analysis, principally, on three techniques currently used in measuring security price performance in event studies (2): Mean Adjusted Returns (MEAR), Market Adjusted Returns (MAR), and Risk Adjusted Returns, using the Single Index Market Model (SIM). On the basis of their simulation study, B&W concluded that the MEAR approach is as likely to detect abnormal performance as other more elegant techniques when applied in event studies. In particular, B&W [1980, p. 249] presented evidence that "...more complicated methodologies can actually make the research worse off, both compared to the Market Model and to even simpler methods, like Mean Adjusted Returns, which make no explicit risk adjustments (3)."

The purpose of this paper is to analyze the efficiency of alternative residual analysis techniques for testing market reactions to financial accounting policy deliberations on foreign currency translation (FCT). Section II

discusses important experimental designs and methodological issues associated with using daily data. Empirical results are presented in Section III. Section IV summarizes our findings.

II. Experimental Design and Methodological Issues

B&W's first study used monthly data in their simulation. Daily data is used in this paper, since daily observations should allow a more refined analysis of the significant relationship between stock price behavior and accounting policy deliberations. Furthermore, daily data is preferred over monthly and weekly data because of the availability of a much larger number of observations. Finally, in the context of an efficient capital market, the effects of accounting policy deliberations should be incorporated into stock prices immediately upon the release of the information (4). B&W and DPS contend that simulation studies assume that the abnormal performance is built into the data; accordingly, the researcher is not required to specify ex-ante the direction or magnitude of a price reaction to any particular event. Yet, when researchers attempt to investigate the relationship between firm specific events and market reaction such assumptions may be unfounded.

Association between firm specific events and security price movements does not imply a cause and effect relationship between the two as was apparently assumed by B&W and DPS, but only makes testable a theory of such relationships. The inherent nature of event studies makes it difficult to state with any reasonable degree of confidence that the observed market reaction is caused by

the event of interest without systematically being affected by other events unless one controls for "confounding events (5)." Foster [1980] criticized empirical event studies because of their limited control for confounding events. Since B&W and DPS used simulation, they did not have to tackle the problem of selecting the most appropriate time period for measuring the capital market reaction to the event of interest. However, in the real world, researchers are required to identify the point in time when the capital market expectations regarding the event of interest change. Thus, identification of the time of hypothesized impact may well be a matter of consequence (6).

Data and Sample Selection

This paper assesses the impact of six accounting policy deliberations to determine which (if any) results in significant stock price changes. A detailed history of accounting development for Foreign Currency Translation (FCT) between World War II and most recent accounting pronouncements can be found in the literature (See Gray 1983). Table 1 provides a summary of the chronology of events pertaining to FCT covering the period of 1974 through 1982.

Using The Center of Research in Security Pricing (CRSP), daily stock price master file of The University of Chicago, and COMPUSTAT Price Dividend Earnings, a sample of Multinational Corporations (MNCs) is selected following the Dukes [1978] and Griffin [1982, 83] procedures. Moody's Industrial Manual and reports of earnings announcements and other significant news announcements in the Wall Street Journal Index were utilized to search for confounding events. Any firm found to have a "significant" news announcement, (other than news of the release of accounting policy deliberations on FCT) during the test period, was removed from the final sample (7). This screening resulted in a sample of 175, 169, 178, 175, 178, and 174 MNC respectively, for events 1 through 6.

The test period selected is an 11-day period around the release date for each of the six events. For consistency, the date of press releases (e.g., The Wall Street Journal) was set as day zero. The 11-day test period consists of the day of -8 through day +2. In addition to the 11-day test period, a 150-day estimation period, a 75-day crude adjustment period (to deal with cross-sectional correlation), and a 12-day search for confounding events were established for each of the six events.

Changes in the price of an individual security may be associated with a large number of macro economic and firm specific events in the capital market. To isolate the component of price change which might be attributed to the economy wide macro event, residual analysis has

proven useful. Regardless of the definition of the residual used, the micro effects should be isolated from the market-wide factors in order to test the average magnitude and statistical significance of security price changes which are associated with a specific event.

