

WRIEC Proposal

Insider Trading and Enterprise Risk Management

James M. Carson
Daniel P. Amos Distinguished Professor
Terry College of Business
University of Georgia
Athens, GA 30602-6255
Email: jcarson@uga.edu

Pei-Han Chen (contact author)
Doctoral Student
Terry College of Business
University of Georgia
Athens, GA 30602-6255
Email: phchen@uga.edu

David L. Eckles
Associate Professor
Terry College of Business
University of Georgia
Athens, GA 30602-6255
Email: deckles@uga.edu

Robert E. Hoyt
Dudley L. Moore, Jr. Chair & Department Head
Terry College of Business
University of Georgia
Athens, GA 30602-6255
Email: rhoyt@uga.edu

ABSTRACT

This paper examines the effects of the enterprise risk management (ERM) program of the firm on the informativeness of insider trading. Insiders in the firm with the ERM program are assumed to have better knowledge about the operation and risk of the firm; thus, these insider stock transactions tend to earn greater abnormal returns. On the other hand, the ERM program may reduce information uncertainty of the firm and information asymmetry between insiders and outside investors. In this case, insiders in ERM firms tend to earn less abnormal returns from their stock transactions than insiders in No-ERM firms. The results show some evidence that ERM has negative (positive) effects on abnormal returns of insider stock purchases (sales), which supports that ERM program can benefit the firm by reducing information uncertainty between insiders and outside investors.

Keywords: Insider trading; Enterprise Risk Management; Information Asymmetry

JEL Classification: G14

July 13th, 2015

Insider Trading and Enterprise Risk Management

ABSTRACT

This paper examines the effects of the enterprise risk management (ERM) program of the firm on the informativeness of insider trading. Insiders in the firm with the ERM program are assumed to have better knowledge about the operation and risk of the firm; thus, these insider stock transactions tend to earn greater abnormal returns. On the other hand, the ERM program may reduce information uncertainty of the firm and information asymmetry between insiders and outside investors. In this case, insiders in ERM firms tend to earn fewer abnormal returns from their stock transactions than insiders in No-ERM firms. The results show some evidence that ERM has negative (positive) effects on abnormal returns of insider stock purchases (sales), which supports that ERM program can benefit the firm by reducing information uncertainty between insiders and outside investors.

Keywords: Insider trading; Enterprise Risk Management; Information Asymmetry

JEL Classification: G14

We examine the informativeness of insider trading from risk management perspective. We investigate the effect of enterprise risk management (ERM) on abnormal returns of insider stock transactions for 420 publicly-traded firms over the period 1996-2013. We also propose to examine the effect of ERM on informativeness of insider trading for 500 publicly-traded firms randomly chosen from the insider stock purchase and sale sample during the same sample period. We use an event study approach and an ex-post regression model to test abnormal returns of insider trades based on whether the firm has ERM program in place. We expect that the informativeness of insider stock transactions may differ across firms with the enactment of enterprise risk management.

Firms with the ERM program combine all risk management activities into one central risk function that integrates decision making across all risk classes (e.g., financial risks,

hazard risk, operational risks, and strategic risk), facilitates the identification of interdependencies between risks and provides better risk identification, and reduce information asymmetries (Hoyt and Liebenberg, 2011; Liebenberg and Hoyt, 2003). Several studies suggest that the ERM program can benefit the firm in several ways including reducing external capital costs, decreasing stock volatility, increasing capital efficiency, and enhancing firm value (e.g., Cumming and Hirtle, 2001; Meulbroek, 2002; Kleffner, Lee, and McGannon, 2003; Beasley, Pagach, and Warr, 2008; Pagach, and Warr, 2010; Hoyt and Liebenberg, 2011; Eckles, Hoyt, and Miller, 2014).

Therefore, insiders in the firm with the ERM program are assumed to have better knowledge about firm performance and the future stock price movements. Insiders in the firm with ERM program are assumed to earn greater positive (negative) abnormal returns from their stock purchases (sales). However, it is also possible that the ERM program may reduce information uncertainty of the firm and information asymmetry between insiders and outside investors. In this case, insiders in the ERM firms tend to earn fewer positive (negative) abnormal returns from their stock purchases (sales) than insiders in the No-ERM firms. This study tests the hypothesis that insiders may be even more/less likely to earn abnormal returns from their stock transactions when the firm has an enterprise risk management program in place. We collected data on ERM programs for a sample of 420 large publicly-traded firms that experienced significant decreases in stock prices for the period from 2000-2012. We are also gathering data on ERM programs for a sample of 500 publicly-traded firms randomly chosen from the insider stock purchase and sale sample over the period 1996-2013.

The remainder of the paper is organized as follows. In section I we provide background and discuss our hypotheses on the effects of ERM on informativeness of insider trading activity. In section II we discuss the data and methodology, and in section III we present and discuss the empirical results of our event studies and ex-post regression models. In section IV we conclude.

I. Background and Hypothesis Development

A. Insider Trading

According to the Securities Exchange Act of 1934, insiders refer to officers, directors, and large shareholders who own 10 percent or more of their company's shares. This definition of insider is commonly used in prior literature (e.g., Lakonishok and Lee, 2001; Jeng et al., 2003; Jiang and Zaman, 2010). Insider trading activities are regulated at both the federal level (e.g. the Securities Exchange Act of 1934 (SEA)) and with company-level policies (e.g., blackout windows) (Bettis, Coles, and Lemmon, 2000). Section 16(a) of the SEA requires insiders to disclose their transactions by the tenth day of the calendar month after the trading month. Since the enactment of the Sarbanes-Oxley Act of 2002, insiders are required to report a change in ownership within two business days following the execution of their transaction. Some firms with blackout window policies only allow insiders to make trades during certain periods after quarterly earnings announcements (e.g. three to twelve days) (Bettis, Coles, and Lemmon, 2000). Also, Section 16(b) of the SEA states that insiders are not allowed to make short-swing profits within six months of their stock transactions. Insiders can trade their securities legally on the basis of their understanding of the long-term outlook for their firm and public information (Seyhun, 1998). Our research

incorporates all available insider trading activities from the Table One File of the Thomson Reuters Insider Filing Data Feed (IFDF) over the time period 1996 to 2013.

Prior literature shows mixed results of informativeness of insider stock transactions. Some studies support that insider trading is informative (e.g., Lorie and Niederhoffer, 1968; Jaffe, 1974; Finnerty, 1976). Lorie and Niederhoffer (1968) suggest that insider trading can be profitable based on the monthly data of insider trading from 105 New York Stock Exchange companies over the period 1950 to 1960. Jaffe (1974) shows that insider trades contain information and insiders can earn profits from their stock transactions. Also, Finnerty (1976) find that insider purchase portfolios earn above average returns particularly for the first six months, and insider sale portfolios obtain below average returns.

However, some studies show that not every type of insider trading is informative (e.g., Eckbo and Smith, 1998; Jeng, Metrick, and Zeckhauser, 2003; Scott and Xu, 2004; Cohen, Malloy, and Pomorski, 2012). Eckbo and Smith (1998) show that insiders may actually earn zero or negative abnormal returns based on a sample of insider trades on the Oslo Stock Exchange from 1985 to 1992. Jeng, Metrick, and Zeckhauser (2003) find that insider purchase portfolios may earn abnormal returns of more than 6% per year, but insider sale portfolios are not informative of future abnormal returns. Also, Scott and Xu (2004) suggest that insider sales of different volumes carry different information: large sales tend to be driven by overvaluation of stocks and small sales tend to be for liquidity and diversification reasons. Cohen, Malloy, and Pomorski (2012) suggest that opportunistic traders are more informed about a firm's future than routine traders and have predictive power of firm's stock returns, news, and events.

There is also a large stream of literature that examines whether insiders make trades based on contrarian investment strategies or based on their superior knowledge about the firm's future performance. Several studies show that insiders are contrarian investors, and their stock transactions are informative of future movements in stock prices (e.g., Seyhun, 1986; Seyhun, 1990; Chowdhury, Howe, and Lin, 1993; Rozeff and Zaman, 1998; Lakonishok and Lee, 2001; Jenter, 2005). For example, Seyhun (1990) examines insider trading activity around the Crash of 1987 and finds evidence that insiders who purchased their companies' stock following significant declines in stock prices during the crash tended to earn greater positive post-crash returns. Lakonishok and Lee (2001) show that insiders in aggregate are contrarian investors and may predict returns in smaller firms.

Other studies suggest insiders possess superior information to predict market-wide stock price movements (e.g., Seyhun, 1988; Ke, Huddart, and Petroni, 2003; Piotroski and Roulstone, 2005; Jiang and Zaman, 2010). For example, Ke, Huddart, and Petroni (2003) show that net insider stock sales increase nine months to two years prior to the earnings declines based on quarterly insider data from 1989 to 1997. Piotroski and Roulstone (2005) suggest that insiders are both contrarians and possessors of superior information based on firm-year insider trading data from 1992 to 1999. They also find that insiders in firms with higher level of information uncertainty are more likely to have superior information about the firm's future performance.

Also, Jiang and Zaman (2010) suggest insiders possess superior information to predict market-wide stock price movements using a first-order vector autoregressive (VAR) model based on quarterly insider trading data from 1978 to 2000. Their results support that insiders have superior information by showing that there is a positive relation between

unexpected returns (i.e., cash-flow news and discount rate news) and the lagged two quarter's and lagged three quarter's insider net buying. Their results reject that insiders are contrarian investors by showing that prior three quarters' expected market excess returns do not predict insider net buying.

B. Enterprise Risk Management (ERM)

Prior studies have investigated the effectiveness of enterprise risk management and show some evidence that ERM may provide firms with several benefits such as creating synergies between different risk management activities, providing better risk identification, reducing information asymmetries, decreasing stock volatility, improving capital efficiency, and enhancing firm value (e.g., Cumming and Hirtle, 2001; Meulbroek, 2002; Kleffner, Lee, and McGannon, 2003; Beasley, Pagach, and Warr, 2008; Pagach, and Warr, 2010; Hoyt and Liebenberg, 2011; Eckles, Hoyt, and Miller, 2014).

For example, Hoyt and Liebenberg (2011) employ a maximum-likelihood treatment effects model to simultaneously model the determinants of ERM and the effect of ERM on firm value. Their results show that insurers having an ERM program tend to be valued approximately 20% higher than other insurers. Meulbroek (2002) suggests that the ERM program can benefit firms with a wide range of investment opportunities by providing a more accurate risk-adjusted rate, and the ERM program can also help firms reduce the expected costs of regulatory scrutiny and external capital by improving a firm's risk management disclosure.

Further, ERM can help a firm diversify risks and reduce return volatility (Kleffner, Lee, and McGannon, 2003; Beasley, Pagach, and Warr, 2008; Pagach, and Warr, 2010; Eckles, Hoyt, and Miller, 2014). For example, Eckles, Hoyt, and Miller (2014) examine

the impact of enterprise risk management on the marginal cost of reducing risk in the insurance industry based on the Heckman two-step model. Their results show that firms adopting ERM tend to experience a reduction in stock return volatility and an increase in operating profits per unit of risk (i.e., ROA/return volatility). Thus, firms that are more volatile are more likely to benefit from the ERM program (Hoyt and Liebenberg, 2011).

The effects of the enterprise risk management (ERM) program of the firm on abnormal returns of insider stock transactions may be undetermined. On the one hand, insiders in the firm with the ERM program are assumed to have better knowledge about the operation and risk of the firm. Insiders may be even more likely to purchase and sell shares during these times if the firm has a Chief Risk Officer (CRO) or an enterprise risk management program in place. Thus, the abnormal returns of insider stock transactions may be greater for firms having ERM programs. On the other hand, outside investors may be more confident in firms with ERM programs and therefore the abnormal returns of insider stock transactions may be smaller for these firms.

