EVENT STUDY METHODOLOGY: AN OVERVIEW AND SPECIAL CONSIDERATIONS FOR AFRICAN MARKETS

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ABSTRACT

Purpose − To explain for doctoral students and new faculty, the appropriate techniques for using event study methods while identifying problems that make the method difficult for use in the context of African markets.

Methodology/approach − We review the finance and strategy literature on event studies, provide an illustrative example of the technique, summarize the prior use of the method in research using African samples, and indicate remedies for problems encountered when using the technique in African markets.

Findings − We find limited use of the technique in African markets due to limited data availability which is attributable to problems of infrequent trading, thin markets, and inadequate access to free data.

Research limitations − *Our review of the literature on event studies using African data is limited to English-language journals and sources accessible through our library research databases.*

Practical implications − *More often, researchers will need to use non-parametric techniques to evaluate market responses for companies in or events affecting the African markets.*

Originality/value of the chapter − *We make a contribution with this chapter by giving a more detailed description of event study methods and by identifying solutions to problems in using the technique in African markets.*

Keywords: Event studies; nonparametric adjustments; African financial markets

INTRODUCTION

This chapter focuses on using event study methodology to analyze data from African markets. This research method is chosen because of its extensive use by scholars in strategic management, economics, and finance among other business fields to generate a financial market-based measure capturing the influence of news announcements about major corporate events or affecting managerial actions on investors' perceptions of the focal firm's future earnings potential (Corrado, 2011; MacKinlay, 1997; Park, 2004; Peterson, 1989). Moreover, the resulting measure, commonly referred to as abnormal or excess stock returns, has a long history of being used in the management field and related business disciplines to measure firm-level or organizational performance (McWilliams & Siegel, 1997; Richard, Devinney, Yip, & Johnson, 2009).

At least three key trends are occurring within the African context that suggest market returns may become increasingly important as an indicator of firm performance and thus used more in academic studies. First, efforts are being made at the individual country and intraregional levels within the African continent to enhance capital market development (International Monetary Fund, 2013). As the number of listed companies and market capitalization levels increase on the various stock exchanges, provisions are established to allow more foreign investors to purchase stakes and reforms are initiated to enhance factors such as equity finance awareness, investor

protection, and the quality of financial reporting (Ernst & Young, 2013; World Bank, 2011), more emphasis will likely be placed on market returns and similar indicators to assess individual firm performance along with that of the economy as a whole. Second, increasing levels of privatization of once government-owned entities, market deregulation in various industries, and the opening of domestic markets across the continent have facilitated the creation of regionally, and in a few cases globally, competitive firms headquartered on the African continent (African Development Bank, 2011; Boston Consulting Group, 2010). As more firms strive to expand their operations into multiple African countries and eventually into markets outside of Africa, they will likely look to the capital market for funding to support such growth initiatives. Thus, investors will monitor corporate actions and market returns more closely. Third, there has been a substantial increase in foreign direct investment inflows into Africa during the last decade as foreign firms seek access to natural resources, expanding middle-class consumer markets, and other new business opportunities in countries that are among the fastest growing in the world (Ernst & Young, 2013; United Nations Conference on Trade and Development, 2013). As foreign firms continue to purchase equity stakes in African firms, even more attention will be placed on market returns. These trends lead us to expect that African scholars will increase the utilization of event study methodology, while investors and creditors will become more interested in the evidence of these studies in assessing the performance and quality of information provided by African companies.

Despite the fact that researchers have extensively employed event study methods to measure the effect of a myriad of events on the stock prices of corporate entities, it is important to keep in mind several key factors. First, much of the empirical work in the existing literature is based on firms trading on developed capital markets such as those in the United States and the United Kingdom where primacy is given to shareholders and the goal of profit maximization (Richard et al., 2009). Second, even in the context of developed capital markets, many scholars emphasize that care should be exercised when using the event study methodology to ensure certain assumptions or conditions are met and detailed procedures followed or necessary corrections made to obtain valid statistical inferences (Corrado, 2011; McWilliams & Siegel, 1997; Peterson, 1989).

As such, it should not be taken for granted that the event study methodology is easily adapted and useful to analyze performance implications of any corporate event anywhere in the world. Instead, it is important to be familiar with statistical properties of event studies and the econometric

issues that might arise to determine the appropriate use of the event study methodology. With this in mind, this chapter is structured to provide an additional resource for both PhD students enrolled in doctoral programs within African universities and other scholars conducting research within the African context who want to gain a better understanding of one of the most widely used methods of evaluating market efficiency, investor reaction, and the financial impact of managerial actions on firm performance.

The section "The Basic Event Study" contains a guide on how to complete an event study. For this section, we draw on resources from the field of financial economics and strategic management to provide information on the basic steps of completing the standard event study analysis. In the section "Event Study Evidence from Africa," we review the academic literature for research where the sample consists predominantly of firms trading on African exchanges and where an event study has been used in the analysis. The primary focus of this section is to describe the type of events that researchers using African market data have considered of interest and that editors deem relevant for publication. We summarize the typical problems and remedies when faced with econometric issues during an event study in section titled "African Markets Studies: Problems and Remedies," highlighting issues of importance to researchers using data on firms trading in African markets.

THE BASIC EVENT STUDY

The purpose of an event study is to measure the extra movement in a stock's price (called the abnormal return) that occurs as the result of unanticipated information expected to influence the firm's future earnings potential. In the most common type of event studies, the abnormal return for a cross-section of firms that experience an event is tested to determine whether it is statistically different from zero. If the average abnormal return for the sample turns out to be significantly positive, the researcher will conclude that the event is viewed as good news by the market and expected to have a favorable influence on firm performance. If, on the other hand, the average abnormal return is significantly negative, the researcher will conclude that the event was viewed as bad news by the market that would have an adverse effect on firm performance. An outcome of an insignificant average return will indicate that the event had no effect on shareholder wealth. Furthermore, there should be no reaction to anticipated events or

expected announcements because their impact will already be incorporated into the price investors are willing to pay for a given stock.

Event study methodology is applicable to firm-specific events as well as events that are expected to impact the entire market, an entire country, or an industry. Some examples of firm-specific events include unexpected dividend initiations, dividend omissions, CEO terminations, surprises in earnings announcements, and lawsuits. Other events that are broader in nature include political outcomes, new legislation, changes in regulatory oversight or requirements, and new information about macroeconomic variables.

