

Examining The Market Reactions to Regulatory Accounting Events

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Abstract

Evaluation of market reaction to regulatory accounting events such as the accounting standards policy setting process has commonly utilized event study methodology. However, this methodology quite often has resulted in inconsistent and conflicting findings due to partial anticipation of the events being examined and due to nonstationarity of the parameters in the estimation model. A multi-regime market model based methodology that allows for the proper treatment of these problems is proposed and is illustrated with an application in the policy setting process for SFAS No. 8.

Introduction

Starting with the Ball and Brown [1968] paper, Market Based Accounting Research (MBAR) continues to be an area attracting substantial attention from researchers. Two main issues are addressed in MBAR studies: the market reaction to the announcement of accounting information, and the market reaction to regulatory events in accounting such as discretionary and nondiscretionary accounting policy changes to the accounting standards policy setting process. Of special interest are MBAR's findings related to regulatory events, which generally have been inconsistent and conflicting for the same events.¹ For example, studies examining the market reaction to the policy setting process for foreign currency translation [e.g., Ziebart and Kim, 1987; and Salatka, 1989], oil and gas accounting [e.g., Dyckman and Smith, 1979; and Collins, Rozeff, and Dhaliwal, 1981], FIFO to LIFO changes [e.g., Ricks, 1982b; and Ricks and Biddle 1985], and accounting for long term investment [e.g., Ricks and Hughes, 1985], among other areas, have reported conflicting results with one study reporting no market reaction, another reporting positive market reaction, and a third reporting negative market reaction to the same announcement or policy setting process.

These conflicting findings in MBAR applied to regulatory events in accounting may be explained by two distinct factors. First, regulatory changes have the potential for changing the riskiness for the firms and/or industries involved. Changes in risk may lead to incorrect results if it is assumed that risk parameters remain

unchanged when equilibrium returns are estimated in MBAR. To some extent this problem has been addressed in recent MBAR through the utilization of the seemingly unrelated regression (SUR) technique (see Schipper and Thompson [1983]). However, a second problem is that quite often "events" in a regulatory process are anticipated. Thus, it is feasible that market participants start to react to the regulatory events prior to the actual event date. Their anticipations may induce structural shifts in the risk and return equilibrium relationships prior to the event announcement dates. Therefore, estimated returns may be derived over more than just one risk and return regime, resulting in conflicting findings.²

The purpose of this study is to introduce an alternative approach to the examination of the stock market reaction to regulatory accounting events. Section 2 provides a review of the event study methodology, its assumptions, and its weaknesses when applied to accounting research. Section 3 presents an alternative to the standard event study methodology, namely, the switching regression approach and its application to the examination of the market reaction to accounting events. Sections 4 and 5 contain the results and analysis, and the conclusion and summary of the paper, respectively.

MBAR and Event Study Methodology

Prior to the development of MBAR, most studies addressing the usefulness (relevance and timeliness) of

accounting information to the decision making process of its users (investors and creditors) adopted an operational framework that was based on deductive reasoning, questionnaire surveys, and laboratory experiments. Researchers used responses by individual investors and creditors to measure and predict the effect of accounting information, accounting policy making, and accounting policy changes on the behavior of the stock market. This operational framework was criticized for missing an empirically testable link between accounting information and its effect and inputs on and to the decision making process of accounting information users as reflected in the stock market [Griffin, 1982].

With the development of the event study methodology, based on the efficient market hypothesis and capital pricing theories, a new operational framework emerged and provided accounting researchers with an empirically testable theoretical link between accounting information and its users as defined by the relationship between information, and the behavior and pricing of securities traded on the stock market [Beaver, 1973].

Event Study Methodology (ESM)

Developed by Fama, Fisher, Jensen, and Roll [1969], the primary objective of the ESM is to assess the extent to which security returns are abnormally distributed surrounding the announcement date of the event or events being examined [Brown and Warner, 1980, 1985]. The measurement of the abnormality in the price or return distribution is achieved through the incorporation of the efficient market hypothesis and capital asset pricing theories.