C. Hypotheses

Based on the aforementioned prior research, we examine the effect of enterprise risk management on insider stock transactions with two hypotheses:

H1 (Enterprise Risk Management): *The enactment of enterprise risk management of a firm has effects on abnormal returns of insider stock transactions.*

H2 (Information Uncertainty): *Following stock price declines (or increases), the effect of the ERM on abnormal returns of insider trading are greater for firms with higher level of information uncertainty (i.e., smaller firm size and higher stock volatility).*

II. Data and Methodology

A. Data

The insider trading activities we focus on are open market and private market transactions of stock purchases and sales. Our event study sample is comprised of 16,332 firm-day observations for insider stock purchases and 48,788 firm-day observations for insider stock sales from 420 firms from 1996 to 2013.¹ These 420 firms are large firms (i.e., market capitalization greater than \$300 millions) which have experienced a more-than-25% stock price decrease from 2000 to 2012. Among these 420 firms, forty firms have started ERM programs during the sample period. The earliest evidence of ERM in our sample is 1999. The sample used in the ex-post regression model is comprised of 20,268 insider-firm-day observations for insider stock purchases and 65,412 observations for insider stock sales over the same time period.² We are also collecting the ERM data for 500 publicly-traded

¹ We choose year 1996 as the starting point of our sample due to the potential data problem of insider trading before year 1996. For example, there are only 1,849 firm-day observations for insider stock purchases in 1995 compared to 15,033 observations in 1996. Similarly, there are only 3,061 firm-day observations for insider stock sales in 1995 compared to 26,594 observations in 1996. As long as there is at least one insider buying (selling) the firm's stocks during the day, the firm is considered to have insider stock purchases (sales) and included in our sample.

² We aggregate insider stock transactions at the insider level. For example, if the insider makes more than one stock purchase transactions on that day, we aggregate his/her dollar value and number of shares traded

firms randomly chosen from the insider stock purchase and sale sample over the period 1996-2013.³

The ERM data are based on key word searches from financial statements, governmental filings, and search engines such as Factiva and LexisNexis (Hoyt and Liebenberg, 2011; Eckles, Hoyt, and Miller, 2014). The ERM key words include “chief risk officer”, “enterprise risk management”, “enterprise risk officer”, “risk committee”, “strategic risk management”, “consolidated risk management”, “holistic risk management”, and “integrated risk management.” We employ an indicator variable to identify whether the firm employs the ERM in any given year over the sample period. For example, if the firm adopts the ERM in 2004, the ERM indicator variable will be assigned with a value of one for year 2005 and the following years.⁴

The insider stock transaction data were obtained from the Table One File of the Thomson Reuters Insider Filing Data Feed (IFDF). The Table One File contains all insider stock transaction information filed on Forms 3, 4, and 5.⁵ We include data for trades coded as “P” for insider stock purchases and “S” for insider stock sales on Form 4. We only include data with a cleanse indicator “R” which indicates data verified through all cleansing checks for reasonableness. The daily security price, stock return, volume data, and

and view it as one observation in our models. See Appendix A for further details of the sample selection process.

³ We randomly pick firms from the sample to avoid the self-selection bias issue. Also, we do not include firms with market capitalization less than \$1.85 million, which is the smallest market capitalization among the Wilshire 5000 firms on December 31st, 2014.

⁴ We propose to assign ERM indicator variable with a value of one for year 2004 as robustness checks.

⁵ Form 3 includes the details of initial statement of beneficial ownership. Form 4 includes the details of statement of changes of beneficial ownership for non-derivative securities (Table One) and derivative securities (Table Two). Form 5 includes the details of annual statement of change in beneficial ownership. Beginning on July 30th, 2003, insiders are required to electronically file their Form 4 documents via the EDGAR system according to the Sarbanes-Oxley Act of 2002.

company financial information were obtained from the Center for Research in Security Prices (CRSP) and the Compustat database available from the Wharton Research Data Services (WRDS). The company financial information obtained from the Compustat database is based on calendar quarter data.⁶ We only consider firms with market capitalization more than \$1 million (Shon and Veliotis, 2013). We also exclude firms which do not have thirty consecutive past stock returns prior to the transaction date of insider trading since the main focus of our research is to examine the market response to insider trading activities after different levels of past stock performance and we calculate stock volatility of the firm based on the thirty consecutive past stock returns.

B. Methodology

We use an event study approach and an ex-post regression to investigate the effects of enterprise risk management on abnormal stock returns of insider trading. First, we conduct event studies for 40 ERM firms and 380 No-ERM firms, respectively. We examine short-term abnormal returns for insider stock purchases and sales, respectively. We classify the sample into sixteen subgroups according to different levels of past stock performance; eight subgroups for positive past stock returns and eight subgroups for negative past stock returns. The classification of stock return levels is based on cumulative stock returns from three days before the transaction date to the transaction date (i.e., four day past stock performance).⁷

⁶ Calendar quarters are determined based on the ending months of each fiscal quarter; that is, February, March, and April are in the first calendar quarter; May, June, and July are in the second calendar quarter; August, September, and October are in the third calendar quarter; and November, December, and January are in the fourth calendar quarter (S&P, 2003).

⁷ We also classify stock return levels based on cumulative stock returns from one day before the transaction date to the transaction date (i.e., two day past stock performance) as robustness checks and get similar results.

We conduct event study analyses of daily abnormal returns for each group. We employ four event windows from 10 to 90 days after the stock transaction: [+1, +10], [+1, +30], [+1, +60], and [+1, +90]. We define the event date as the transaction date of the insiders' stock purchases or sales and the estimation window as the 255-day trading period which ends 46 days before the event date. Our estimation model is based on the Fama-French-Momentum Time Series model since insider trading activities and abnormal returns may differ across firm size, market to book ratio, and past stock returns (Fama and French, 1993; Carhart, 1997). We primarily use the CRSP value-weighted index as a measure of market returns (and the CRSP equal-weighted index for robustness).

We then employ an ordinary least squares regression model with heteroscedasticity-consistent standard errors to investigate the relationship between abnormal returns of insider trades and ERM enactment, insider type, firm's past stock performance, firm size, and stock volatility. We run regression models for cumulative abnormal returns (CAR) of insider stock purchases and sales based on four event windows: [+1, +10], [+1, +30], [+1, +60], and [+1, +90], respectively. The cumulative abnormal return for each firm is calculated based on the Cross-Sectional Analysis using the Market Model. Our regression model is as follows:

$$\begin{aligned}
 \mathbf{CAR}_{i,j,t} = & \beta_0 + \beta_1 \mathbf{ERM}_{j,t} + \beta_2 \mathbf{Insider\ type}_{i,j,t} + \beta_3 \mathbf{Past\ stock\ performance}_{j,t} \\
 & + \beta_4 \mathbf{CEO * ERM}_{j,t} + \beta_5 \mathbf{CEO * Past\ stock\ performance}_{j,t} + \beta_6 \mathbf{Firm\ size}_{j,t} \\
 & + \beta_7 \mathbf{Stock\ Volatility}_{j,t} + \beta_8 \mathbf{Insider\ trading\ characteristics}_{i,j,t} \\
 & + \beta_9 \mathbf{Firm\ characteristics}_{j,t} + \beta_{10} \mathbf{Insurance\ industry}_{j,t} \\
 & + \beta_{11} \mathbf{Banking\ industry}_{j,t} + \beta_{12} \mathbf{January}_t + \beta_{13} \mathbf{Fourth\ quarter}_t \\
 & + \beta_{14} \mathbf{Year\ fixed\ effects} + \varepsilon_{i,j,t}
 \end{aligned}$$

The dependent variable, $CAR_{i,j,t}$, is the cumulative daily abnormal return for each insider's stock purchase and sale (i.e., insider i , firm j , and day t). The key independent variables are ERM enactment, insider type, the firm's past stock performance, firm size, and stock volatility of the firm. As for insider type, insiders with greater decision making authority such as CEOs and CFOs may have better knowledge about their firms' operations and may earn greater abnormal returns from their stock transactions compared to other insiders. We use five binary variables with the value of one to proxy CEOs, CFOs, directors, officers, and large shareholders, respectively.⁸ We also include the interaction term of CEOs and ERM.

We use four binary variables for firm's past stock performance to proxy significant increases or decreases in firm's past stock returns: stock returns greater than 25%, stock returns between 20% and 25%, stock returns between -25% and -20%, and stock returns less than -25%. We classify past stock return levels of individual firms based on cumulative daily stock returns from three days before the transaction date to the transaction date of insider trades (i.e., four day past stock performance).⁹ Our model also includes the interaction terms of CEOs and stock returns less than -25%, and CEOs and stock returns greater than 25% to examine whether CEOs may have more superior information and earn abnormal returns from these stock transactions.

⁸ Based on data availability and insider classification from the Table One File of the Thomson Reuters Insider Filing Data Feed, we define director as chairman of the board, director, and vice chairman, and we define an officer to be either the chief investment officer, chief operating officer, chief technology officer, executive vice president, officer, president, secretary, senior vice president, or vice president.

⁹ We also classify stock return levels based on cumulative stock returns from one day before the transaction date to the transaction date (i.e., two day past stock performance) as robustness checks.

We divide the sample into three groups based on firm size (i.e., market capitalization) to examine the firm size effect of abnormal returns of insider stock transactions.¹⁰ Based on the groups mentioned above, we use two binary variables to proxy firm size (i.e., small firms and medium firms for insider stock purchases; large firms and medium firms for insider stock sales). In addition to examining firm size effect of insider stock purchases and sales, we allow for a stock volatility effect. We divide the sample into three groups based on different levels of stock volatility.¹¹ In the regression model, we employ two binary variables for stock volatility of the firm (i.e., high stock volatility firms and medium stock volatility firms) which is measured by the standard deviation of daily stock returns over the 30 days prior to the insider transaction. We also consider the interaction effect of firm size and stock volatility of the firm.

We include several control variables in our regression models since factors other than insider type, the firm's past stock performance, firm size, and stock volatility may affect stock returns of insider trades. The control variables we consider are insider trading characteristics, firm characteristics, the fourth quarter effect, the January effect, industry-fixed effects, and year fixed effects. We use two variables to proxy insider trading

¹⁰ Firm size classification for the regression model analysis: (1) Insider stock purchases: small firms with market capitalization less than or equal to \$332,796,509 (25th percentile), medium firms with market capitalization between \$332,796,509 and \$1,963,293,258 (25th percentile to 75th percentile), and large firms with market capitalization greater than \$1,963,293,258 (75th percentile). (2) Insider stock sales: small firms with market capitalization less than or equal to \$626,650,226 (25th percentile), medium firms with market capitalization between \$626,650,226 and \$4,560,525,154 (25th percentile to 75th percentile), and large firms with market capitalization greater than \$4,560,525,154 (75th percentile).

¹¹ Stock volatility classification for the regression model analysis: (1) Insider stock purchases: low stock volatility firms with stock volatility less than or equal to 0.01954 (25 percentile), medium stock volatility firms with stock volatility between 0.01954 and 0.04950 (25 percentile to 75 percentile), and high stock volatility firms with stock volatility greater than 0.04950 (75 percentile); (2) Insider stock sales: low stock volatility firms with stock volatility less than or equal to 0.01831 (25 percentile), medium stock volatility firms with stock volatility between 0.01831 and 0.04088 (25 percentile to 75 percentile), and high stock volatility firms with stock volatility greater than 0.04088 (75 percentile).

characteristics: the ratio of the number of insider shares traded to number of shares outstanding of the firm, and the number of shares traded by the insider.¹²

Several firm characteristics may affect abnormal returns of stock transactions and insider trading activities as well (Lakonishok and Lee, 2001; Shon and Veliotis, 2013). Our model includes four variables to proxy firm characteristics: market to book ratio, loss, leverage, and return on assets (ROA). The market to book ratio is the ratio of market value of equity to book value of equity, the loss variable equals one if net income is less than zero, leverage is defined as the ratio of the long-term debt to equity, and ROA refers to the ratio of net income to total assets.¹³

Finally, we consider the fourth quarter effect, the January effect, industry fixed effects, and year fixed effects. Seyhun (1998) finds seasonal patterns in insider trading consistent with seasonal variations in stock returns: insider purchases peak in the last quarter of the year, particularly for the month of October and December. Abnormal returns of stock transactions are larger particularly for small firms in January (Keim, 1983; Seyhun, 1988). Thus, we include fourth quarter and January binary variables in our model. We also include seventeen binary variables to consider year fixed effects. To control industry effects, we use two binary variables to proxy highly regulated industries (i.e., insurance and banking).