How should the abnormal return be determined? Should the significance of the abnormal return be tested for only one day or should multiple days be considered? If the researcher selects the market model as the estimation model, what will be the best proxy for the return on the market? What theories explain the reaction of the stock price? While many aspects of an event study are left up to the researcher, the goal is the same: to determine whether there is any significant stock price movement at an event in comparison to stock price movement without the event. Several published articles describe event study methodology, make excellent recommendations, and provide surveys of additional literature for researchers interested in event study techniques. Some of the most comprehensive descriptions are found in Peterson (1989), Binder (1991), McWilliams and Siegel (1997), MacKinlay (1997), and Corrado (2011).

In an event study the researcher must identify the event of interest. The event may be firm-specific (e.g., a dividend initiation, stock split, merger, CEO transition, or any other corporate action) or it may be market-wide (e.g., a legislative action, a political event, or any country-level announcements that are expected to affect the future performance of the firm). To be considered relevant for this methodology, the focal event should be unanticipated. While it is often the case that the market reaction is an empirical question the researcher would like to resolve, he or she should have some theoretical basis for expecting a positive market reaction or a negative market reaction. It could also be the case that the outcome of the event study methodology will resolve a debate between competing theories. The researcher should be clear about the basis of the study and present a predicted outcome before collecting additional data.

It is common for the researcher to use publicly available information which may come from company filings, news reports, press releases, or research databases to identify the event day. The event day is designated as day zero, and data from other days will be measured relative to this day. The researcher may place a limit on the sample period used to identify all

occurrences of the focal event to keep the sample manageable or to avoid certain economic events that may affect the stability of the parameters being estimated.

The researcher determines an event period based upon the certainty regarding the event day. The event period will be longer when the event day cannot be pinpointed with accuracy or when the researcher expects information leakage. A typical event period where a public announcement day is known with certainty could include all the days in a two-week trading period surrounding the event day. In this case, the event period would go from day −5 to day +5 for a total of 11 days. The event period and the event window could be the exact same time period. In our discussion, we use the event window to mean the days over which the researcher expects the information to affect the stock price, while the event period will be longer if leakage or market inefficiencies exist. One reason the event period is longer than the event window is in cases where the researcher wants to ensure that the estimation period is not affected by the event or would like to document the pattern of stock price movements around the event of interest. Another reason to define a longer event period is to use the event period as a buffer for other events which have been shown in prior studies to have a significant effect on firm returns. These events are considered to be contaminating events (also referred to as confounding events) which the researcher typically removes from the sample. To identify contaminating events, one searches for major announcements about each sample firm in the period surrounding the firm's specific announcement day. Meznar, Nigh, and Kwok (1994) discuss the pros and cons of various ways of handling contaminating events.

After removing contaminating events, the researcher is ready to select an estimation period. This involves selecting the number of days (i.e., length) for the estimation period as well as when it occurs (i.e., timing). The most commonly used period for estimation is a window of time prior to the event. The last day of the estimation period should be far enough away from the event to avoid any possible contamination due to leakage or other effects caused by the event. A frequently used length for the estimation period is 250 days which is about one year of trading days. The purpose of the estimation period is to determine a stock's behavior during a nonevent time period. Fig. 1 depicts a timeline showing an event day, event period, and estimation period using values from an example that we will present below. The event day (day 0) is the day that the event is announced. The event period (−5,+5) includes the days of interest for removing contaminated events as well as the days where we are interested in statistical significance of
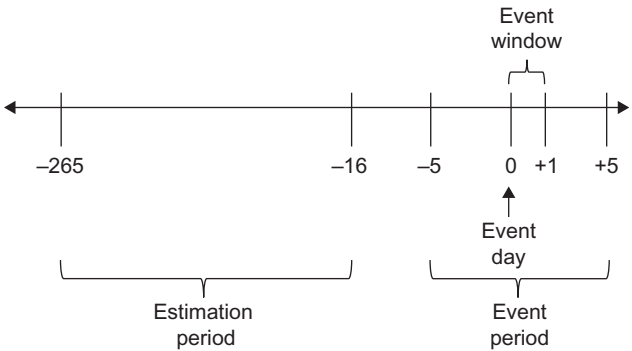
Fig. 1. Event Study Timeline Using Parameters from the Data Breach Example. *Note*: The event day represents the day the data breach occurred (January 21, 2009). The event window, days (0,+1), represents the time period that we expect the news to impact the stock price. The event period, days (−5,+5), is the period over which we will look for news of other events that might contaminate the stock price reaction attributable to the data breach. The window from day −265 to day −16 is called the estimation period and is used to estimate intercept and slope coefficients for the firm's stock under conditions that do not include a data breach.

abnormal returns across event windows not shown in the figure. A commonly used primary event window is two days (0,+1).

A model is chosen for application over the estimation period. The most common models are the mean adjusted model, the market adjusted model, and the market model. The assumption when using the mean adjusted model is that the stock's average return during the estimation period gives the best estimate of what the stock return should be in a nonevent. The assumption when using the market adjusted model is that the average return on some stock market index is the best estimate of the stock's return during a nonevent. The market model includes a risk adjustment by considering the comovement between the stock's return and the market's return to be an important factor in determining the stock's return during a nonevent. When selecting the market model, the researcher must also decide what to use as a proxy for the return on the market. The most commonly used market index for studies using New York Stock Exchange firms is the equally weighted market index. Other models may include additional factors that the researcher believes are important to consider (e.g., size, industry, etc.). However, survey papers suggest that little value is added in most cases by having these additional factors and that the market model with the equally weighted index is robust in most cases.

If the researcher chooses the market model, the expected intercept (alpha) and slope (beta) measures can be computed using ordinary least squares (OLS) regression. For each day of the estimation period, the stock return of each firm is regressed on the market return for that same day. If the researcher has a sample of size N, the researcher will end up with N alphas and N betas which will be used to compute the abnormal returns during the event window. In studies of market-wide or economy-wide events, use of the market model has the added advantage of reducing biases created due to calendar time clustering (Peterson, 1989).