The efficient market hypothesis is invoked to define the relationship between information and the prices or returns of securities traded in the stock market [Fama, 1970]. Capital asset pricing theories are used to characterize the process by which are generated equilibrium returns of securities traded in the market, given the market return (Market Model), the market return and the risk free return (Capital Assets Pricing Model), or the market return, the risk free return, and other stock price or return related variables (Arbitrage Pricing Theory) [Copeland and Weston, 1988]. Three additional assumptions are invoked in ESM: first, the return generating process follows the pre-event, event, and post-event regimes; second, the event date or dates related to the three regimes are known to the researcher; third, the return generating process remains stationary within the three regimes. Within this operational framework, accounting researchers have examined and tested the market reaction to regulatory accounting events. However, as previously discussed, the reported findings of MBAR have been inconsistent and conflicting among various studies examining the same event. The literature addressing the methodological problems

in MBAR and its event study approach has attributed this problem to two main weaknesses in the ESM when applied to an accounting context. Given that all other research design areas are accounted for, these weaknesses are: confounding of events and confounding of results [Brown and Warner, 1980, 1985; Griffin, 1982; Ricks, 1982a; Bernard, 1987; and Brown, 1987]. The problem of confounding of events exists when the period selected to test for the event's effect includes date(s) when the market received information concerning other events. The problem of confounding of results exists when the period selected to test for an event effect does not include the date(s) when the stock market actually received information concerning the event [Ricks, 1982a]. The latter problem relates to the ESM assumption that the date or dates when the market received information concerning the event under consideration is known, i.e., that the event was unanticipated by investors and that they received information on the event announcement date. However, it may be that these dates can never be determined exactly because investors partially anticipate the events of the accounting policy setting process. The inability to pinpoint when the market received information concerning the event being examined increases the possibility of a confounding of results.

Another problem with ESM relates to the assumption of the model used in market based studies to define the return generating process of security returns. The foundation of these models is based on the efficient market hypothesis and its assumption of competitive security markets. Under the efficient market paradigm, all security returns are based on an equilibrium risk and return relationship. Hence, when new regulatory information is received by the market, such as an announcement related to the foreign currency translation policy setting process, it may well alter the expectations of market participants, resulting in security returns based on a new equilibrium.³

The market model (MM) attributes the variations in the returns of a security to two types of events: (1) market-wide events that affect the entire market return, and (2) firm-specific events that affect the return on the security. The former are assumed to be isolated from firm-specific events and are accounted for in the slope of the market model, while the latter are assumed to be represented in the residual of the model. Additionally, it is assumed that the slope and intercept terms of the model are stationary (constant) over the period during which the model is fitted to the data [Copeland and Weston, 1988].

The validity of the assumption of parameters stationarity in the MM has been examined and questioned by many researchers. Bildersee and Roberts [1981], and Alexander, Benson, and Eger [1982], among others, have

found evidence in support of beta nonstationarity. Moreover, Fabozzi and Francis [1978], Larker, Gordon, and Pinches [1980], and McDonald and Nichols [1984] have examined the effect of beta nonstationarity on the estimation of the MM beta, residuals, and on the efficiency and lack of bias of the model estimators. The conclusion of these studies was that, when beta nonstationarity is not accounted for in the testing procedures, the model estimators (standard deviation and variance) are biased and inefficient with the result that confounding estimates of beta and the residuals will be generated by the model. In conclusion, as long as researchers do not account for the possibility of confounding of results and beta nonstationarity problems in MBAR related regulatory events, the reported findings of their studies will continue to hold the potential for inconsistent and conflicting results.

The problems mentioned here can be addressed by using a method that provides the ability to first, relax the assumption of the researcher's knowledge of the information received by investors with respect to the event being examined, and second, which allows for tests for nonstationarity of parameters. A method that provides the ability to account for these problems is a multi-regime market model (MRMM) based event study method. The following section provides a description of the MRMM method and its application.