Residual analysis is employed using three models (MEAR, MAR, and SIM). Assuming that these models represent the true stochastic process generating securities rates of return. The abnormal returns (AR_t) for security j in time period t is estimated as follows:

$$AR_t = R_{jt} - Y_{jt}$$

where R_{jt} is the actual return for j -th security on day t and Y_{jt} is the return implied by the three respective models for the j -th security on day t .

The following hypothesis is tested using the three alternative models.

- H_0 : Abnormal return is not significantly different from zero at i -th announcement date for portfolio of securities in the sample. (for $i = 1, \dots, 6$)
- H_a : Rejects the null hypothesis at the .05 level or better.

The mean return for the 150 day estimation period (day-158 through day-9) is used as proxy for Y_{jt} in the MEAR Model. In the market adjusted returns the S&P 500 index return R_{mt} is used as a proxy for Y_{jt} . This method takes into consideration market wide movements which may occur simultaneously with firm specific events. The single index model is used to estimate Y_{jt} as follows:

$$Y_{jt} = \alpha_j + \beta_j R_{mt} + \epsilon_t \quad (1)$$

where α_j and β_j are the ordinary least square estimates during the estimation period and ϵ_t is the uncorrelated error term with zero mean and constant variance. The cumulative average abnormal returns, CAR_t , are also calculated for each trading day of an 11-day window for each of the three methodologies; as

$$CAR_t = CAR_{t-1} + AR_t \quad (2)$$

for $t = -8, \dots, +2$

To test the null hypothesis cumulative average abnormal returns are estimated for a portfolio of firms from the sample for each of the six events. The test statistics are designed to control non-normality of daily data and cross-sectional dependence in security returns. Specifically, the 75-days from day-83 to day-9 adjustment period is utilized to remedy cross-sectional dependence in the securities performance measures. The following z test statistic is obtained:

$$Z_t = \frac{CAR_t}{S} \quad (3)$$

S = Empirical standard deviation of average abnormal returns over the 75 days from day-83 to day-9.

$$S = \left[\frac{1}{74} \sum_{t=-83}^{-9} \left\{ \frac{1}{N} \sum_{j=1}^N AR_{jt} - \overline{AR} \right\}^2 \right]^{1/2} \quad (4)$$

Validation Test

In order to validate the empirical results and allow for evaluation of the previously described techniques, a Control Group of 110 domestic firms was identified from the COMPUSTAT tape. Using the domestic firms as a control sample should enable one to isolate the effects of the FCT events from other potentially broad economic influences, which could affect each MNC during part or all of the 11-day test period. The null hypothesis to be tested is that the security price behavior of MNCs in the sample is not significantly different from the security price behavior of domestic firms in the control group. The null hypothesis cannot be rejected. Results are found in Table 2.

III. Empirical Results

The empirical results presented in Table 2, using the MEAR method, suggest that the capital market reacted positively to events 1 and 2, and negatively to event 4. The CAR generated by Market Adjusted Returns, the single index and the Control Group suggests that capital markets did not react to any of the six FCT events. Since translation of financial statements for consolidated reporting purposes does not affect an MNC's cashflows, then the null hypothesis may not be rejected. Our evidence is in line with the semi-strong form of the efficient market hypothesis that the accounting information is of zero marginal value. The MEAR model results in a residual that includes an individual security as well as a market-related disturbance term. Furthermore, when market-wide news of a significant nature is disseminated during the test period, the MEAR model may be unable to distinguish between the economy-wide events that affect the price of all securities and those events which are unique to the specific firm.

IV. Summary and Conclusion

The evidence provided in this paper supports propositions, made by well-known researchers in this area (Viz., Beaver [1972 and 1981], Gonedes and Dopuch [1974], Beaver and Demski [1974]), that accounting information is only one element in the entire information set. Events on foreign currency translation examined in this study did not produce significant stock price reactions. Accounting

policy bodies such as the SEC and FASB should not rely solely on the findings of event studies regarding the association test between firm specific event(s) and security price movements. Regarding this particular study, the evidence is less supportive of a firm specific relationship. The MEAR approach appears to be an inappropriate one for studying the reaction to the six hypothesized events upon multinational firms as outlined in Table 1. Therefore, it is difficult to conclude with a reasonable degree of confidence that the use of the MEAR method is appropriate or meaningful for event studies. The method may be inappropriate when: (1) event dates are clustered in calendar time (as stated by B&W [1980] and DPS [1984], (2) affected firms constitute a significant portion of the capital market, and (3) multiple announcement events for a given policy deliberation are highly correlated. Researchers faced with the above possibilities should exercise particular caution and consider alternative methodologies.