The abnormal return, $A_{i,t}$, for the ith firm on day t of the event window is calculated by the following equation, using the notation given in Brown and Warner (1985):

$$A_{i,t} = R_{i,t} - \hat{\alpha}_i - \hat{\beta}_i R_{m,t} \qquad (1)$$

where $\hat{\alpha}_i$ and $\hat{\beta}_i$ are the intercept and slope for the ith firm from the OLS regressions. $R_{i,t}$ and $R_{m,t}$ are the returns for the ith firm and the market on day t of the event window. For the event window in Fig. 1, there will be 11 abnormal returns (going from day -5 to day $+5$) for each firm in the sample. The first abnormal return would be computed by taking the firm's beta and multiplying by the return on the market index for day -5. This would be added to the intercept for the first firm. The sum of the intercept and the product of beta and the market return represents the expected return for the first firm. This expected return is subtracted from the actual return that is observed on the first firm in the market, resulting in the abnormal return on day -5. The process is repeated for each day of the event window and for each firm in the sample.

Under the assumption of cross-sectional independence, the researcher can cumulate abnormal returns, standardize them, and then test for statistical significance. The cumulative abnormal return (CAR) is simply the sum of abnormal returns over the T days of the event window and is specified as:

$$\text{CAR}_i = \sum_{t=0}^{T} A_{i,t} \qquad (2)$$

The CARs are examined for the event windows of interest to the researcher. For a two-day CAR over our event window $(0,+1)$, we would add the abnormal return on day 0 to the abnormal return on day 1 before testing for significance. To examine whether there is leakage prior to the event window, we could sum the abnormal returns for days -5, -4, -3, -2,

and −1. We would then need to test this five-day CAR for significance. Peterson (1989) provides insight on alternative adjustments for testing abnormal returns over periods longer than a day in length.

The standardized CAR (SCAR) is calculated as the CAR divided by its standard error. That formula is specified as:

$$\text{SCAR}_i = \frac{\text{CAR}_i}{\sqrt{\text{Variance (CAR)}_i}} \qquad (3)$$

Under an assumption of normality, tests of significance can be performed by computing the *Z*-statistic for each event day or for an event window. Although we have only shown the SCAR, the researcher who uses a single-day event window can standardize the one-day abnormal return before testing. The advantage of computing standardized abnormal returns is that they reduce problems of heteroskedasticity in cross-sectional analyses where abnormal performance is used as the dependent variable (Peterson, 1989).

An Illustrative Example

We present a seven-step model for completing an event study in Fig. 2. Some researchers might combine identifying the event and choosing the event window as one step rather than list them as the two we have in Fig. 2. Additionally, some researchers consider the cross-sectional analysis of CARs on firm characteristics as a component of the event study, while others consider it a separate, albeit necessary, analysis that follows the event study. However, the focus should not be on the number of steps but rather on completing the actions included in each stage.

We present the steps for completing an event study by using a computer data breach as an example of an unanticipated event that provides new information to the market. New information is provided to the market when corporate executives make the public announcement that such an event has happened. On January 21, 2009, the *Wall Street Journal* (*WSJ*) reported that Heartland Payment Systems Inc. had disclosed what at the time might have been the largest data breach ever when cyber criminals hacked into their computer network. Industry analysts pointed out that TJX Companies had suffered a similar card-data breach about four years prior which had affected around 45 million credit card numbers. The analysts further indicated that data breaches could cost as much as $600 per account due to fees, legal costs, and covering fraudulent purchases.
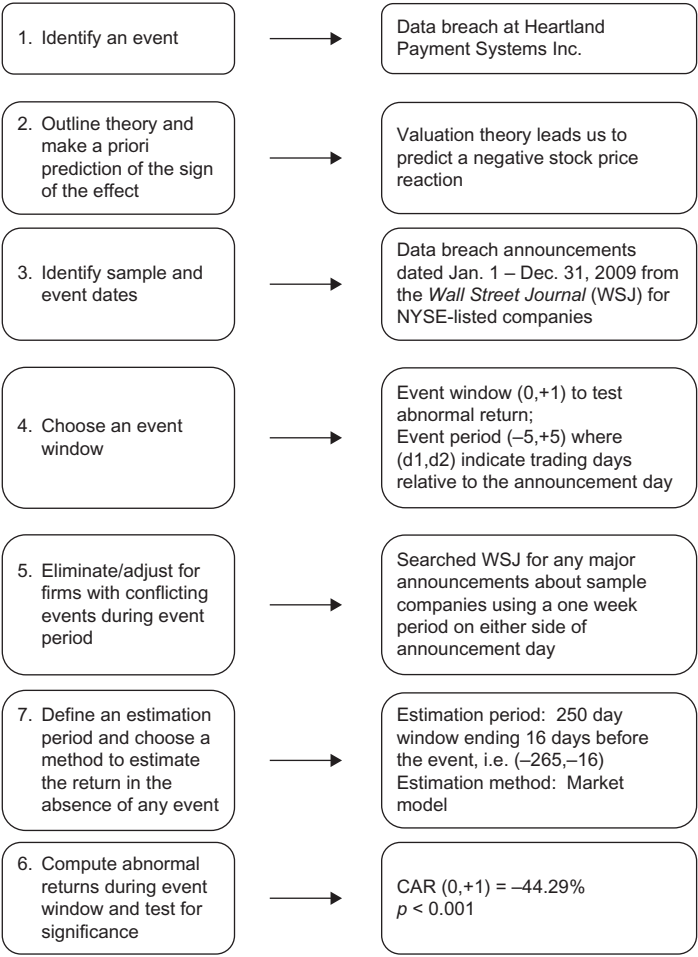
1. Identify an event	Data breach at Heartland Payment Systems Inc.
2. Outline theory and make a priori prediction of the sign of the effect	Valuation theory leads us to predict a negative stock price reaction
3. Identify sample and event dates	Data breach announcements dated Jan. 1 – Dec. 31, 2009 from the *Wall Street Journal* (WSJ) for NYSE-listed companies
4. Choose an event window	Event window (0,+1) to test abnormal return; Event period (–5,+5) where (d1,d2) indicate trading days relative to the announcement day
5. Eliminate/adjust for firms with conflicting events during event period	Searched WSJ for any major announcements about sample companies using a one week period on either side of announcement day
7. Define an estimation period and choose a method to estimate the return in the absence of any event	Estimation period: 250 day window ending 16 days before the event, i.e. (–265,–16) Estimation method: Market model
6. Compute abnormal returns during event window and test for significance	CAR (0,+1) = –44.29% $p < 0.001$

Fig. 2. Steps for Conducting an Event Study Using the Data Breach Example.

Although no one could say how many cards had been impacted by the data breach at the time, Heartland executives indicated that the company handled about 100 million card transactions a month. On the day of the public announcement, Heartland's market capitalization was approximately $531 million. Therefore, the data breach event represents an example of an unexpected event that provided new information about

the quality of computer controls at Heartland and which could be expected to affect the company's financial standing.