Multi-Regime Market Model Based ESM

Multi-Regime Market Model

The MRMM is based on the switching regression model developed by Quandt [1972], and Goldfeld and Quandt [1972, 1973]. The objective of a switching regression model (SR) is to test the null hypothesis that the observations in a time series have been generated by one regression equation (zero switch one regime hypothesis) against the alternative hypothesis that the observations in the time series have been generated by two or more distinct regression equations (i.e., one or more switch points, or equivalently, two or more regimes, hypothesis). To determine if a time series can be represented by more than one regression equation, the Log Likelihood Function (LLF) of each hypothesis tested must be derived and maximized to estimate the attributes of each identified distinct regime of observations, and to identify the point in time when the time series switches from one regime to another.

The multi-regime market model can be written as:⁴

$$R_{it} = a_{ik} + b_{ik} R_{mt} + e_{it} \quad (1)$$

where:

R_{it} = dependent variable in period t .

R_{mt} = independent variable in period t .

a_{ik} = the intercept of the k th regime.

b_{ik} = beta, the slope of the k th regime.

e_{it} = residual term.

k = regime number, $1 \leq k \leq r$, where r is the number of regimes examined

t = time index ($t=1, \dots, T$).

(1) reduces to the standard MM when $k = 1$ i.e., when there are no switches and one regime. The generalized log likelihood function used for testing for the number of regimes can be expressed as:

$$LLF_r = -T \log(2\pi)^{-5} + \sum_{i=1}^r t_i \log \frac{V_{i+1}}{V_i} - T \log V_r - T/2 \quad (2)$$

where r is as defined above and equal to the number switch points being tested plus one. (2) is a generalized form of the LLF and can be used to derive the log likelihood function of any tested hypothesis. For example, the one switch two regimes hypothesis can be derived using (2) by substituting 2 for r and simplifying the equation to

$$LLF_2 = -T \log(2\pi)^{-5} - t_1 \log V_1 - (T-t_1) \log V_2 - T/2 \quad (3)$$

With the MRMM, the first step is to test for the zero switch one regime null hypothesis against the alternative of the one switch two regimes hypothesis. If the null hypothesis is not rejected then further testing of the returns time series is not necessary and the standard ESM is valid. However, if the null hypothesis is rejected, then the next step is to test for the null hypothesis of one switch two regimes against the alternative of two switches three regimes. The procedure is continued sequentially until the null hypothesis of $r-1$ switches r regimes cannot be rejected.

Significance of The Identified Switch Points

The Quandt log likelihood ratio test statistic (LLRT) is used to determine both the number of tested hypotheses and the significance of the identified switch points. The LLRT test statistic is asymptotically chi-square distributed with 4 degrees of freedom, representing the null hypothesis restrictions [Maddala, 1977].⁵ Notationally the test of a one switch two regimes hypothesis can be written as

$$\chi^2_4 = -2[(t \log V_1 + (T-t) \log V_2) - T \log V_{pt}] \quad (4)$$

where V_{pt} is the standard error of estimate given the null hypothesis.⁶ To further insure the validity of the identified switch points, the Chow structural shift test can also be used to test if, in fact, a structural shift has occurred at each switch point as identified by LLRT.

Test of Non-Stationarity of Parameters

A change in the behavior of security returns can be induced by either a change in alpha and/or beta of the MRMM. Each identified switch point divides a set of observations into two regimes, the pre-switch point regime defined by one market model and the post-switch point regime defined by another market model.