¹² We also use the ratio of the dollar value of insider shares traded to market capitalization of the firm and the dollar value of shares traded by the insider to proxy insider trading characteristics as a robustness check.

¹³ We also use the ratio of long-term debt to total assets to proxy leverage as a robustness check.

III. Preliminary Empirical Results and Discussion

Table 1 presents the details of sector and industry information for 40 ERM firms and 380 No-ERM firms.¹⁴ Consistent with prior literature, firms in finance sector and public utilities sector are more likely to adopt the ERM. Among the 40 ERM firms in our sample, twenty-three firms are from finance sector (e.g., seven firms are from banking industry and eight firms are from insurance industry) and seven firms are from public utilities sector. Table 2 shows the univariate analysis of financial characteristics for ERM firms and No-ERM firms. Panel A shows that firms with the ERM deployment during the period 1996-2013 tend to be larger than firms without the ERM, which supports that larger firms tend to have greater ability to adopt the ERM (Colquitt, Hoyt, and Lee, 1999; Beasley, Clune, and Hermanson, 2005). Panel B shows that firms generally become larger and have higher market-to-book ratios after they have ERM programs in place among the 40 ERM firms in our sample.

[TABLE 1 ABOUT HERE]

[TABLE 2 ABOUT HERE]

Figure 1 illustrates event study results for insider stock purchases and insider stock sales for 40 ERM firms and 380 No-ERM firms, respectively. Table 3 accompanies Figure 1 and provides the details of event study results. For firms which have enacted ERM programs during 1996 to 2013, many of abnormal returns of insider stock transactions traded at different levels of past stock performance are not significantly different from zero. Thus, insiders in the ERM firms tend to earn fewer positive (negative) abnormal returns

¹⁴ The 420 firms in the sample are firms which have insider stock purchases and have experienced stock price declines by more than 25% over the period 2000 to 2012. ERM firms refer to firms with the ERM program enactment over the period 1996 to 2013.

from their stock purchases (sales) than insiders in the No-ERM firms. This result may suggest that ERM program is associated with reducing information asymmetry and uncertainty of the firm. However, this result may also be due to small sample size.

[FIGURE 1 ABOUT HERE]

[TABLE 3 ABOUT HERE]

Figure 2 illustrates event study results for insider stock purchases and insider stock sales for the period before the ERM enactment and after the ERM enactment based on data of 40 ERM firms, respectively. Table 4 accompanies Figure 2 and provides the details of event study results. Results provide some evidence that the absolute value of abnormal returns of insider stock transactions after firms have enacted ERM programs are smaller than that before firms have enacted ERM programs. Again, this result supports that ERM program is associated with reducing information asymmetry and uncertainty of the firm.

[FIGURE 2 ABOUT HERE]

[TABLE 4 ABOUT HERE]

Table 5 and Table 6 show the regression model results for the effects of ERM enactment on abnormal returns of insider stock purchases and sales conditional on insider trading and firm characteristics, respectively. Our results show that the ERM deployment is positively associated with abnormal returns of insider stock purchases and sales. Also, for firms in which insiders purchase shares, abnormal returns are larger for smaller firms (i.e., an approximately 15% to 17% abnormal return over a 90-day event window) than for larger firms. Further, insiders in higher stock volatility firms tend to earn greater positive (negative) abnormal returns from their stock purchases (sales) (i.e., a 1% to 8% abnormal

return for insider stock purchases and a -1% to -6% abnormal return for insider stock sales over a 90-day event window) than in lower stock volatility firms.

[TABLE 5 ABOUT HERE]

[TABLE 6 ABOUT HERE]

IV. Conclusions and Future Works

The study examines the effects of the enterprise risk management (ERM) program of the firm on the informativeness of insider trading. We first examine the abnormal returns of insider stock transactions for 40 ERM firms and 380 No-ERM firms based on the data from 1996 to 2013. The event study results suggest that insiders in the ERM firms tend to earn fewer positive (negative) abnormal returns from their stock purchases (sales) than insiders in the No-ERM firms, which suggests that ERM program is associated with reducing information asymmetry and uncertainty of the firm. Consistent with prior literature, we also find insiders in firms with higher level of information uncertainty (i.e., smaller firm size and higher stock volatility) tend to earn greater abnormal returns from their stock purchases. Therefore, we are going to collect the ERM data of 500 publicly-traded firms randomly chosen from the insider stock purchase and sale sample to avoid the self-selection bias issue and examine the effects of ERM on informativeness of insider trading.

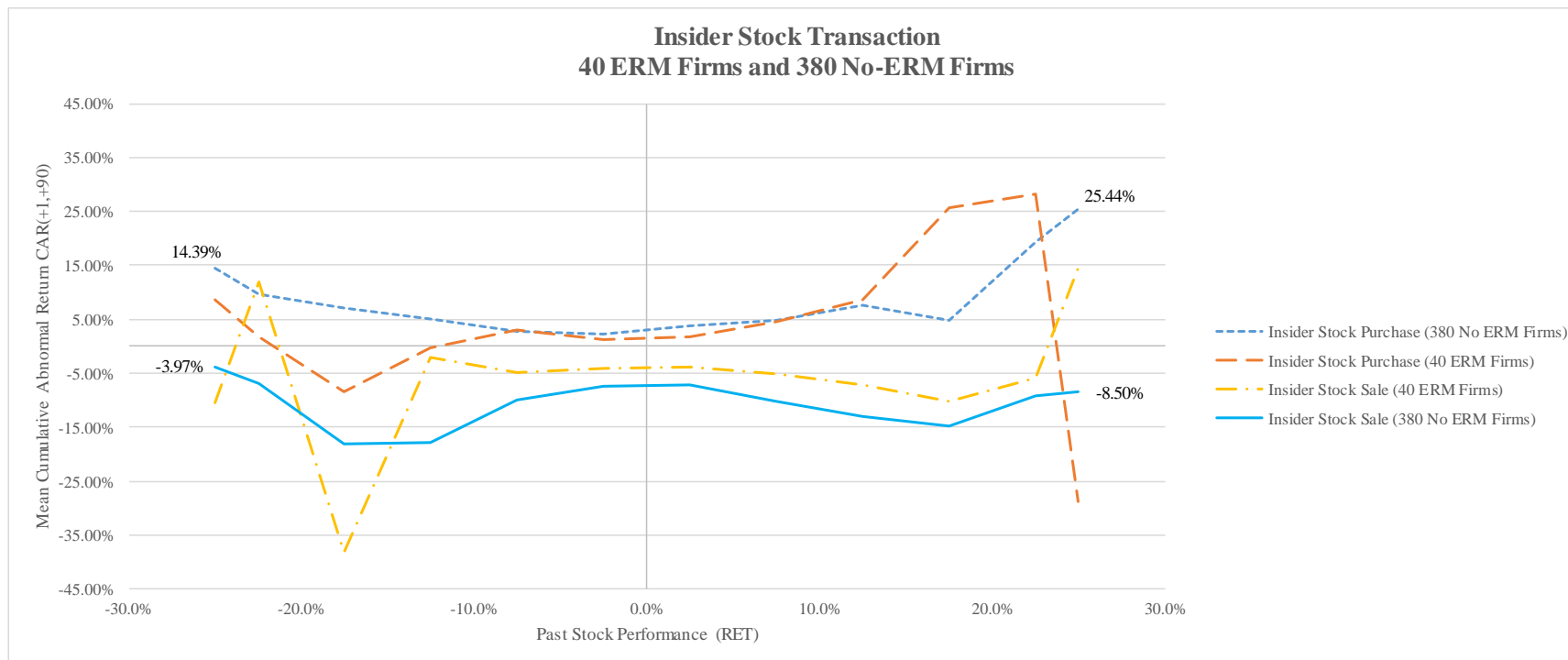
References

- Beasley, Mark, Don Pagach, and Richard Warr, 2008, The information conveyed in hiring announcements of senior executives overseeing enterprise-wide risk management processes, *Journal of Accounting, Auditing, and Finance* 23, 311–332.
- Bettis, Carr, Jeffrey Coles, and Michael Lemmon, 2000, Corporate policies restricting trading by insiders, *Journal of Financial Economics* 57, 191–220.

- Carhart, Mark M., 1997, On persistence in mutual fund performance, *The Journal of Finance* Vol. LII, No. 1, 57-82.
- Cohen, Lauren, Christopher Malloy, and Lukasz Pomorski, 2012, Decoding inside information, *The Journal of Finance* Vol. LXVII, No. 3, 1009–1043.
- Cumming, Christine M., and Beverly J. Hirtle, 2001, The challenges of risk management in diversified financial companies, *FRBNY Economic Policy Review* 7, 1–17.
- Eckbo, Espen B., and David C. Smith, 1998, The conditional performance of insider trades, *Journal of Finance* LIII, 467–498.
- Eckles, David L., Robert E. Hoyt, and Steve M. Miller, 2014, The impact of Enterprise Risk Management on the marginal cost of reducing risk: evidence from the insurance industry, *Journal of Banking and Finance* 43, 247-261.
- Fama, Eugene F. and Kenneth R. French, 1993, Common risk factors in the returns on stocks and bonds, *Journal of Financial Economics* 33, 3-56.
- Finnerty, Joseph E., 1976, Insiders and market efficiency, *Journal of Finance* 31, 1141–1148.
- Hoyt, Robert E., and Andre P. Liebenberg, 2011, The value of Enterprise Risk Management, *Journal of Risk and Insurance* 78, 795-822.
- Jaffe, Jeffrey, 1974, Special information and insider trading, *Journal of Business* 47, 410–428.
- Jeng, Leslie, Andrew Metrick, and Richard Zeckhauser, 2003, Estimating the returns to insider trading: A performance-evaluation perspective, *Review of Economics and Statistics* 85, 453–471.
- Jenter, Dirk, 2005. Market timing and managerial portfolio decisions, *Journal of Finance* 60, 1903–1949
- Jinag, Xiaoquan and Mir A. Zaman, 2010, Aggregate insider trading: Contrarian belief or superior information?, *Journal of Banking and Finance* 34, 1225–1236.
- Ke, Bin, Steven Huddart, and Kathy Petroni, 2003, What insiders know about future earnings and how they use it: Evidence from insider trades, *Journal of Accounting and Economics* 35, 315–346.
- Keim, Donald B., 1983, Size-related anomalies and stock return seasonality: Further empirical evidence, *Journal of Financial Economics* 12, 13-32.
- Kleffner, Anne E., Ryan B. Lee, and Bill McGannon, 2003, The effect of corporate governance on the use of enterprise risk management: evidence from Canada, *Risk Management and Insurance Review* 6, 53–73.