Valuation theories indicate that the present value of a firm is the discounted value of its expected future cash flows. Data breaches are expected to create new outflows in the form of fees and legal costs. Furthermore, confidence regarding the company's ability to avoid future breaches may lead to reluctance of companies to allow Heartland to handle future transactions. Thus, the expectation that there will be losses and cash outlays in the future leads us to predict a negative stock price reaction at the data breach announcement.

If we want to determine whether our prediction is correct, we can gather a sample of firms that made public announcements of a data breach and analyze the results of an event study. At this point, we would define the parameters of our sample. For this example, we will limit our sample to publicly traded firms that make data breach announcements in the *WSJ* during a sample period from January 1, 2009, to December 31, 2009. For the purposes of this example, we are being more restrictive so that we can show details of the full sample here. In an actual research analysis, we would be likely to use a longer sample period than one year or we would provide justification for why this particular year might be of greater interest. We have restricted our sample to publicly traded firms to increase the likelihood of having stock return or price data available, and we have limited the news to publication in the *WSJ* because as a leading business periodical it should include coverage of widely followed firms and of events that are more likely to impact financial markets. Completing a search of the *WSJ*, we find only one event that meets our sample criteria. The announcement date of that event is January 21, 2009, when the Heartland news story was first published in the *WSJ*.

Our next step is to choose the event window. Although we are quite certain of the *WSJ's* publication date, it is customary to define the announcement day (identified as day 0) and the next day (day +1) as the event window because there is the possibility that the news is reported at the close of trading. A two-day window would be more likely to fully capture the impact of the news. If the event study measures the effect of an event that has not been too widely studied, it is justifiable to include a longer event period to allow the researcher to determine whether stock price movements near the event might be associated with information leakage or market inefficiencies. Therefore, we select an event period that covers the two-week period surrounding the announcement. That is, we use five trading days before and five trading days after the announcement day as the event

period. However, we use the two-day event window to determine the accuracy of our prediction for the stock price reaction.

In the fifth step, we search for any major news that is announced within the event period. We find no additional news coverage of Heartland Payment Systems Inc. from January 14 through January 28, 2009, so it will remain in our sample. If we had additional firms, we would need to check their unique event periods for any news that we expect would influence their stock prices (e.g., dividend increases, dividend omissions or initiations, stock splits or dividends, mergers or acquisitions, executive resignations or terminations, and major product introductions). Firms with conflicting events would have been removed from the sample.

The sixth step is to choose an estimation period and model. We use the customary pre-event estimation period and 250-day estimation period length. To ensure that there is no overlap between our event and the estimation period, we end the estimation period 16 days before the event. We use returns from the equally weighted market index to proxy the market returns while estimating the expected return parameters under nonevent conditions with the market model. In other words, we regress the firm's return for each day of the estimation period on the returns for the chosen market index. This process gives us an intercept (alpha) and slope (beta) for each firm in the sample.

The next step is to compute and test the significance of the abnormal return of interest. We compute the abnormal return for the focal firm on each day of the event window using Eventus.[1] We present the event study output in Table 1. Based on Eq. (1), the abnormal return is found by multiplying the market return each day by the estimated beta and then subtracting this product from the estimated alpha. This value is then the expected return on that event day. The abnormal return is simply the difference between the actual and the expected return on the event day. The CAR for (0,+1) is the sum of the abnormal return on day 0 and the abnormal return on day 1. We find a statistically significant CAR of −44.29 percent for the two-day event window ($p < 0.0001$). The CAR for the period leading up to the event window (i.e., days −5 to −1) is insignificant (CAR = −10.09 percent, $p = 0.1157$), as is that for the period following (i.e., days 2 to +5, CAR = 7.39 percent, $p = 0.1978$). This leads us to conclude that there was no leakage, and the reaction pattern around the announcement appears to be consistent with the semi-strong form of the efficient markets hypothesis.[2]

Although we have completed the basic steps for an event study, we would be remiss not to complete robustness tests and cross-sectional analyses. A common robustness check is to complete nonparametric tests even

Table 1. Selected Event Study Output.

Panel A: Event Period Abnormal Returns

Day	Abnormal return, %	Standardized abnormal return	*p*-value
−5	−0.28	0.097	0.9231
−4	−1.01	−0.352	0.7253
−3	−0.20	−0.068	0.9455
−2	−6.81	−2.390	0.0176
−1	−2.36	−0.819	0.4136
0	−4.78	−1.667	0.0968
+1	−39.51	−13.846	<0.0001
+2	3.93	1.381	0.1685
+3	−6.25	−2.195	0.0291
+4	5.43	1.904	0.0581
+5	4.28	1.496	0.1360

Panel B: Event Period Abnormal Returns

Windows	Cumulative abnormal return, % (CAR)	Standardized CAR	*p*-value
(0,+1)	−44.29	−10.925	<0.0001
(−5,−1)	−10.09	−1.573	0.1157
(+2,+5)	7.39	1.288	0.1978

Panel C: Nonparametric Tests

Windows	Rank test *Z*	*p*-value
(0,+1)	−2.318	0.0212
(−5,−1)	−1.448	0.1487
(+2,+5)	1.553	0.1217

Notes: The event is the January 21, 2009 data breach that occurred at Heartland Payment Systems, Inc. The abnormal return was computed using an equally weighted market index in a regression of firm returns on the market return where the market model parameters were estimated using a 250-day estimation period that started 265 days before the event. We find these results using Eventus software.

when samples are large and nonnormality is not expected to be a problem. The rank test is often used but there are various specifications as indicated in Corrado (2011). We include the *Z*-statistic and *p*-values for the three event windows using the Corrado (1989) rank test in Panel C of Table 2. The results from the rank test are consistent with the evidence from the parametric analysis. Only our primary event window (0,+1) is statistically significant at traditional levels, having a *p*-value less than 0.05.[3]

In this example, we have only one firm-specific observation. However, we could collect a sample of data breach announcements across more years.

Table 2. Event Studies Using Data from African Countries.