Endnotes

1. See Foster [1980], Holthausen and Leftwich [1983], Kelly [1983], Lev and Ohlson [1982], Ricks [1982], and Chow [1983] for a more detailed discussion of these reviews.
2. Although the DPS study was conducted independently of the B&W study, the approaches and conclusions in both studies were very similar.
3. B&W's first simulation study [1980] was based upon monthly data; however, in their second study [1985] they examined the statistical properties of both observed daily security returns and daily excess returns by utilizing the three techniques mentioned above.
4. In fact, Dann, Meyers, and Roab [1977, pp. 3-22] and Foster [1979, pp. 362-77] found that the impact of new information is fully reflected in stock prices within a few days.
5. See Foster [1980, pp. 52-55] for several possible methods to control for the problem of confounding events and the systematic approach to search for confounding events which has also been incorporated into the methodology of this paper.
6. Indeed, DPS (p.29) encouraged researchers to examine "actual distributions of abnormal return level across firms for specified events" in assessing the abilities of these methods to detect the presence of abnormal return.
7. The capital market reaction to accounting policy deliberation on FCT has been examined by many researchers. Ziebart and Kim [1987] concluded that the market reacted negatively to SFAS No.8 and positively to SFAS No.52, while Garlicki, et al [1987] found no market reaction to several events pertaining to the adoptions of SFAS No.8 and 52. Cheng [1986]

TABLE 1

Selected Events Associated with the FASB and the SEC Policy Deliberations on Accounting for the Transaction of Foreign Currency Transactions and Foreign Currency Financial Statements (December, 1974 - November, 1983).

Event No.	Dates and Descriptions
I.	December 31, 1974, the FASB issued an Exposure Draft entitled "Accounting for the Transaction of Foreign Currency Transactions and Foreign Currency Financial Statements."
II.	October 15, 1975, the FASB issued Statement of Financial Accounting Standards No. 8: Accounting for the Translation of Foreign Currency Transactions and Foreign Currency Financial Statements.
III.	August 28, 1981, the FASB issued an Exposure Draft that set forth new proposals for foreign currency translation.
IV.	June 30, 1981, the FASB issued a Revised Exposure Draft which established criteria for determining the newly proposed concept of functional currency, translation in highly inflationary economies, and treatment of certain foreign currency transactions.
V.	December 8, 1981, the FASB issued Statement of Financial Accounting Standards No. 52: Foreign Currency Translation.
VI.	November 19, 1982, The Securities and Exchange Commission issued a release requesting increased disclosure of foreign currency translation practices in corporate reports.

TABLE 2

Comparative Analysis for Average Cumulative Abnormal Performance Over the Period $t = -8$, to $+2$.

Events	Average Cumulative Residual t-statistic in parenthesis			
	Mean Adjusted Return %	Market Adjusted Return	CAPM Adjusted Return	Control Group
1.	0.3304 (2.0)**	0.0030 (0.60)	0.0033 (0.65)	0.0007 (0.13)
2.	0.1947 (1.62)*	-0.0008 (-0.27)	-0.0007 (-0.26)	-0.0003 (-0.08)
3.	-0.1372 (-1.53)	-0.0005 (-0.25)	0.0013 (0.32)	-0.0010 (-0.48)
4.	-0.2243 (-2.45)**	-0.0006 (-0.24)	0.0004 (-0.17)	0.0006 (0.24)
5.	0.1139 (0.86)	-0.0009 (-0.31)	0.0006 (-0.24)	-0.0004 (-0.15)
6.	-0.2132 (-1.24)	0.0018 (0.46)	0.0023 (0.51)	0.0014 (0.37)

* significant at .05 level for a two-tailed test

** significant at .01 level for a two-tailed test

detected positive market reaction around the time of the appointment of the task force and the exposure draft of SFAS No.8. Thompson [1986] found inconclusive results with respect to the capital market reaction to the same events.

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