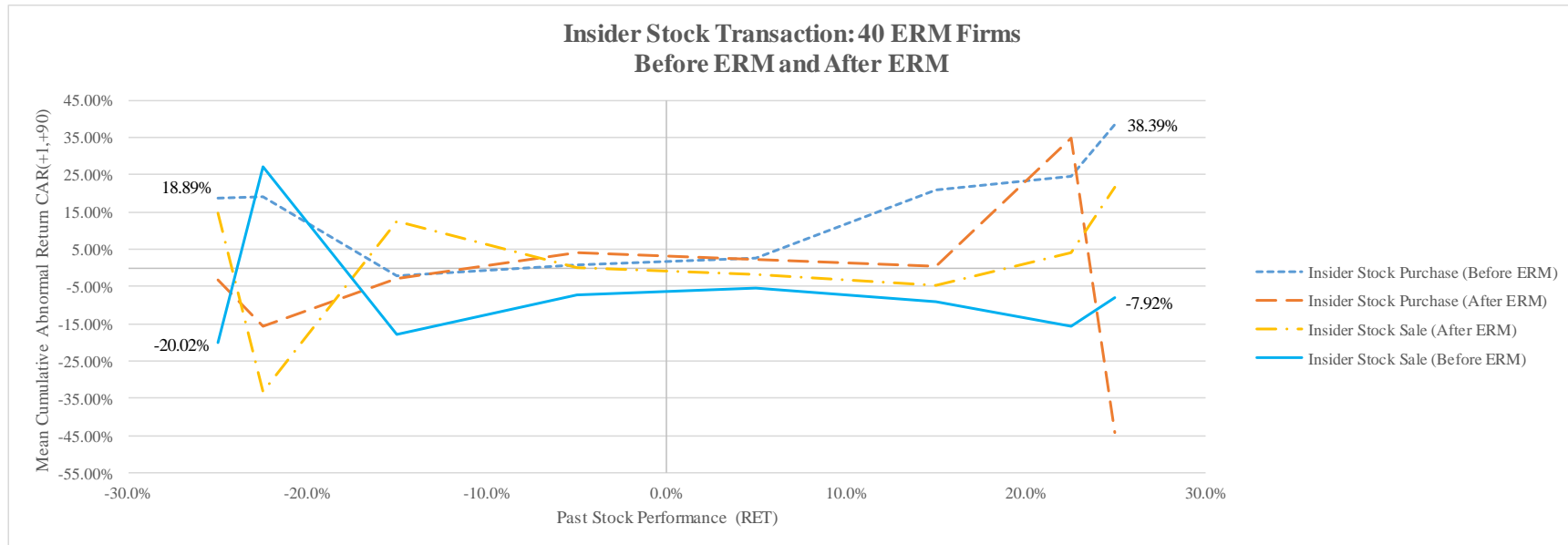
- Lakonishok, Josef, and Inmoo Lee, 2001, Are insiders' trades more informative? *Review of Financial Studies* 14, 79–111.
- Liebenberg, Andre P., and Robert E. Hoyt, 2003, Determinants of Enterprise Risk Management: evidence from the appointment of Chief Risk Officers, *Risk Management and Insurance Review* 6, 37-52.
- Lorie, James H. and Victor Niederhoffer, 1968, Predictive and statistical properties of insider trading, *Journal of Law and Economics* 11, 35–51.
- Meulbroek, Lisa K., 2002, Integrated risk management for the firm: a senior manager's guide, *Journal of Applied Corporate Finance* 14, 56–70.
- Pagach, Donald, and Richard Warr, 2010, The effects of Enterprise Risk Management on firm performance. World Wide Web: <http://ssrn.com/abstract=1155218> (accessed April 10, 2010).
- Piotroski, Joseph D., and Darren T. Roulstone, 2005, Do insider trades reflect both contrarian beliefs and superior knowledge about cash flow realizations? *Journal of Accounting and Economics* 39, 55–81.
- Rozeff, Michael, and Mir A. Zaman, 1998, Overreaction and insider trading: Evidence from growth and value portfolios, *The Journal of Finance* Vol. LIII, 701–716.
- Scott, James, and Peter Xu, 2004, Some insider sales are positive signals, *Financial Analysts Journal* 60, 44–51.
- Seyhun, Nejat H., 1986, Insiders' profits, costs of trading, and market efficiency, *Journal of Financial Economics* 16, 189–212.
- Seyhun, Nejat H., 1988, The information content of aggregate insider trading, *Journal of Business* 61, 1–24.
- Seyhun, Nejat H., 1988, The January effect and aggregate insider trading, *The Journal of Finance* XLIII, 129-141.
- Seyhun, Nejat H., 1990, Overreaction or fundamentals: Some lessons from insiders' response to the market crash of 1987, *Journal of Finance* 45, 1363–1388.
- Seyhun, Nejat H., 1998, *Investment Intelligence from Insider Trading* (MIT Press, Cambridge, MA).
- Shon, John, and Stanley Veliotis, 2013, Insiders' sales under Rule 10b5-1 plans and meeting or beating earnings expectations, *Management Science* 59, 1988–2002.
- Standard & Poor's Compustat User's Guide, 2003, *The McGraw-Hill Companies, Inc.*
- US insider filing feed specification, *Thomson Reuters*

Figure 1



1. The 420 firms are large firms (i.e., market capitalization greater than \$300 millions) which have experienced a more-than-25% stock price decrease from 2000 to 2012.
2. ERM firms refer to firms with the ERM program enactment over the period 1996 to 2013.
3. As in the Securities Exchange Act of 1934, we define insiders as officers, directors, and large shareholders who own 10 percent or more of their company's shares.
4. The insider stock purchase sample is comprised of 1,660 firm-day observations for 40 ERM firms and of 14,672 firm-day observations for 380 No-ERM firms from 1996 to 2013, respectively. The insider stock sale sample is comprised of 4,011 firm-day observations for 40 ERM firms and of 44,777 firm-day observations for 380 No-ERM firms from 1996 to 2013, respectively.
5. We divide the insider stock purchase sample into 16 groups based on cumulative daily stock returns (RET) and run the event study separately for each group to examine the abnormal returns of insider stock transactions traded at different levels of past stock performance: $RET \leq -25\%$, $-25\% < RET \leq -20\%$, $-20\% < RET \leq -15\%$, $-15\% < RET \leq -10\%$, $-10\% < RET \leq -5\%$, $-5\% < RET \leq 0\%$, $0\% < RET \leq 5\%$, $5\% < RET \leq 10\%$, $10\% < RET \leq 15\%$, $15\% < RET \leq 20\%$, $20\% < RET \leq 25\%$, and $25\% < RET$.
6. RET refers to the cumulative daily stock returns from three days before the transaction date to the transaction date (i.e., four day past stock performance). We also use the cumulative daily stock returns from one day before the transaction date to the transaction date (i.e., two day past stock performance) to proxy RET and get similar results. Interestingly, the abnormal returns are slightly higher when we use two day past stock performance as stock return classification method.
7. CAR(+1, +90) refer to a 90-day cumulative abnormal return of insider stock transactions, respectively. We employ the event study method based on the Fama-French-Momentum Time Series Model using CRSP value-weighted index. We also employ the event study using CRSP equal-weighted index as robustness checks and get similar results.
8. The mean cumulative abnormal return (+1, +90) of insider stock sales for 380 no ERM firms are not statistically significant for the following groups: $RET \leq -25\%$, $-25\% < RET \leq -20\%$, and $20\% < RET \leq 25\%$.
9. The mean cumulative abnormal return (+1, +90) of insider stock purchases for 40 ERM firms are not statistically significant for the following groups: $RET \leq -25\%$, $-25\% < RET \leq -20\%$, $-20\% < RET \leq -15\%$, $-15\% < RET \leq -10\%$, $-10\% < RET \leq -5\%$, $20\% < RET \leq 25\%$, and $25\% < RET$. The mean cumulative abnormal return (+1, +90) of insider stock sales for 40 ERM firms are not statistically significant for the following groups: $RET \leq -25\%$, $-25\% < RET \leq -20\%$, $-20\% < RET \leq -15\%$, $15\% < RET \leq 20\%$, $20\% < RET \leq 25\%$, and $25\% < RET$.

Figure 2



1. The 40 ERM firms are large firms (i.e., market capitalization greater than \$300 millions) which have experienced a more-than-25% stock price decrease from 2000 to 2012.
2. ERM firms refer to firms with the ERM program enactment over the period 1996 to 2013.
3. As in the Securities Exchange Act of 1934, we define insiders as officers, directors, and large shareholders who own 10 percent or more of their company's shares.
4. The insider stock purchase sample is comprised of 1,660 firm-day observations for 40 ERM firms from 1996 to 2013: 1,136 observations for firms before the ERM enactment and 527 observations for firms after the ERM enactment. The insider stock sale sample is comprised of 4,011 firm-day observations for 40 ERM firms: 2,446 observations for firms before the ERM enactment and 1,525 observations for firms after the ERM enactment.
5. We divide the insider stock purchase sample into 8 groups based on cumulative daily stock returns (RET) and run the event study separately for each group to examine the abnormal returns of insider stock transactions traded at different levels of past stock performance: $RET \leq -25\%$, $-25\% < RET \leq -20\%$, $-20\% < RET \leq -10\%$, $-10\% < RET \leq 0\%$, $0\% < RET \leq 10\%$, $10\% < RET \leq 20\%$, $20\% < RET \leq 25\%$, and $25\% < RET$.
6. RET refers to the cumulative daily stock returns from three days before the transaction date to the transaction date (i.e., four day past stock performance). We also use the cumulative daily stock returns from one day before the transaction date to the transaction date (i.e., two day past stock performance) to proxy RET and get similar results. Interesting, the abnormal returns are slightly higher when we use two day past stock performance as stock return classification method.
7. $CAR(+1, +90)$ refer to a 90-day cumulative abnormal return of insider stock transactions, respectively. We employ the event study method based on the Fama-French-Momentum Time Series Model using CRSP value-weighted index. We also employ the event study using CRSP equal-weighted index as robustness checks and get similar results.

Table 1**Sector and Industry: ERM Firms versus No-ERM Firms****Panel A: 40 ERM Firms**

| Sector | Number of Firms | Industry (Number of Firms) |
|--------------------------|------------------------|---|
| 01 Finance | 23 | Financial Services (6), Savings And Loans (1), Banking (7), Insurance (8), Multi-Industry Finance (1) |
| 02 Healthcare | 1 | Medical Supplies (1) |
| 03 Consumer Non-Durables | 0 | |
| 04 Consumer Services | 4 | Communications (1), Retailing - Foods (1), Retailing - Goods (1), Industrial Services (1) |
| 05 Consumer Durables | 0 | |
| 06 Energy | 1 | Oil (1) |
| 07 Transportation | 0 | |
| 08 Technology | 2 | Software & Edp Services (1); Undesignated Technology (1) |
| 09 Basic Industries | 0 | |
| 10 Capital Goods | 1 | Truck Manufacturers (1) |
| 11 Public Utilities | 7 | Electrical Utilities (5), Gas Utilities (1), Telephone Utilities (1) |
| 99 Miscellaneous | 1 | |

Panel B: 380 No-ERM Firms

| Sector | Number of Firms | Industry (Number of Firms) |
|--------------------------|------------------------|--|
| 01 Finance | 62 | Finance & Loan (4), Financial Services (13), Savings And Loans (1), Banking (6), Insurance (14), Investments (24) |
| 02 Healthcare | 54 | Drugs (8), Hospitals (5), Biotechnology (16), Medical Supplies (10), Services To Medical Prof (8), Home Health Care (4), Undesignated Health (3) |
| 03 Consumer Non-Durables | 6 | Clothing (2), Cosmetics (1), Food Processors (2), Home Products (1) |
| 04 Consumer Services | 61 | Communications (24), Leisure (11), Retailing - Foods (5), Retailing - Goods (10), Industrial Services (3), Undesignated Control Service (8) |
| 05 Consumer Durables | 8 | Automotive Manufacturers (1), Auto Part Manufacturers (2), Home Furnishings (1), Leisure Products (4) |
| 06 Energy | 33 | Oil (25), Coal (3), Gas (2), Alternative Energy (3) |
| 07 Transportation | 5 | Airlines (3), Maritime (1), Undesignated Transport (1) |
| 08 Technology | 77 | Computer Manufacturers (2), Electronics (6), Software & Edp Services (21), Other Computers (12), Semiconductors/Component (11), Photo-Optical Equipment (1), Electronic Syst/Devices (8), Office/Comm Equipment (16) |
| 09 Basic Industries | 28 | Building & Related (2), Chemicals (10), Containers (2), Metal Fabricators & Dist (3), Forest Products (3), Steel (2), Nonferrous Base Metals (3), Precious Metals (1), Multi-Ind Basic (2) |
| 10 Capital Goods | 32 | Defense (3), Electrical (6), Machinery (9), Building Materials (5), Office Products (1), Multi-Ind Cap Good (6), Undesignated Capital (2) |
| 11 Public Utilities | 10 | Electrical Utilities (4), Gas Utilities (1), Telephone Utilities (5) |
| 99 Miscellaneous | 4 | |

1. The 420 firms are large firms (i.e., market capitalization greater than \$300 millions) which have experienced a more-than-25% stock price decrease from 2000 to 2012.