Studies	Event	Sample	Event Window	Findings	Additional Analysis to Explain CARs
Panel A: Wealth effects of corporate actions					
Ghorbel (2012)	Financial statement announcements from 2003 to 2007	48 Tunisian-listed firms	$(-15,+15)$ days	A significant reaction to the release of financial statements occurs for Big 4 auditors; the auditor's opinion and the existence of a costatutory audit also impact the reaction	None
Sare et al. (2014)	Dividend initiations from 1990 to 2012	29 firms listed on the Ghana Stock Exchange (GSE)	$(-5,+5)$ days	Dividend initiations by GSE firms resulted in positive abnormal returns	The market reaction was most positive for manufacturing firms
Panel B: Tests of market efficiency					
Asamoah (2010)	Dividend announcements from 2003 to 2005	Three poorly performing stocks on GSE	$(-12,6)$ months	GSE was not semi-strong efficient	None
Okeahalam and Jefferis (1999)	Earnings announcements by firms from the banking and retail sectors from 1996 to 1997	49 events from Botswana Stock Exchange (BSE), Zimbabwe Stock Exchange (ZSE), and Johannesburg Stock Exchange (JSE)	$(-2,+2)$ weeks	The BSE and ZSE are not semi-strong form efficient; the JSE is semi-strong form efficient	None

Panel C: Legislation resulting from apartheid in South Africa

Strydom et al. (2009)	Black Economic Empowerment (BEE), 1996−2006	254 events by JSE firms	(−5,+5) days	No economic impact for BEE transactions	None
Arya and Zhang (2009)	CSR adoption in South Africa from 1996 to 2005	71 events	(−5,+5) days	CSR adoptions are positive for late adopters	Cross-sectional regressions of CARs on early adoption (−) and percent equity sold (+)
Jackson et al. (2005)	BEE transactions from 1996 to 1998	20 deals from South Africa	(−2,+2) days	Empowerment deals led to positive abnormal returns	CARs are positively related to the size of the interest acquired

Panel D: Trade effects, governance implications, and economic infrastructure

Alber (2013)	International and national quality accreditation announcements from 2006 to 2012	11 Egyptian listed companies	(−10,+10) days	The comparative advantage indicated by quality accreditations has a positive impact on Egyptian firm returns	None
Chortareas et al. (2012)	Devaluing currency or switching from pegged exchange rate to floating rates (Egypt − January 28, 2003, Morocco − April 25, 2001, Turkey − February 22, 2001)	Egypt ($N = 18$) Morocco ($N = 22$) Turkey ($N = 55$)	(−3,+3) days	Significant abnormal returns were found in Egypt and Turkey, but no significant abnormal returns were found in Morocco	None
Nezerwe (2014)	Southern African Development Community Free Trade	JSE stock index	(−45,+45) days	The free trade agreement had a positive impact on the stock market	None

Table 2. *(Continued)*

Studies	Event	Sample	Event Window	Findings	Additional Analysis to Explain CARs
	Agreement (August 18, 2008)				
Osuala et al. (2013)	Sudden removal of bank CEOs (2009)	5 Nigerian banks	(−2,0) (+18,+21) days	The announcement of the CEOs' removals had a positive, but insignificant impact on the stock returns	None
Raddatz (2011)	Multilateral Debt Relief Initiative (July 8, 2005); Modified HIPC (June 18, 1999); Heavily Indebted Poor Countries (June 27, 1996)	68 South African MNCs	(−10,+10) days	The announcement of debt relief initiatives conveys positive news	Graphical pairwise comparisons of CARs by subsidiary employment levels (i.e., a measure of the intensity of exposure to the initiative) and by two industry categories (i.e., service or natural resource)

After completing the event study analysis, we would test whether relationships between the standardized abnormal returns and firm characteristics support existing theory using an appropriate cross-sectional test.

EVENT STUDY EVIDENCE FROM AFRICA

To what extent has the event study methodology been used in the African context? To address this question, we conducted a review of the existing literature. In particular, we searched the ABI-Inform database, regarded as the most comprehensive business database available for researchers worldwide, using as initial criteria (1) the keywords "event study," "market reaction," "abnormal return," or "announcement event" in the text of the paper; (2) the name of any African country in the text of the paper; (3) the paper was peer reviewed; and (4) the paper was available in full text. Moreover, we further limited our review to studies where the research indicated that an event study had been undertaken using firms from African countries and where at least one third of the sample firms were listed on an African stock exchange. This resulted in the identification of a total of 12 studies focused on analyzing events that were expected to impact firms listed on a stock exchange in an African country.[4] We provide brief details of each of these studies which use firm-specific data from African markets in Table 2.

The studies that we review here are varied with respect to many characteristics of the event study analyses. Among these studies, researchers use daily, weekly, and monthly data. The studies contain both parametric and nonparametric methods with some studies completing standard cross-sectional analyses while others use graphical analyses after the event study and a few conduct no cross-sectional analyses at all. The sample firms are listed on seven different exchanges in Africa. The researchers are located in various countries, both African and non-African, at the time their analysis was published. Also, the occupation at the time of publication indicates that the authors are in government, academic, agency, or institutional research as well as hold private firm positions thereby indicating the widespread interest in these markets.

Events Common with Mainstream Research

Despite the variations aforementioned, we find that researchers examining African stock market data have used event study methods for reasons

common to those in developed countries, primarily investigating price reactions or assessing market efficiency. First, there are two studies examining stock price changes around the date of public announcements of corporate actions which find patterns that confirm theories of market participants' expectations in developed countries and help establish levels of confidence that market mechanisms may function well in the African context. In particular, Sare, Pearl-Kumah, and Salakpi (2014) find that news of a dividend initiation by firms listed on the Ghana Stock Exchange results in significant, positive abnormal returns. Also, Ghorbel's (2012) study of market reaction to financial statement announcements by Tunisian firms indicates that the magnitude and direction of firm-specific events are related to transaction-specific characteristics in that auditor quality and auditor opinion are significantly related to CARs. Panel A of Table 2 contains more details of these African studies which provide evidence of wealth effects of managerial actions to shareholders similar to those reported in event studies conducted in developed markets. Second, documenting the efficiency of the market in which a stock trade allows traders to identify the potential for gaining returns in excess of what should be earned given the risk characteristics of a particular situation. In this regard, the two studies that use standard event study methods to assess market efficiency suggest that African markets, for the most part, are not semi-strong form efficient. Specifically, as detailed in Table 2, Panel B, these studies fail to find this level of efficiency for the Ghana Stock Exchange (Asamoah, 2010) using unexpected dividend announcements or for the Botswana and Zimbabwe Stock Exchanges (Okeahalam & Jefferis, 1999) using earnings announcements. However, the pattern of market response that Okeahalam and Jefferis (1999) found using earnings announcements by firms trading on the Johannesburg Stock Exchange supports semi-strong efficiency for that market. Collectively, evidence from these studies suggests that African markets exhibit some consistency with existing theories and findings in terms of the wealth effects of corporate actions, but in general appear not to exhibit attributes of the semi-strong form of market efficiency.