The sources inducing each of the identified switch points are determined by testing the restriction of equality in the betas and alphas of the pre-switch and post-switch point regimes by using the Chow F test for alpha and beta stability.⁸

Application of the Multi-Regime Market Model

The application of the MRMM based ESM (MRMMESM) is demonstrated by examining the market reaction to the announcement of the policy setting process of SFAS No. 8. The application of the MRMMESM requires the adjustment of the testing procedures normally used in prior ESM studies. The first step in the MRMMESM is to examine the behavior of security returns, the second is to test for significant changes in the time series, and to identify, if any, the sources inducing the change and to test for their significance, the third step is to attempt to associate the identified change date or dates with the formal announcement dates of the event being examined, and the last step is estimate the average and cumulative average residuals (ARs and CARs) based on the switch dates identified.

Sample and Analysis Period

The sample used in this study consists of multinational corporations (MNCs) only because SFAS No. 8 affects only corporations with foreign operations and those with foreign currency based transactions. The sample was randomly selected from all the United States-based MNCs listed in Stopford's World Dictionary of Multinational Enterprises 1982-1983, and in Dukes' [1978] study. Each MNC had to satisfy the following criteria to be included in the final sample: (1) the availability of daily return data on the CRSP tapes during the analysis period, (2) the on-going existence of the corporation over the analysis period, and (3) the availability of information on the corporation in Moody's manuals. The final sample included 254 MNCs representing 103 industries. The returns for these MNCs were used to form an equally weighted weekly returns portfolio.⁹

The selected analysis period extends from December

1, 1973 to January 10, 1975 and includes the FASB announcement of SFAS No. 8 discussion memorandum, public hearings, and the issuance of SFAS No. 8 exposure draft.

Behavior of Security Returns of MNCs

The objective of examining the behavior of security returns of MNCs is to identify the point or points in time at which the returns time series switches from one equilibrium level to another. Given a semi-strong efficient market, a change in equilibrium returns can only be induced by a change in market expectations, which in turn, occurs when the market receives information with value or content. Therefore, it is the assumption of this study that any identified switch point or points will be used as an estimate of the date or dates at which the market received MNC-related valuable information.¹⁰ It is also assumed that if any of the events leading to the issuance of SFAS No. 8 have any informational value, then it should induce a change in the behavior of security returns of MNCs. If no switch points are identified, i.e., the pre- and post-event parameters are the same, then it can be assumed that the market views the new information in a firm-specific context. Thus, standard ESM is applicable and there is no need to use the MRMMESM.

Tests of Nonstationarity of Parameters

Both the LLRT and the Chow test were utilized in hypothesis testing. A switch point was disregarded if the Chow test did not confirm the LLRT. Table 1 presents the LLRT based results of the hypotheses testing and shows a one switch two regimes solution. These results were confirmed with the chow test.

Test of Nonstationarity of Parameters

Table 1 also presents the results of the test of non-stationarity of parameters. As shown in the table, the switch point was induced by a structural shift in the beta. This finding lends credence to the notion that the beta of the MM may be nonstationary surrounding the announcement of regulatory accounting events. The results indicate that the use of a stationary MM in the examination of the market reaction to SFAS No. 8 may be questionable and most likely would lead to biased and inefficient estimates of the model variance and result in confounding estimates of MM parameters.

Switch Date and SFAS No. 8 Formal Announcement Dates

The date of the identified switch point is compared to

Table 1
RESULTS OF HYPOTHESIS TESTING

Hypothesis Tested ^a	X ²	Switch Date	Hypothesis Tested	F Value
r = 1 vs. r = 2	19.86*	12/13/74	b ₁ = b ₂ a ₁ = a ₂	42.77* 0.45

*Significant at 1 percent level.

^aThe hypothesis of r = 1 vs. r = 2 was tested also but could not be rejected.

Table 2
IDENTIFIED SWITCH DATE AND SFAS NO. 8 ANNOUNCEMENT DATES

Behavior of MNCs Security Returns		SFAS No. 8 Policy Setting Process	
Switch Date	Lag Period	Announcement Dates	Action Announced
None		Feb-21-1974	1. Discussion memorandum
None		Jun-10, 11-1974	2. Public hearings.
Dec-13-1974	3	Dec-31-1974	3. Exposure draft.

the formal announcement dates of SFAS No. 8 in this section. The objective of this step is to determine if the switch points identified can be attributed to the formal announcement dates of SFAS No. 8 policy setting process. The closeness in time between the two dates will be used as the attribution criteria. That is, the less the lag time between the two dates the greater the attribution to an SFAS No. 8 announcement date. Table 2 presents a comparison of the identified switch dates and the formal announcement dates of SFAS No. 8 and the lag period between the two dates.