2. ERM firms refer to firms with the ERM program enactment over the period 1996 to 2013.

3. The sector and industry classification is based on the Thomson Reuters Insider Filing Data Feed (IFDF).

Table 2

Financial Characteristics: ERM Firms versus No-ERM Firms

| Panel A: ERM Firms versus No-ERM Firms (1996 - 2013) | | | | | | | | |
|---|-------------------------------|----------------|----------------|-------------------------------------|----------------|----------------|-----------------------------|---------------------|
| Firm-Quarter Level Data | 40 ERM Firms (N=2,509) | | | 380 No-ERM Firms (N= 21,677) | | | Two-Sample Mean Test | |
| | Mean | Std Dev | Std Err | Mean | Std Dev | Std Err | Difference | t-statistics |
| 1996-2013 | (1) | | | (2) | | | (1) - (2) | |
| Total Asset (in millions) | 111,394 | 345,655 | 6,901 | 15,759 | 126,328 | 858 | 95,634 | 27.76*** |
| Long-Term Debt (in millions) | 40,549 | 278,322 | 5,556 | 2,689 | 20,239 | 138 | 37,860 | 19.59*** |
| Net Income (in millions) | 162 | 1,851 | 37 | 42 | 493 | 3 | 120 | 7.51*** |
| Sales (in millions) | 2,426 | 4,462 | 89 | 911 | 2,709 | 18 | 1,516 | 24.45*** |
| Equity (in millions) | 7,908 | 17,624 | 352 | 2,308 | 11,935 | 81 | 5,600 | 21.00*** |
| Market Value (in millions) | 12,523 | 24,494 | 489 | 4,606 | 15,271 | 104 | 7,917 | 22.79*** |
| Leverage ratio (Long-Term Debt/Total Asset) (%) | 22 | 19 | 0 | 26 | 26 | 0 | -4 | -7.58*** |
| Leverage ratio (Long-Term Debt/Equity) (%) | 660 | 30,063 | 600 | 91 | 1,734 | 12 | 569 | 2.75*** |
| Market to Book Ratio (%) | 207 | 531 | 11 | 174 | 28,760 | 195 | 33 | 0.06 |

| Panel B: Before the ERM enactment versus After the ERM enactment (40 ERM Firms) | | | | | | | | |
|--|--|----------------|----------------|---|----------------|----------------|-----------------------------|---------------------|
| Firm-Quarter Level Data | After the ERM enactment (N=1,007) | | | Before the ERM enactment (N=1,502) | | | Two-Sample Mean Test | |
| | Mean | Std Dev | Std Err | Mean | Std Dev | Std Err | Difference | t-statistics |
| 1996-2013 | (1) | | | (2) | | | (1) - (2) | |
| Total Asset (in millions) | 192,135 | 499,968 | 15,755 | 57,261 | 157,461 | 4,063 | 134,874 | 9.76*** |
| Long-Term Debt (in millions) | 80,805 | 430,966 | 13,581 | 13,559 | 55,991 | 1,445 | 67,246 | 5.97*** |
| Net Income (in millions) | 183 | 2,856 | 90 | 148 | 505 | 13 | 36 | 0.47 |
| Sales (in millions) | 3,574 | 5,926 | 187 | 1,657 | 2,873 | 74 | 1,917 | 10.79*** |
| Equity (in millions) | 12,849 | 23,537 | 742 | 4,595 | 10,970 | 283 | 8,255 | 11.81*** |
| Market Value (in millions) | 15,397 | 29,242 | 922 | 10,596 | 20,496 | 529 | 4,801 | 4.83*** |
| Leverage ratio (Long-Term Debt/Total Asset) (%) | 22 | 20 | 1 | 22 | 18 | 0 | 0.01 | 0.02 |
| Leverage ratio (Long-Term Debt/Equity) (%) | 1,404 | 47,454 | 1,495 | 161 | 448 | 12 | 1,243 | 1.02 |
| Market to Book Ratio (%) | 107 | 450 | 14 | 274 | 569 | 15 | -168 | -7.85*** |

1. The 420 firms are large firms (i.e., market capitalization greater than \$300 millions) which have experienced a more-than-25% stock price decrease from 2000 to 2012.

2. ERM firms refer to firms with the ERM program enactment over the period 1996 to 2013.

3. We employ an indicator variable to identify whether the firm employs the ERM in any given year over the sample period. For example, if the firm adopts the ERM in 2004, the ERM indicator variable will be assigned with a value of one for year 2005 and the following years. We do not assign ERM indicator variable with a value of one for year 2004 to avoid the situation that the firm adopts the ERM at the end of the year.

Table 3

Insider Stock Purchase (40 ERM Firms)

RET refers to cumulative stock returns from three days before the transaction date to the transaction date

Negative Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | RET ≤ -75% | RET ≤ -50% | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -15% | -15% < RET ≤ -10% | -10% < RET ≤ -5% | -5% < RET ≤ 0% |
|----------|------------|------------|------------|-------------------|-------------------|-------------------|------------------|----------------|
| (+1,+10) | | | 8.05% | 3.16% | 8.29% | 2.35% | 2.42% | 0.83% |
| (+1,+30) | NA | NA | 11.59% | 3.51% | 5.13% | 3.39% | 2.34% | 1.45% |
| (+1,+60) | | | 11.17% | 7.73% | -3.26% | 0.17% | 3.75% | 0.92% |
| (+1,+90) | | | 8.55% | 1.72% | -8.38% | -0.35% | 2.92% | 1.29% |

B. N+:N-

| Days | RET ≤ -75% | RET ≤ -50% | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -15% | -15% < RET ≤ -10% | -10% < RET ≤ -5% | -5% < RET ≤ 0% |
|----------|------------|------------|------------|-------------------|-------------------|-------------------|------------------|----------------|
| (+1,+10) | | | 48:21>>> | 23:13> | 22:11> | 55:33>> | 127:82>>> | 337:239>>> |
| (+1,+30) | NA | NA | 44:25>> | 19:17 | 21:12> | 48:40 | 118:91>> | 320:256>>> |
| (+1,+60) | | | 44:25>> | 20:16 | 22:11> | 42:46 | 114:95> | 294:282 |
| (+1,+90) | | | 39:30 | 20:16 | 14:19 | 46:42 | 108:101 | 305:271> |

C. Number of Firms

| | RET ≤ -75% | RET ≤ -50% | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -15% | -15% < RET ≤ -10% | -10% < RET ≤ -5% | -5% < RET ≤ 0% |
|--|------------|------------|------------|-------------------|-------------------|-------------------|------------------|----------------|
| | NA | NA | 40 | 14 | 20 | 26 | 36 | 40 |

Positive Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | 0% < RET ≤ 5% | 5% < RET ≤ 10% | 10% < RET ≤ 15% | 15% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET | 50% < RET | 75% < RET |
|----------|---------------|----------------|-----------------|-----------------|-----------------|-----------|-----------|-----------|
| (+1,+10) | 0.76% | 1.80% | 2.12% | 4.44% | 1.44% | -1.16% | -3.85% | |
| (+1,+30) | 1.02% | 2.19% | 3.97% | 16.38% | 12.24% | -14.54% | -27.65% | NA |
| (+1,+60) | 1.83% | 6.12% | 8.37% | 17.77% | 20.44% | -15.90% | -4.85% | |
| (+1,+90) | 1.84% | 4.50% | 8.55% | 25.59% | 28.18% | -28.71% | -0.21% | |

B. N+:N-

| Days | 0% < RET ≤ 5% | 5% < RET ≤ 10% | 10% < RET ≤ 15% | 15% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET | 50% < RET | 75% < RET |
|----------|---------------|----------------|-----------------|-----------------|-----------------|-----------|-----------|-----------|
| (+1,+10) | 235:205> | 62:55 | 21:23 | 13:5> | 8:6 | 7:9 | 2:1 | |
| (+1,+30) | 229:211) | 68:49> | 28:16> | 14:4>> | 11:3> | 7:9 | 1:2 | NA |
| (+1,+60) | 227:213) | 67:50> | 27:17> | 15:3>> | 10:4> | 6:10 | 1:2 | |
| (+1,+90) | 231:209> | 66:51> | 27:17> | 15:3>> | 9:5 | 6:10 | 1:2 | |

C. Number of Firms

| | 0% < RET ≤ 5% | 5% < RET ≤ 10% | 10% < RET ≤ 15% | 15% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET | 50% < RET | 75% < RET |
|--|---------------|----------------|-----------------|-----------------|-----------------|-----------|-----------|-----------|
| | 38 | 34 | 22 | 9 | 10 | 9 | 3 | NA |

1. This table accompanies Figure 1.

2. The 420 firms are large firms (i.e., market capitalization greater than \$300 millions) which have experienced a more-than-25% stock price decrease from 2000 to 2012.

3. ERM firms refer to firms with the ERM program enactment over the period 1996 to 2013.

4. As in the Securities Exchange Act of 1934, we define insiders as officers, directors, and large shareholders who own 10 percent or more of their company's shares.

5. The insider stock purchase sample is comprised of 1,660 firm-day observations for 40 ERM firms and of 14,672 firm-day observations for 380 No-ERM firms from 1996 to 2013, respectively. The insider stock sale sample is comprised of 4,011 firm-day observations for 40 ERM firms and of 44,777 firm-day observations for 380 No-ERM firms from 1996 to 2013, respectively.

6. We divide the insider stock purchase sample into 16 groups based on cumulative daily stock returns (RET) and run the event study separately for each group to examine the abnormal returns of insider stock transactions traded at different levels of past stock performance: RET ≤ -25%, -25% < RET ≤ -20%, -20% < RET ≤ -15%, -15% < RET ≤ -10%, -10% < RET ≤ -5%, -5% < RET ≤ 0%, 0% < RET ≤ 5%, 5% < RET ≤ 10%, 10% < RET ≤ 15%, 15% < RET ≤ 20%, 20% < RET ≤ 25%, and 25% < RET.

7. RET refers to the cumulative daily stock returns from three days before the transaction date to the transaction date (i.e., four day past stock performance). We also use the cumulative daily stock returns from one day before the transaction date to the transaction date (i.e., two day past stock performance) to proxy RET and get similar results. Interestingly, the abnormal returns are slightly higher when we use two day past stock performance as stock return classification method.

8. CAR(+1, +10), CAR(+1, +30), CAR(+1, +60), and CAR(+1, +90) refer to 10-day, 30-day, 60-day, and 90-day cumulative abnormal return of insider stock transactions, respectively. We employ the event study method based on the Fama-French-Momentum Time Series Model using CRSP value-weighted index. We also employ the event study using CRSP equal-weighted index as robustness checks and get similar results.

9. The symbols (<, <<, <<< or), >, >>, >>> show the direction and significance at the 0.10, 0.05, 0.01 and 0.001 levels of the generalized sign test, respectively.

Table 3 (cont.)