Events Unique to the African Context

Researchers have also used data from African exchanges to lend evidence on situations unique to African countries (e.g., apartheid) or which are of

particular concern for the economic growth of the continent (e.g., trade effects or infrastructure problems). In Panel C of Table 2, we present the details from three papers examining the market reaction to firm-specific transactions that result from Black Economic Empowerment (BEE) transactions, which one study (Arya & Zhang, 2009) classifies as corporate social responsibility (CSR) initiatives. BEE transactions, mandated by government legislation starting in 1994, are equity transfers from white-owned South African firms to blacks. The purpose of these transactions was to provide more inclusion (in business ownership, hiring, procurement, etc.) for those who had been disadvantaged by the previous apartheid system in that country. The evidence on whether these BEE transactions create positive abnormal returns is somewhat mixed. Jackson, Alessandri, and Black (2005) find a positive market reaction using nonparametric methods for a small sample analysis of 20 transactions that occurred from 1996 to 1998. Arya and Zhang (2009) use a sample of 71 transactions occurring from 1996 to 2005 and only find a significant, positive reaction for companies classified as late adopters. Strydom, Christison, and Matias (2009) find no significant reaction in their sample of 254 events from 1996 to 2006. Thus, the authors did not complete any further cross-sectional analyses. The two studies showing some positive reaction provide cross-sectional analyses which both indicate that the CAR is positively related to the size of the equity transferred. The average size of equity transferred is approximately 16 percent in the Arya and Zhang (2009) study and 24 percent in the study by Jackson et al. (2005). No information on the size of equity transfers was provided by Strydom et al. (2009).

Economic growth in Africa has been hampered by trade restrictions, weak economic infrastructure, and poor corporate governance. Therefore, it is not surprising that researchers using event study methods on African data would be interested in seeing the relationship between initiatives pertaining to any of these issues and stock returns. We include the brief details from five studies that analyze the effect of one or more of these on the stock price of African firms in Panel D of Table 2. Three of the papers focus on situations that have cross-country trade implications. Chortareas, Cipollini, and Eissa (2012) evaluate the effects of announced currency devaluation and changes from fixed to floating currencies following financial crises in one Middle Eastern and two African countries. In doing so, they report significant, positive abnormal returns for Egyptian firms, but not Moroccan firms. Nezerwe (2014) completes an event study analysis of the 2008 Southern African Development Community Free Trade Agreement.

Results of this study provide evidence about the market's positive expectation at the removal of trade restrictions among member countries which would foster greater economic integration in the Southern Africa region. Moreover, a paper by Raddatz (2011) analyzes the impact of debt relief initiatives on South African companies having subsidiaries in countries expected to benefit from such initiatives. Using three distinct announcements of debt relief initiatives in 1996, 1999, and 2005, the author finds that abnormal returns are positive in all three time periods, but only statistically and economically significant for the 2005 debt relief initiative which resulted in a write-off of almost 70 percent of the poorest countries' total debt.

The other two papers place emphasis on quality and governance initiatives within Egypt and Nigeria, respectively. Alber (2013) finds a positive market reaction for 11 companies listed on the Egyptian Exchange at the announcement of events signaling quality competitive advantages. The author indicates that these events include international and national accreditations and provide as examples the implementation of quality standards, quality awards, and listing on the Environment, Social, and Governance (ESG) index in Egypt. Osuala, Nto, and Akpan (2013) examine the market response to a country-wide event in which the Governor of the Central Bank of Nigeria ousted five bank chief executives on a single day in August of 2009. The executive removals were a result of poor risk-management decisions and corporate governance practices that led to non-performing loans and other faulty practices. The authors conclude that their finding of no abnormal return indicates that the sudden removals had no impact on the banks' stock prices.

AFRICAN MARKETS STUDIES: PROBLEMS AND REMEDIES

Given the growing interest in African markets and the widespread use of event study methodology in academic research, one might wonder why there is a dearth of event study evidence in these markets. We suggest there are at least three factors that deter researchers from publishing event studies within the context of African markets: (1) data insufficiencies, (2) limited use of more advanced statistical techniques or tools, and (3) incomplete theoretical arguments to motivate the research question(s) of interest.

Insufficiencies pertaining to the data create difficulties for using standard event study methodology to investigate stock price reactions for securities trading in African market. There are many sources of data insufficiency which include:

1. Nonsynchronous trading or infrequent trading;
2. Missing returns;
3. Exchanges having only a small number of listed firms;
4. Limited industry representation among listed securities;
5. Lack of major news sources that focus on business activity; and
6. Limited or costly access to historical (and in some cases, even current) trading information.

The good news is that most of the data inadequacies can be addressed by removing the second factor (i.e., giving attention to statistical detail). Attention to statistical detail means that the researcher will have a deep knowledge of the sample and events being included in the event study and will maintain an awareness of statistical developments relevant for event studies and the assessments of them. That is, the research should be aware of biases and issues with the sample or event, the potential remedies for the situations, and the pros/cons of the remedy.

The nonsynchronous trading problem stems from the fact that researchers typically use the last closing price in their analyses. However, the actual prices used for the datasets may not be recorded at the same time for all firms. For a portfolio that includes a regularly trading stock and another stock that trades infrequently, serial independence is created by the cross-autocorrelation in the securities' prices when the infrequently traded security's price adjusts to news after the regularly trading stock's price has already adjusted.[5] The nonsynchronous trading problem appears to be exacerbated by higher frequency data in samples where some of the securities may not trade regularly. Consistent with this, Fernandes and Ferreira (2009) choose to use monthly data instead of daily or weekly returns data because of the nonsynchronous trading problem prevalent for the emerging market firms in their sample.

Occasionally, data for a given firm may not be available for all trading days included in the estimation period. In cases of lack of trading activity driven by investor interest, trading halts, and suspensions initiated by a stock exchange, governmental regulatory entity, or firm, and/or other gaps in data sources, there will be missing returns on the relevant date(s). Although missing returns may be due to factors other than infrequent trading, the options for reducing the effects of infrequent trading can also be

used for handling missing returns. Peterson (1989, p. 52) presents a list of four options with caveats for three of them. The remaining option is for the researcher to remove the time period of missing data, as well as the succeeding period, from the analysis and complete the analysis with the remaining available data.