Out of the three events being examined only the FASB issuance of SFAS No. 8 exposure draft has a switch date identified prior to its announcement date.¹¹ The lack of identification of any switch points at or before the announcement dates of the remaining two events indicate that the behavior of security returns of MNCs was not affected by the release of information on these events and, therefore, it may be concluded that the announcement of these events either have no effect on security returns of MNCs, or that the effects are firm specific and not category specific.

For the issuance of the exposure draft, the lag period between the matched switch point and the event an-

nouncement date is 3 observations or weeks. Given that the switch point does not exactly match or is close to the announcement date of the event (a maximum of one observation), the identified switch point cannot immediately be related to the event. The inability to relate the switch date to the matched announcement date may be due to the possibility that other relevant non-foreign currency and MNCs (NFCT) related events occurred during each of the lag period. To rule out this possibility, the lag period was examined to determine if other NFCT events did in fact occur between the identified switch date and the matched announcement date. For this purpose, a review of the *Wall Street Journal* index during the lag period was conducted.¹²

During the lag period, which extended from December 9, 1974 (the first trading day in the week of the switch point) to December 31, 1974, most of the major events were market wide and none were MNC related. Therefore, the announcement of SFAS No. 8 exposure draft appears to be the most likely event inducing the identified change in the behavior of security returns of MNCs.

Additionally, a control sample of 89 domestic firms was identified. The MRMMESM was applied to this

control sample and no switches were identified, indicating that the switch on December 13, 1974, could be attributed to the SFAS No. 8 event.

In summary, out of the three announcement dates examined in this study, only the announcement of SFAS No. 8 exposure draft can be associated with an identified switch point and, therefore, has an effect on the behavior of security returns of MNCs.

Ziebart and Kim (1987), who examined the December 31, 1974 announcement date, reported no market reaction to the announcement on this date. Our evidence indicates that the market anticipated this announcement because a switch that can be associated with it occurred on December 13, 1974. It is probable that Ziebart and Kim's result may be attributed to a confounding of results [Ricks, 1982]. I.e., the market anticipated the event during the time period that Ziebart and Kim used to estimate the equilibrium parameters. The market reaction was embedded in the estimated equilibrium parameters. No changes occurred during the announcement period, thereby producing the result that the market did not react to the announcement.

Estimations of ARs and CARs

The fourth and last step in the MRMMESM is to estimate ARs and CARs. The traditional ESM is applicable if no switches are identified during the analysis period. CARs are estimated for periods surrounding the event dates using the estimated pre-event parameters. Thus, the traditional ESM can be utilized to estimate CARs surrounding the first two announcement dates shown in Table 2.¹³

The MRMMESM is applicable when multiple regimes are observed and when the switches cannot be attributed to events other than the ones being studied. CARs are then estimated by using the pre-switch parameters. The CARs estimated here also capture the efforts of structural shifts in the risk and return relationships induced by the events and appropriately reflect changes in shareholder wealth.

The final case is where multiple regimes are observed and some (or all) of the switches can be attributed to events other than the ones being studied i.e., some (or all) of the events are contaminated. In this case the contaminated events should be excluded from analysis, and CARs for only the noncontaminated events should be analyzed by using the pre-switch parameters.