Insider Stock Purchase (380 No-ERM Firms)

RET refers to cumulative stock returns from three days before the transaction date to the transaction date

Negative Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | RET ≤ -75% | RET ≤ -50% | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -15% | -15% < RET ≤ -10% | -10% < RET ≤ -5% | -5% < RET ≤ 0% |
|----------|------------|------------|------------|-------------------|-------------------|-------------------|------------------|----------------|
| (+1,+10) | 20.92% | 6.37% | 6.27% | 5.41% | 2.90% | 2.51% | 2.20% | 1.48% |
| (+1,+30) | 31.28% | 17.05% | 11.84% | 7.96% | 6.75% | 5.45% | 2.91% | 1.82% |
| (+1,+60) | 15.10% | 23.10% | 13.83% | 8.44% | 8.51% | 5.59% | 2.69% | 2.13% |
| (+1,+90) | 29.93% | 26.67% | 14.39% | 9.52% | 7.12% | 5.17% | 2.83% | 2.30% |

B. N+:N-

| Days | RET ≤ -75% | RET ≤ -50% | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -15% | -15% < RET ≤ -10% | -10% < RET ≤ -5% | -5% < RET ≤ 0% |
|----------|------------|------------|------------|-------------------|-------------------|-------------------|------------------|----------------|
| (+1,+10) | 7:3 | 49:34> | 493:282>>> | 193:94>>> | 284:171>>> | 499:352>>> | 1043:800>>> | 2374:1868>>> |
| (+1,+30) | 5:5 | 54:29>> | 512:263>>> | 183:104>>> | 286:169>>> | 501:350>>> | 1000:843>>> | 2330:1912>>> |
| (+1,+60) | 5:5 | 61:22>>> | 511:264>>> | 178:109>>> | 283:172>>> | 483:368>>> | 988:855>>> | 2296:1946>>> |
| (+1,+90) | 5:5 | 52:31>> | 480:295>>> | 167:120>>> | 253:202>>> | 467:384>>> | 972:871>>> | 2231:2011>>> |

C. Number of Firms

| | RET ≤ -75% | RET ≤ -50% | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -15% | -15% < RET ≤ -10% | -10% < RET ≤ -5% | -5% < RET ≤ 0% |
|--|------------|------------|------------|-------------------|-------------------|-------------------|------------------|----------------|
| | 8 | 58 | 373 | 179 | 221 | 275 | 322 | 342 |

Positive Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | 0% < RET ≤ 5% | 5% < RET ≤ 10% | 10% < RET ≤ 15% | 15% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET | 50% < RET | 75% < RET |
|----------|---------------|----------------|-----------------|-----------------|-----------------|-----------|-----------|-----------|
| (+1,+10) | 1.53% | 2.26% | 2.34% | 3.63% | 9.41% | 3.22% | 1.46% | 18.18% |
| (+1,+30) | 2.69% | 3.59% | 3.85% | 4.02% | 14.69% | 9.83% | 17.63% | 41.25% |
| (+1,+60) | 3.04% | 4.37% | 5.54% | 5.59% | 15.23% | 20.41% | 31.12% | 49.27% |
| (+1,+90) | 3.68% | 4.81% | 7.70% | 4.80% | 19.26% | 25.44% | 32.26% | 55.40% |

B. N+:N-

| Days | 0% < RET ≤ 5% | 5% < RET ≤ 10% | 10% < RET ≤ 15% | 15% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET | 50% < RET | 75% < RET |
|----------|---------------|----------------|-----------------|-----------------|-----------------|-----------|-----------|-----------|
| (+1,+10) | 2111:1711>>> | 756:577>>> | 298:227>>> | 136:88>>> | 66:48> | 110:80>> | 13:13 | 8:3> |
| (+1,+30) | 2165:1657>>> | 760:573>>> | 278:247> | 124:100> | 73:41>>> | 113:77>> | 18:8> | 10:1>> |
| (+1,+60) | 2076:1746>>> | 741:592>>> | 290:235>>> | 124:100> | 73:41>>> | 125:65>>> | 20:6>> | 9:2>> |
| (+1,+90) | 2042:1780>>> | 724:609>>> | 294:231>>> | 119:105> | 70:44>> | 131:59>>> | 17:9> | 9:2>> |

C. Number of Firms

| | 0% < RET ≤ 5% | 5% < RET ≤ 10% | 10% < RET ≤ 15% | 15% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET | 50% < RET | 75% < RET |
|--|---------------|----------------|-----------------|-----------------|-----------------|-----------|-----------|-----------|
| | 339 | 301 | 211 | 128 | 83 | 109 | 18 | 6 |

1. This table accompanies Figure 1.

2. The 420 firms are large firms (i.e., market capitalization greater than \$300 millions) which have experienced a more-than-25% stock price decrease from 2000 to 2012.

3. ERM firms refer to firms with the ERM program enactment over the period 1996 to 2013.

4. As in the Securities Exchange Act of 1934, we define insiders as officers, directors, and large shareholders who own 10 percent or more of their company's shares.

5. The insider stock purchase sample is comprised of 1,660 firm-day observations for 40 ERM firms and of 14,672 firm-day observations for 380 No-ERM firms from 1996 to 2013, respectively. The insider stock sale sample is comprised of 4,011 firm-day observations for 40 ERM firms and of 44,777 firm-day observations for 380 No-ERM firms from 1996 to 2013, respectively.

6. We divide the insider stock purchase sample into 16 groups based on cumulative daily stock returns (RET) and run the event study separately for each group to examine the abnormal returns of insider stock transactions traded at different levels of past stock performance: RET ≤ -25%, -25% < RET ≤ -20%, -20% < RET ≤ -15%, -15% < RET ≤ -10%, -10% < RET ≤ -5%, -5% < RET ≤ 0%, 0% < RET ≤ 5%, 5% < RET ≤ 10%, 10% < RET ≤ 15%, 15% < RET ≤ 20%, 20% < RET ≤ 25%, and 25% < RET.

7. RET refers to the cumulative daily stock returns from three days before the transaction date to the transaction date (i.e., four day past stock performance). We also use the cumulative daily stock returns from one day before the transaction date to the transaction date (i.e., two day past stock performance) to proxy RET and get similar results. Interestingly, the abnormal returns are slightly higher when we use two day past stock performance as stock return classification method.

8. CAR(+1, +10), CAR(+1, +30), CAR(+1, +60), and CAR(+1, +90) refer to 10-day, 30-day, 60-day, and 90-day cumulative abnormal return of insider stock transactions, respectively. We employ the event study method based on the Fama-French-Momentum Time Series Model using CRSP value-weighted index. We also employ the event study using CRSP equal-weighted index as robustness checks and get similar results.

9. The symbols (<, <<, <<< or), >, >>, >>> show the direction and significance at the 0.10, 0.05, 0.01 and 0.001 levels of the generalized sign test, respectively.

Table 3 (cont.)

Insider Stock Sale (40 ERM Firms)

RET refers to cumulative stock returns from three days before the transaction date to the transaction date

Negative Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | RET ≤ -75% | RET ≤ -50% | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -15% | -15% < RET ≤ -10% | -10% < RET ≤ -5% | -5% < RET ≤ 0% |
|----------|------------|------------|------------|-------------------|-------------------|-------------------|------------------|----------------|
| (+1,+10) | | | 2.98% | 12.72% | 4.51% | 2.81% | -0.39% | -0.60% |
| (+1,+30) | NA | NA | -3.45% | 32.03% | -3.84% | -1.66% | -1.67% | -1.56% |
| (+1,+60) | | | -21.07% | 20.41% | -33.91% | -0.33% | -4.14% | -3.07% |
| (+1,+90) | | | -10.60% | 12.05% | -38.24% | -1.95% | -4.93% | -4.19% |

B. N+:N-

| Days | RET ≤ -75% | RET ≤ -50% | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -15% | -15% < RET ≤ -10% | -10% < RET ≤ -5% | -5% < RET ≤ 0% |
|----------|------------|------------|------------|-------------------|-------------------|-------------------|------------------|----------------|
| (+1,+10) | | | 8:3 | 3:1 | 7:4 | 22:21 | 100:113 | 546:611 |
| (+1,+30) | NA | NA | 6:5 | 4:0> | 6:5 | 20:23 | 92:121(| 518:639<< |
| (+1,+60) | | | 4:7 | 3:1 | 6:5 | 23:20 | 100:113 | 531:626< |
| (+1,+90) | | | 4:7 | 3:1 | 5:6 | 26:17) | 93:120(| 525:632< |

C. Number of Firms

| | RET ≤ -75% | RET ≤ -50% | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -15% | -15% < RET ≤ -10% | -10% < RET ≤ -5% | -5% < RET ≤ 0% |
|--|------------|------------|------------|-------------------|-------------------|-------------------|------------------|----------------|
| | NA | NA | 7 | 4 | 8 | 19 | 35 | 37 |

Positive Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | 0% < RET ≤ 5% | 5% < RET ≤ 10% | 10% < RET ≤ 15% | 15% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET | 50% < RET | 75% < RET |
|----------|---------------|----------------|-----------------|-----------------|-----------------|-----------|-----------|-----------|
| (+1,+10) | -0.41% | -0.75% | -2.74% | -1.97% | -1.99% | 7.26% | 7.06% | 21.31% |
| (+1,+30) | -1.47% | -1.94% | -3.36% | -1.16% | 4.99% | 6.00% | -6.98% | -7.14% |
| (+1,+60) | -2.79% | -4.26% | -4.04% | -3.78% | 7.55% | 13.93% | 42.36% | 24.11% |
| (+1,+90) | -3.81% | -5.23% | -7.27% | -10.34% | -5.77% | 14.58% | 67.16% | 48.04% |

B. N+:N-

| Days | 0% < RET ≤ 5% | 5% < RET ≤ 10% | 10% < RET ≤ 15% | 15% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET | 50% < RET | 75% < RET |
|----------|---------------|----------------|-----------------|-----------------|-----------------|-----------|-----------|-----------|
| (+1,+10) | 909:1056< | 195:270<< | 35:63<< | 9:13 | 1:3 | 11:6) | 2:1 | 1:0 |
| (+1,+30) | 852:1113<<< | 210:255(| 34:64<< | 9:13 | 2:2 | 10:7 | 1:2 | 0:1 |
| (+1,+60) | 802:1163<<< | 188:277<<< | 35:63<< | 9:13 | 3:1 | 11:6) | 2:1 | 1:0 |
| (+1,+90) | 810:1155<<< | 182:283<<< | 38:60< | 10:12 | 2:2 | 9:8 | 2:1 | 1:0 |

C. Number of Firms

| | 0% < RET ≤ 5% | 5% < RET ≤ 10% | 10% < RET ≤ 15% | 15% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET | 50% < RET | 75% < RET |
|--|---------------|----------------|-----------------|-----------------|-----------------|-----------|-----------|-----------|
| | 38 | 36 | 27 | 13 | 3 | 10 | 2 | 1 |

1. This table accompanies Figure 1.

2. The 420 firms are large firms (i.e., market capitalization greater than \$300 millions) which have experienced a more-than-25% stock price decrease from 2000 to 2012.

3. ERM firms refer to firms with the ERM program enactment over the period 1996 to 2013.

4. As in the Securities Exchange Act of 1934, we define insiders as officers, directors, and large shareholders who own 10 percent or more of their company's shares.

5. The insider stock purchase sample is comprised of 1,660 firm-day observations for 40 ERM firms and of 14,672 firm-day observations for 380 No-ERM firms from 1996 to 2013, respectively. The insider stock sale sample is comprised of 4,011 firm-day observations for 40 ERM firms and of 44,777 firm-day observations for 380 No-ERM firms from 1996 to 2013, respectively.

6. We divide the insider stock purchase sample into 16 groups based on cumulative daily stock returns (RET) and run the event study separately for each group to examine the abnormal returns of insider stock transactions traded at different levels of past stock performance: RET ≤ -25%, -25% < RET ≤ -20%, -20% < RET ≤ -15%, -15% < RET ≤ -10%, -10% < RET ≤ -5%, -5% < RET ≤ 0%, 0% < RET ≤ 5%, 5% < RET ≤ 10%, 10% < RET ≤ 15%, 15% < RET ≤ 20%, 20% < RET ≤ 25%, and 25% < RET.

7. RET refers to the cumulative daily stock returns from three days before the transaction date to the transaction date (i.e., four day past stock performance). We also use the cumulative daily stock returns from one day before the transaction date to the transaction date (i.e., two day past stock performance) to proxy RET and get similar results. Interestingly, the abnormal returns are slightly higher when we use two day past stock performance as stock return classification method.

8. CAR(+1, +10), CAR(+1, +30), CAR(+1, +60), and CAR(+1, +90) refer to 10-day, 30-day, 60-day, and 90-day cumulative abnormal return of insider stock transactions, respectively. We employ the event study method based on the Fama-French-Momentum Time Series Model using CRSP value-weighted index. We also employ the event study using CRSP equal-weighted index as robustness checks and get similar results.

9. The symbols (<, <<, <<< or), >, >>, >>>) show the direction and significance at the 0.10, 0.05, 0.01 and 0.001 levels of the generalized sign test, respectively.