Another source of data insufficiency pertains to the number of firms listed on a given stock exchange based in Africa. As shown in Table 3, there are 24 exchanges registered as members of the African Stock Exchange Association (ASEA). The exchanges in Johannesburg, Egypt, and Nigeria have the largest number of listings on the ASEA with 423, 244, and 188, respectively. Removing these three exchanges, the remaining exchanges have approximately 33 listed securities, on average. In addition, we find seven other exchanges in Africa that are nonmembers of the ASEA. Of these exchanges which we list in Table 4, the exchange in Gabon has the highest number of listed securities with only seven. With these small exchanges, unless researchers consider multiple countries in a given event study when appropriate (i.e., Chortareas et al., 2012; Okeahalam & Jefferis, 1999; Park, 2004) many analyses are likely to be small sample analyses and results are likely to be more robust using nonparametric tests. Corrado (2011) lists multiple studies which show that violations of normality assumptions create concerns for numerous exchanges. In their event study analysis that included firms from 24 developed markets and 24 emerging markets, Campbell, Cowan, and Salotti (2010) find that using nonparametric tests to compute statistics from multicountry samples outperforms standard parametric testing in event studies. The nonparametric models also help to avoid the bias that is created when a sample firm makes up a large part of the capitalization of its country's national market index.

Examining the listings, we find that the smaller exchanges are often dominated by the presence of a large number of firms from only a few sectors. This may lead to samples with only one industry. Ahern (2009) indicates that one-factor models such as the market model perform just as multifactor models. However, in situations where a sample is heavily weighted with firms of a similar characteristic (e.g., industry or size), a multifactor model that includes a factor for the overriding characteristic leads to more robust results.

There is also some concern about general availability of trading data of listed firms and dissemination of news about business activities, earnings reports, and other stories of interest. In gathering data on the exchanges and their listings, we found that some websites were not current, some neither gave a listing of companies nor their latest prices, and some

Table 3. Members of the African Securities Exchange Association (ASEA).

Stock Exchange	Origin	Website	Listings	Location
Bolsa de Valores de Cabo Verde (BVC)	2005	http://www.bvc.cv/	24	Cape Verde
Botswana Stock Exchange (BSE)	1989	http://www.bse.co.bw/	37	Botswana
Bourse de Tunis (XTUN)	1969	http://www.bvmt.com.tn/	62	Tunisia
Bourse Régionale des Valeurs Mobilières (BVRM)[a]	1996	http://www.brvm.org/	37	Benin
Casablanca Stock Exchange (CSE)	1929	http://www.casablanca-bourse.com/	75	Morocco
Dar es Salaam Stock Exchange (DSE)	1996	http://www.dse.co.tz/	17	Tanzania
Douala Stock Exchange (DSX)	2006	http://www.douala-stock-exchange.com/	3	Cameroon
Egyptian Exchange (EGX)	1883	http://www.egx.com.eg/	244	Egypt
Ghana Stock Exchange (GSE)	1989	http://www.gse.com.gh/	36	Ghana
Johannesburg Stock Exchange (JSE)	1887	http://www.jse.co.za/	423	South Africa
Khartoum Stock Exchange (KSE)	1994	http://www.kse.com.sd/	59	Sudan
Libyan Stock Market (LSM)	2006	http://www.lsm.ly/	10	Libya
Lusaka Stock Exchange (LuSE)	1994	http://www.luse.co.zm/	23	Zambia
Malawi Stock Exchange (MSE)	1994	http://www.mse.co.mw/	14	Malawi
Mozambique Stock Exchange (BVM)	1999	http://www.bolsadevalores.co.mz/	32	Mozambique
Nairobi Securities Exchange (NSE)	1954	http://www.nse.co.ke/	52	Kenya
Namibian Stock Exchange (NSX)	1992	http://www.nsx.com.na/	32	Namibia
Nigerian Stock Exchange (NSE)	1960	http://www.nse.com.ng/	188	Nigeria
Rwanda Stock Exchange (RSE)	2005	http://www.rse.rw/	5	Rwanda
Sierra Leone Stock Exchange (SLSE)	2009	No active website found	1	Sierra Leone
Stock Exchange of Mauritius				
Official Market (SEM)	1989	http://www.stockexchangeofmauritius.com/	47	Mauritius
Development & Enterprise Market (DEM)			51	
Uganda Securities Exchange (USE)	1998	http://www.use.or.ug/	18	Uganda
Zimbabwe Stock Exchange (ZSE)	1896	http://www.zse.co.zw/	62	Zimbabwe

Note: The first source for data is the stock exchange website. The second source is the ASEA website. All data are as of February 2014.
[a]Serves Benin, Burkina Faso, Guinea Bissau, Côte d'Ivoire, Mali, Niger, Senegal, and Togo.

Table 4.   Other African Exchanges.

Stock Exchange	Origin	Website	Listings	Location
Abuja Securities and Commodities Exchange	1998	http://www.abujacomex.com/	–	Nigeria
Agricultural Commodities Exchange of Zambia	2007	No active website found	–	Zambia
Algiers Stock Exchange	1999	http://www.sgbv.dz/	4	Algiers
Bourse Régionale des Valeurs Mobilières d'Afrique Centrale (BVMAC)[a]	2003	http://www.bvm-ac.com/fr/	7	Gabon
Seychelles Stock Exchange	2012	http://www.trop-x.com/	1	Republic of Seychelles
Somalia Stock Exchange	2012	No active website found	–	Kenya
Swaziland Stock Exchange	1990	http://www.ssx.org.sz/	5	Swaziland

Note: The exchanges listed here were not included on the ASEA website as member exchanges.
[a]Serves Cameroon, Central African Republic, Chad, Congo, Equatorial Guinea, and Gabon.

indicated that historical data would need to be purchased.[6] Also, we noticed that most websites provided only a limited volume of news stories about listed firms, and in some cases the news accounts had not been updated for several months. With regard to news sources independent of the exchanges, we noticed a few websites, most notably allafrica.com, that provide daily news stories. However, this site is not focused primarily on business news and aggregates content from over 125 African news organizations and more than 200 other news sources.[7] Similarly, data are available online through *Reuters Africa Daily*. However, this source provides very broad news coverage and typically reports only about four to five stories daily Mondays through Fridays. With regard to print sources, publications with a focus on business news in Africa such as *This is Africa* (owned by the *Financial Times Ltd* from the United Kingdom) and *African Business* are published on a bimonthly and monthly basis, respectively. Collectively, these issues with accessibility to trading data, dissemination of business news, and timeliness in reporting complicate the use of event study methodology, so much so that in extreme cases it may be advisable not to conduct the analysis. Hopefully, these issues can be resolved in time as investors and researchers push the stock exchanges as well as individual firms for greater data availability, enhanced overall transparency, and development of mechanisms to improve information dissemination throughout the continent.