Conclusion

The purpose of the study was to introduce an alternative approach to the examination of the market reaction to regulatory accounting events. The first and second sections of this paper provided a review of the development, application, and problems in MBAR as it relates to regulatory events. Section 3 provided a review of the multi-regime market model approach to evaluating regulatory accounting events. Section 4 contained a demonstration of its application to the test of some of the announcement dates of the SFAS No. 8 policy setting process. The findings of this paper showed that for the three announcement dates evaluated in this analysis, there was a market-wide reaction to the third event -- the announcement of the exposure draft of SFAS No. 8 --, which resulted in a structural shift.

The main difference between the MRMMESM proposed in this study and the standard ESM approach used in prior MBAR is that the MRMM does not make any *a priori* assumptions concerning the behavior of security returns of MNCs, the time period when the market received information related to the event, and the stationarity of the parameters of the returns generating process. Therefore, the MRMMESM examines the behavior of the relevant security returns to determine the dates at which the market received valuable information related to the firms in general (switch date or dates), identifies the effect of the information received on the security returns of the firms (possible structural shift in beta and/or alpha), provides for comparison of the identified dates with the formal announcement dates of the event and allows for calculation of CARs that take into consideration structural shifts induced by the events being studied. The use of this approach strongly decreases, if not eliminates, the possibility of a confounding of results and the resultant interpretation problems, and provides the ability to test for the nonstationarity of parameters, which generally have not been properly controlled in prior MBAR related to regulatory events in accounting.

Suggestions For Future Research

The use of a multi-regime market model based methodology was applied to a portion of the policy setting process for SFAS No. 8. Future research may focus on replicating previous MBAR studies, such as those conducted by Salatka [1989], Ziebart and Kim [1987], Ricks [1982b], and Ricks and Biddle [1985], to identify possible alternative explanations of the observed results, and to identify market reactions to events after controlling for possible sources of errors.

Endnotes

1. The market reactions to the announcement of accounting information are not discussed in this paper.
2. The Schipper and Thompson methodology will identify these structural shifts if they coincide with the event announcement dates, i.e., if the events are unanticipated.
3. Events such as earnings announcements are firm specific events and any effects should be reflected in the residual terms. However, regulatory events affect numerous firms and can change the risk and return equilibrium relationships for the affected firms.
4. Except for the relaxation of the assumption of stationarity of parameters, the assumptions of the MRMM are identical to the assumptions of the MM used in ESM.
5. The LLRT represents the ratio of the maximum likelihood of the observation given the null hypothesis to the maximum likelihood given the alternative hypothesis.
6. The LLRT was tested at various significance levels by using three randomly generated data with induced switch points. The first data set included switches induced by a change in alpha, the second included switches induced by a change in beta, and the third included switches induced by both alpha and beta. The results of this validation process showed that the test provides consistent results at the specified significance levels.
7. The Chow [1960] test is based on the assumptions that the residuals of the regression equations are normally distributed with a mean equal to zero and homoscedastic or constant variance and that the residuals of the two equations are independently distributed.
8. The calculation of the Chow F statistic requires combining the observations in the pre- and post-switch point regimes and then remaximizing the LLF in (3) under the restriction imposed in the null hypothesis of each test.
9. The use of an equally weighted portfolio decreases the probability of a type II error and the size of the portfolio reduces the effects of industry type, firm size, and beta clustering [Brown and Warner, 1980, 1985]. Weekly returns were used to enable comparison with results of Ziebart and Kim [1987].
10. The possibility that non-foreign currency translation related events may be causing the switches will be accounted for by an appropriate review of the *Wall Street Journal Index*.
11. The second switch point occurs 3 weeks after the announcement of the exposure draft of SFAS No. 8

and, thus, cannot be attributed to the SFAS No. 8 policy setting process.

12. The identification of NFCT events would indicate two possibilities; first, if the date of the NFCT event is close to or matches the identified switch date, then the switch point could be attributed to the NFCT event; second, if the NFCT event is close to or matches the matched announcement date, then the switch point cannot be attributed exclusively to either event.
13. The estimation of CARs is straightforward and not a methodological issue once the appropriate parameters are identified and, therefore, CARs not estimated in this paper.

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