Table 3 (cont.)

Insider Stock Sale (380 No-ERM Firms)

RET refers to cumulative stock returns from three days before the transaction date to the transaction date

Negative Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | RET ≤ -75% | RET ≤ -50% | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -15% | -15% < RET ≤ -10% | -10% < RET ≤ -5% | -5% < RET ≤ 0% |
|----------|------------|------------|------------|-------------------|-------------------|-------------------|------------------|----------------|
| (+1,+10) | | 8.95% | 1.15% | -1.37% | -0.51% | -1.91% | -1.03% | -1.03% |
| (+1,+30) | NA | 1.65% | -0.41% | -1.71% | -5.44% | -5.50% | -2.86% | -2.73% |
| (+1,+60) | | 15.36% | 0.55% | -6.90% | -10.88% | -10.45% | -6.49% | -5.10% |
| (+1,+90) | | 14.63% | -3.97% | -6.89% | -18.21% | -17.83% | -9.88% | -7.41% |

B. N+:N-

| Days | RET ≤ -75% | RET ≤ -50% | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -15% | -15% < RET ≤ -10% | -10% < RET ≤ -5% | -5% < RET ≤ 0% |
|----------|------------|------------|------------|-------------------|-------------------|-------------------|------------------|----------------|
| (+1,+10) | | 76 | 9490 | 6180 | 168:183 | 397:506< | 1390:1649< | 5176:6507<<< |
| (+1,+30) | NA | 67 | 8896 | 65:76 | 157:194 | 374:529<<< | 1322:1717<<< | 4991:6692<<< |
| (+1,+60) | | 94 | 99:85 | 59:82< | 145:206< | 347:556<<< | 1215:1824<<< | 4872:6811<<< |
| (+1,+90) | | 76 | 87:97 | 65:76 | 132:219<<< | 333:570<<< | 1177:1862<<< | 4746:6937<<< |

C. Number of Firms

| | RET ≤ -75% | RET ≤ -50% | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -15% | -15% < RET ≤ -10% | -10% < RET ≤ -5% | -5% < RET ≤ 0% |
|--|------------|------------|------------|-------------------|-------------------|-------------------|------------------|----------------|
| | NA | 12 | 94 | 80 | 133 | 245 | 338 | 373 |

Positive Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | 0% < RET ≤ 5% | 5% < RET ≤ 10% | 10% < RET ≤ 15% | 15% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET | 50% < RET | 75% < RET |
|----------|---------------|----------------|-----------------|-----------------|-----------------|-----------|-----------|-----------|
| (+1,+10) | -1.00% | -1.55% | -1.88% | -2.12% | -1.96% | -2.38% | -5.16% | 0.32% |
| (+1,+30) | -2.73% | -3.71% | -4.36% | -5.60% | -4.00% | -3.53% | -12.25% | -12.70% |
| (+1,+60) | -5.00% | -7.15% | -8.83% | -10.02% | -7.79% | -7.27% | -7.36% | -5.93% |
| (+1,+90) | -7.12% | -10.28% | -13.05% | -14.73% | -9.32% | -8.50% | -7.07% | 4.07% |

B. N+:N-

| Days | 0% < RET ≤ 5% | 5% < RET ≤ 10% | 10% < RET ≤ 15% | 15% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET | 50% < RET | 75% < RET |
|----------|---------------|----------------|-----------------|-----------------|-----------------|-----------|-----------|-----------|
| (+1,+10) | 7734:9987<<< | 2798:3915<<< | 928:1317<<< | 387:517<< | 191:249< | 188:262< | 16:23 | 4:4 |
| (+1,+30) | 7416:10305<<< | 2767:3946<<< | 932:1313<<< | 377:527<<< | 196:244 | 210:240 | 14:25< | 2:6 |
| (+1,+60) | 7152:10569<<< | 2676:4037<<< | 866:1379<<< | 372:532<<< | 200:240 | 207:243 | 19:20 | 4:4 |
| (+1,+90) | 7122:10599<<< | 2556:4157<<< | 811:1434<<< | 347:557<<< | 196:244 | 195:255< | 22:17 | 5:3 |

C. Number of Firms

| | 0% < RET ≤ 5% | 5% < RET ≤ 10% | 10% < RET ≤ 15% | 15% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET | 50% < RET | 75% < RET |
|--|---------------|----------------|-----------------|-----------------|-----------------|-----------|-----------|-----------|
| | 369 | 359 | 314 | 243 | 174 | 157 | 21 | 5 |

1. This table accompanies Figure 1.

2. The 420 firms are large firms (i.e., market capitalization greater than \$300 millions) which have experienced a more-than-25% stock price decrease from 2000 to 2012.

3. ERM firms refer to firms with the ERM program enactment over the period 1996 to 2013.

4. As in the Securities Exchange Act of 1934, we define insiders as officers, directors, and large shareholders who own 10 percent or more of their company's shares.

5. The insider stock purchase sample is comprised of 1,660 firm-day observations for 40 ERM firms and of 14,672 firm-day observations for 380 No-ERM firms from 1996 to 2013, respectively. The insider stock sale sample is comprised of 4,011 firm-day observations for 40 ERM firms and of 44,777 firm-day observations for 380 No-ERM firms from 1996 to 2013, respectively.

6. We divide the insider stock purchase sample into 16 groups based on cumulative daily stock returns (RET) and run the event study separately for each group to examine the abnormal returns of insider stock transactions traded at different levels of past stock performance: RET ≤ -25%, -25% < RET ≤ -20%, -20% < RET ≤ -15%, -15% < RET ≤ -10%, -10% < RET ≤ -5%, -5% < RET ≤ 0%, 0% < RET ≤ 5%, 5% < RET ≤ 10%, 10% < RET ≤ 15%, 15% < RET ≤ 20%, 20% < RET ≤ 25%, and 25% < RET.

7. RET refers to the cumulative daily stock returns from three days before the transaction date to the transaction date (i.e., four day past stock performance). We also use the cumulative daily stock returns from one day before the transaction date to the transaction date (i.e., two day past stock performance) to proxy RET and get similar results. Interestingly, the abnormal returns are slightly higher when we use two day past stock performance as stock return classification method.

8. CAR(+1, +10), CAR(+1, +30), CAR(+1, +60), and CAR(+1, +90) refer to 10-day, 30-day, 60-day, and 90-day cumulative abnormal return of insider stock transactions, respectively. We employ the event study method based on the Fama-French-Momentum Time Series Model using CRSP value-weighted index. We also employ the event study using CRSP equal-weighted index as robustness checks and get similar results.

9. The symbols (<, <<, <<< or >, >>, >>>) show the direction and significance at the 0.10, 0.05, 0.01 and 0.001 levels of the generalized sign test, respectively.

Table 4

Insider Stock Purchase (40 ERM Firms, Before ERM)

RET refers to cumulative stock returns from three days before the transaction date to the transaction date

Negative Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -10% | -10% < RET ≤ 0% |
|----------|------------|-------------------|-------------------|-----------------|
| (+1,+10) | 5.10% | 1.22% | 2.61% | 0.60% |
| (+1,+30) | 11.29% | 6.04% | 3.43% | 1.08% |
| (+1,+60) | 14.35% | 14.30% | 0.04% | 1.22% |
| (+1,+90) | 18.89% | 19.08% | -2.19% | 0.83% |

B. N+:N-

| Days | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -10% | -10% < RET ≤ 0% |
|----------|------------|-------------------|-------------------|-----------------|
| (+1,+10) | 23:14) | 10:8 | 44:24>> | 310:250>>> |
| (+1,+30) | 23:14) | 11:7 | 37:31 | 305:255>> |
| (+1,+60) | 23:14) | 11:7 | 35:33 | 295:265> |
| (+1,+90) | 22:15 | 11:7 | 32:36 | 287:273) |

C. Number of Firms

| | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -10% | -10% < RET ≤ 0% |
|--|------------|-------------------|-------------------|-----------------|
| | 19 | 7 | 21 | 33 |

Positive Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | 0% < RET ≤ 10% | 10% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET |
|----------|----------------|-----------------|-----------------|-----------|
| (+1,+10) | 0.99% | 3.84% | 0.55% | 6.16% |
| (+1,+30) | 1.55% | 11.20% | 11.88% | 23.72% |
| (+1,+60) | 3.18% | 14.85% | 18.60% | 27.04% |
| (+1,+90) | 2.50% | 20.76% | 24.44% | 38.39% |

B. N+:N-

| Days | 0% < RET ≤ 10% | 10% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET |
|----------|----------------|-----------------|-----------------|-----------|
| (+1,+10) | 214:184> | 24:16) | 4:5 | 2:1 |
| (+1,+30) | 223:175>> | 28:12>> | 6:3 | 3:0> |
| (+1,+60) | 212:186> | 29:11>> | 7:2> | 3:0> |
| (+1,+90) | 214:184> | 29:11>> | 5:4 | 3:0> |

C. Number of Firms

| | 0% < RET ≤ 10% | 10% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET |
|--|----------------|-----------------|-----------------|-----------|
| | 31 | 13 | 8 | 2 |

1. This table accompanies Figure 2.

2. The 40 ERM firms are large firms (i.e., market capitalization greater than \$300 millions) which have experienced a more-than-25% stock price decrease from 2000 to 2012.

3. ERM firms refer to firms with the ERM program enactment over the period 1996 to 2013.

4. As in the Securities Exchange Act of 1934, we define insiders as officers, directors, and large shareholders who own 10 percent or more of their company's shares.

5. The insider stock purchase sample is comprised of 1,660 firm-day observations for 40 ERM firms from 1996 to 2013: 1,136 observations for firms before the ERM enactment and 527 observations for firms after the ERM enactment. The insider stock sale sample is comprised of 4,011 firm-day observations for 40 ERM firms: 2,446 observations for firms before the ERM enactment and 1,525 observations for firms after the ERM enactment.

6. We divide the insider stock purchase sample into 8 groups based on cumulative daily stock returns (RET) and run the event study separately for each group to examine the abnormal returns of insider stock transactions traded at different levels of past stock performance: RET ≤ -25%, -25% < RET ≤ -20%, -20% < RET ≤ -10%, -10% < RET ≤ 0%, 0% < RET ≤ 10%, 10% < RET ≤ 20%, 20% < RET ≤ 25%, and 25% < RET.

7. RET refers to the cumulative daily stock returns from three days before the transaction date to the transaction date (i.e., four day past stock performance). We also use the cumulative daily stock returns from one day before the transaction date to the transaction date (i.e., two day past stock performance) to proxy RET and get similar results. Interestingly, the abnormal returns are slightly higher when we use two day past stock performance as stock return classification method.

8. CAR(+1, +10), CAR(+1, +30), CAR(+1, +60), and CAR(+1, +90) refer to 10-day, 30-day, 60-day, and 90-day cumulative abnormal return of insider stock transactions, respectively. We employ the event study method based on the Fama-French-Momentum Time Series Model using CRSP value-weighted index. We also employ the event study using CRSP equal-weighted index as robustness checks and get similar results.

9. The symbols (<, <<, <<< or), >, >>, >>> show the direction and significance at the 0.10, 0.05, 0.01 and 0.001 levels of the generalized sign test, respectively.

Table 4 (cont.)