CONCLUSION

Many factors point to increased interest by researchers in stock market activity and behavior within African countries. From an external market-based perspective, numerous governments on the continent are implementing new legislation and reforms to enhance capital market development as a key driver of overall national economic growth (Ernst & Young, 2013; International Monetary Fund, 2013; Jefferis & Smith, 2005; World Bank, 2011). Also, many African governments and African-headquartered companies are engaging in a myriad of actions aimed at attracting more equity investments from foreign companies eager to establish or strengthen their presence on the continent as well as individual foreign investors desiring the potential for high returns (African Development Bank, 2011; Boston Consulting Group, 2010; Jefferis & Smith, 2005; United Nations Conference on Trade and Development, 2013). As a result of these factors, researchers are likely to utilize event study methodology to understand the effects of government- and company-announced initiatives on estimations for the future earnings potential of firms listed on African stock exchanges.

To date, however, there is a dearth of African event studies published in peer-reviewed journals covered by the most comprehensive business database with a global reach upon which to build. However, this needs to and is expected to change in light of the trends mentioned above and others. Thus, we hope that this chapter will prove useful for African scholars and others interested in advancing knowledge about stock market activity in various countries that comprise the continent of Africa. Of primary importance to growing this body of knowledge is that scholars gain a deeper understanding of the event study methodology, its core assumptions, and techniques to address violations of such assumptions or other research design issues which is the focus of this chapter.

In particular, scholars interested in conducting event studies in African markets should have a keen understanding of the econometric properties associated with and multiple steps required by the methodology. Also, they should articulate a theoretical argument for expected market reaction and provide explanations for choices such as the focal event being analyzed or the event window being used. In addition, it is important that appropriate adjustments and corrections are made that take into account unique characteristics of the focal African capital market(s) highlighted in this chapter as well as others that may violate assumptions or necessitate different research designs.

The need to pay more attention to issues and remedies associated with event studies in Africa is critical for at least three main reasons. First, it is necessary in order to enhance the interpretative validity of statistical inferences drawn from the results. Failure to make necessary corrections or adjustments reduces confidence in conclusions drawn from the event study (McWilliams & Siegel, 1997). Second, it facilitates the researchers' ability to position the findings of their study within the context of existing literature and determine the extent to which stock market behavior in African markets is similar to that of markets such as the United States and the United Kingdom. This also helps to identify potential boundary conditions of existing theories developed mainly from an Anglo-American perspective. Third, it enhances the chances of the study being published in leading academic journals in management, finance, and other business fields. This is necessary in order to disseminate and advance knowledge of African stock market behavior in particular and management of African firms in general to a broader, global audience of academicians and practitioners. This last reason is one of the chief goals of the African Academy of Management (AFAM), a new organization established in 2011 by a group of African scholars on the continent and in the diaspora with membership in the Academy of Management. Subsequent to its establishment, the AFAM in January 2014 launched a new journal, the *African Journal of Management*, with the express intent of maintaining high academic standards necessary to increase the credibility and visibility of research in Africa. It is our sincere desire this chapter will assist scholars in developing research projects which utilize the event study methodology in the African context in a way that meets such standards.

NOTES

1. A method to complete the event study using Microsoft Excel is fully described by Seiler (2004). To complete an event study with about 40 stocks using Excel may take a researcher a few hours. Using event study software (e.g., Eventus), the same analysis could be completed in a matter of minutes. Other means of completing the analysis for an event study is to create a program using statistical software such as SAS or EViews. Boehmer, Broussard, and Kallunki (2002) provide a chapter which includes an SAS example for conducting an event study, and Cowan (2002) provides examples using Eventus along with SAS.

2. The semi-strong form of market efficiency assumes that publicly available information will be incorporated into stock prices with such speed that investors will not consistently be able to earn higher abnormal trading profits than others

from use of such information. The U.S. markets are generally considered to be semi-strong form efficient. The other forms of market efficiency are weak form (based on historical information) and strong form (based on private information). Each stronger form of market efficiency also incorporates the type of information that its weaker counterpart is based on. Tests of weak form efficiency usually involve tests using technical trading rules. See Hudson et al. (1996) for an example. Tests of stock markets' effects from insider trading are frequently used to test strong form efficiency. For an early study of strong form efficiency, see Finnerty (1976).

3. Corrado (2011, p. 211) presents a very simple test where the assumption of normality is not needed. The researchers need to only compute the abnormal return at the event date, compare it to returns during the estimation period, and compute a simple test statistic to determine significance.

4. An example of a study not included in the table (due to a small proportion of firms trading on an African exchange) is the interesting analysis of the end of the Angolan civil war by Guidolin and La Ferrara (2007). The analysis consists of an event study for seven diamond mining firms holding concessions in Angola at the time of the death of the rebel leader. These firms were control-matched to a portfolio of diamond mining firms having no concessions in Angola. Of the seven firms in the Angolan portfolio, only two were listed on the Johannesburg Stock Exchange while the others were listed on the Toronto and Australia Exchanges. The negative stock price reaction to the end of the civil war led authors to conclude that conflict leads to private benefits for some firms.

5. For a more thorough description of the problems caused by nonsynchronous trading, see Lo and MacKinlay (1990).

6. There are many data services in the United States that provide data in a format that facilitates the research process. Though such services typically require paid subscriptions, historical price data needed to conduct an event study is also freely available from various internet websites and in leading business periodicals.

7. In contrast, major daily newspapers exist in the United States (*WSJ*) and the United Kingdom (*Financial Times*) that place primary emphasis on business and economics news. Given their focus on topics having domestic and international relevance and publication of several international editions outside their respective home countries, both newspapers are widely circulated with over 3 million daily subscribers combined. Also, these newspapers provide detailed information reflecting the previous day's trading activity on a firm-level and aggregate basis in each issue (mainly for the NYSE and NASDAQ) that can be used for determining abnormal returns.

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