Insider Stock Purchase (40 ERM Firms, After ERM)

RET refers to cumulative stock returns from three days before the transaction date to the transaction date

Negative Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -10% | -10% < RET ≤ 0% |
|----------|------------|-------------------|-------------------|-----------------|
| (+1,+10) | 11.46% | 5.09% | 5.71% | 2.88% |
| (+1,+30) | 11.94% | 0.98% | 4.42% | 3.19% |
| (+1,+60) | 7.50% | 1.15% | -1.80% | 2.81% |
| (+1,+90) | -3.40% | -15.65% | -2.98% | 3.94% |

B. N+:N-

| Days | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -10% | -10% < RET ≤ 0% |
|----------|------------|-------------------|-------------------|-----------------|
| (+1,+10) | 25:7>>> | 13:5> | 33:20> | 154:71>>> |
| (+1,+30) | 21:11> | 8:10 | 32:21> | 133:92>>> |
| (+1,+60) | 21:11> | 9:9 | 29:24 | 113:112 |
| (+1,+90) | 17:15 | 9:9 | 28:25 | 126:99> |

C. Number of Firms

| | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -10% | -10% < RET ≤ 0% |
|--|------------|-------------------|-------------------|-----------------|
| | 22 | 9 | 20 | 25 |

Positive Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | 0% < RET ≤ 10% | 10% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET |
|----------|----------------|-----------------|-----------------|-----------|
| (+1,+10) | 0.94% | 0.90% | 3.05% | -2.85% |
| (+1,+30) | 0.54% | 0.99% | 12.89% | -23.36% |
| (+1,+60) | 1.63% | 4.28% | 23.76% | -25.81% |
| (+1,+90) | 2.16% | 0.30% | 34.93% | -44.19% |

B. N+:N-

| Days | 0% < RET ≤ 10% | 10% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET |
|----------|----------------|-----------------|-----------------|-----------|
| (+1,+10) | 83:76 | 10:12 | 4:1 | 5:8 |
| (+1,+30) | 74:85 | 14:8) | 5:0>> | 4:9(|
| (+1,+60) | 82:77 | 13:9 | 3:2 | 3:10< |
| (+1,+90) | 83:76 | 13:9 | 4:1) | 3:10< |

C. Number of Firms

| | 0% < RET ≤ 10% | 10% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET |
|--|----------------|-----------------|-----------------|-----------|
| | 27 | 11 | 3 | 7 |

- This table accompanies Figure 2.
- The 40 ERM firms are large firms (i.e., market capitalization greater than \$300 millions) which have experienced a more-than-25% stock price decrease from 2000 to 2012.
- ERM firms refer to firms with the ERM program enactment over the period 1996 to 2013.
- As in the Securities Exchange Act of 1934, we define insiders as officers, directors, and large shareholders who own 10 percent or more of their company's shares.
- The insider stock purchase sample is comprised of 1,660 firm-day observations for 40 ERM firms from 1996 to 2013: 1,136 observations for firms before the ERM enactment and 527 observations for firms after the ERM enactment. The insider stock sale sample is comprised of 4,011 firm-day observations for 40 ERM firms: 2,446 observations for firms before the ERM enactment and 1,525 observations for firms after the ERM enactment.
- We divide the insider stock purchase sample into 8 groups based on cumulative daily stock returns (RET) and run the event study separately for each group to examine the abnormal returns of insider stock transactions traded at different levels of past stock performance: RET ≤ -25%, -25% < RET ≤ -20%, -20% < RET ≤ -10%, -10% < RET ≤ 0%, 0% < RET ≤ 10%, 10% < RET ≤ 20%, 20% < RET ≤ 25%, and 25% < RET.
- RET refers to the cumulative daily stock returns from three days before the transaction date to the transaction date (i.e., four day past stock performance). We also use the cumulative daily stock returns from one day before the transaction date to the transaction date (i.e., two day past stock performance) to proxy RET and get similar results. Interestingly, the abnormal returns are slightly higher when we use two day past stock performance as stock return classification method.
- CAR(+1, +10), CAR(+1, +30), CAR(+1, +60), and CAR(+1, +90) refer to 10-day, 30-day, 60-day, and 90-day cumulative abnormal return of insider stock transactions, respectively. We employ the event study method based on the Fama-French-Momentum Time Series Model using CRSP value-weighted index. We also employ the event study using CRSP equal-weighted index as robustness checks and get similar results.
- The symbols (<, <<, <<< or), >, >>, >>>) show the direction and significance at the 0.10, 0.05, 0.01 and 0.001 levels of the generalized sign test, respectively.

Table 4 (cont.)

Insider Stock Sale (40 ERM Firms, Before ERM)

RET refers to cumulative stock returns from three days before the transaction date to the transaction date

Negative Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -10% | -10% < RET ≤ 0% |
|----------|------------|-------------------|-------------------|-----------------|
| (+1,+10) | -1.89% | 10.40% | 1.92% | -0.90% |
| (+1,+30) | -11.47% | 27.91% | -5.98% | -2.71% |
| (+1,+60) | -18.20% | 6.23% | -13.73% | -5.19% |
| (+1,+90) | -20.02% | 27.13% | -17.74% | -7.08% |

B. N+:N-

| Days | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -10% | -10% < RET ≤ 0% |
|----------|------------|-------------------|-------------------|-----------------|
| (+1,+10) | 5:3 | 2:1 | 19:20 | 382:450(|
| (+1,+30) | 4:4 | 3:0> | 16:23 | 355:477<<< |
| (+1,+60) | 4:4 | 2:1 | 19:20 | 364:468<< |
| (+1,+90) | 3:5 | 3:0> | 20:19 | 354:478<<< |

C. Number of Firms

| RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -10% | -10% < RET ≤ 0% |
|------------|-------------------|-------------------|-----------------|
| 6 | 3 | 16 | 31 |

Positive Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | 0% < RET ≤ 10% | 10% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET |
|----------|----------------|-----------------|-----------------|-----------|
| (+1,+10) | -0.64% | -3.28% | -9.79% | 4.47% |
| (+1,+30) | -2.25% | -3.96% | -6.25% | 2.36% |
| (+1,+60) | -4.53% | -5.21% | -11.00% | -6.89% |
| (+1,+90) | -5.58% | -8.94% | -15.76% | -7.92% |

B. N+:N-

| Days | 0% < RET ≤ 10% | 10% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET |
|----------|----------------|-----------------|-----------------|-----------|
| (+1,+10) | 635:833<<< | 32:57< | 02(| 3:1 |
| (+1,+30) | 622:846<<< | 33:56< | 1:1 | 2:2 |
| (+1,+60) | 549:919<<< | 29:60<< | 1:1 | 1:3 |
| (+1,+90) | 558:910<<< | 32:57< | 1:1 | 0:4< |

C. Number of Firms

| 0% < RET ≤ 10% | 10% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET |
|----------------|-----------------|-----------------|-----------|
| 33 | 20 | 2 | 3 |

- This table accompanies Figure 2.
- The 40 ERM firms are large firms (i.e., market capitalization greater than \$300 millions) which have experienced a more-than-25% stock price decrease from 2000 to 2012.
- ERM firms refer to firms with the ERM program enactment over the period 1996 to 2013.
- As in the Securities Exchange Act of 1934, we define insiders as officers, directors, and large shareholders who own 10 percent or more of their company's shares.
- The insider stock purchase sample is comprised of 1,660 firm-day observations for 40 ERM firms from 1996 to 2013: 1,136 observations for firms before the ERM enactment and 527 observations for firms after the ERM enactment. The insider stock sale sample is comprised of 4,011 firm-day observations for 40 ERM firms: 2,446 observations for firms before the ERM enactment and 1,525 observations for firms after the ERM enactment.
- We divide the insider stock purchase sample into 8 groups based on cumulative daily stock returns (RET) and run the event study separately for each group to examine the abnormal returns of insider stock transactions traded at different levels of past stock performance: RET ≤ -25%, -25% < RET ≤ -20%, -20% < RET ≤ -10%, -10% < RET ≤ 0%, 0% < RET ≤ 10%, 10% < RET ≤ 20%, 20% < RET ≤ 25%, and 25% < RET.
- RET refers to the cumulative daily stock returns from three days before the transaction date to the transaction date (i.e., four day past stock performance). We also use the cumulative daily stock returns from one day before the transaction date to the transaction date (i.e., two day past stock performance) to proxy RET and get similar results. Interestingly, the abnormal returns are slightly higher when we use two day past stock performance as stock return classification method.
- CAR(+1, +10), CAR(+1, +30), CAR(+1, +60), and CAR(+1, +90) refer to 10-day, 30-day, 60-day, and 90-day cumulative abnormal return of insider stock transactions, respectively. We employ the event study method based on the Fama-French-Momentum Time Series Model using CRSP value-weighted index. We also employ the event study using CRSP equal-weighted index as robustness checks and get similar results.
- The symbols (<, <<, <<< or), >, >>, >>> show the direction and significance at the 0.10, 0.05, 0.01 and 0.001 levels of the generalized sign test, respectively.

Table 4 (cont.)

Insider Stock Sale (40 ERM Firms, After ERM)

RET refers to cumulative stock returns from three days before the transaction date to the transaction date

Negative Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -10% | -10% < RET ≤ 0% |
|----------|------------|-------------------|-------------------|-----------------|
| (+1,+10) | 15.95% | 19.67% | 6.39% | -0.06% |
| (+1,+30) | 17.94% | 44.38% | 7.98% | 0.16% |
| (+1,+60) | -28.71% | 62.93% | 9.89% | -0.23% |
| (+1,+90) | 14.52% | -33.21% | 12.49% | -0.01% |

B. N+:N-

| Days | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -10% | -10% < RET ≤ 0% |
|----------|------------|-------------------|-------------------|-----------------|
| (+1,+10) | 3:0> | 1:0 | 10:5) | 264:274 |
| (+1,+30) | 2:1 | 1:0 | 10:5) | 255:283 |
| (+1,+60) | 0:3< | 1:0 | 10:5) | 267:271 |
| (+1,+90) | 1:2 | 0:1 | 11:4> | 264:274 |

C. Number of Firms

| | RET ≤ -25% | -25% < RET ≤ -20% | -20% < RET ≤ -10% | -10% < RET ≤ 0% |
|--|------------|-------------------|-------------------|-----------------|
| | 1 | 1 | 10 | 29 |

Positive Past Stock Returns

A. Mean Cumulative Abnormal Return

| Days | 0% < RET ≤ 10% | 10% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET |
|----------|----------------|-----------------|-----------------|-----------|
| (+1,+10) | -0.22% | -0.64% | 5.81% | 8.11% |
| (+1,+30) | -0.50% | -0.08% | 16.23% | 7.12% |
| (+1,+60) | -0.84% | -0.50% | 26.10% | 20.34% |
| (+1,+90) | -1.80% | -4.65% | 4.21% | 21.50% |

B. N+:N-

| Days | 0% < RET ≤ 10% | 10% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET |
|----------|----------------|-----------------|-----------------|-----------|
| (+1,+10) | 469:493 | 12:19 | 1:1 | 8:5 |
| (+1,+30) | 440:522< | 10:21< | 1:1 | 8:5 |
| (+1,+60) | 441:521< | 15:16 | 2:0) | 10:3> |
| (+1,+90) | 434:528< | 16:15 | 1:1 | 9:4) |

C. Number of Firms

| | 0% < RET ≤ 10% | 10% < RET ≤ 20% | 20% < RET ≤ 25% | 25% < RET |
|--|----------------|-----------------|-----------------|-----------|
| | 30 | 13 | 2 | 8 |

- This table accompanies Figure 2.
- The 40 ERM firms are large firms (i.e., market capitalization greater than \$300 millions) which have experienced a more-than-25% stock price decrease from 2000 to 2012.
- ERM firms refer to firms with the ERM program enactment over the period 1996 to 2013.
- As in the Securities Exchange Act of 1934, we define insiders as officers, directors, and large shareholders who own 10 percent or more of their company's shares.
- The insider stock purchase sample is comprised of 1,660 firm-day observations for 40 ERM firms from 1996 to 2013: 1,136 observations for firms before the ERM enactment and 527 observations for firms after the ERM enactment. The insider stock sale sample is comprised of 4,011 firm-day observations for 40 ERM firms: 2,446 observations for firms before the ERM enactment and 1,525 observations for firms after the ERM enactment.
- We divide the insider stock purchase sample into 8 groups based on cumulative daily stock returns (RET) and run the event study separately for each group to examine the abnormal returns of insider stock transactions traded at different levels of past stock performance: RET ≤ -25%, -25% < RET ≤ -20%, -20% < RET ≤ -10%, -10% < RET ≤ 0%, 0% < RET ≤ 10%, 10% < RET ≤ 20%, 20% < RET ≤ 25%, and 25% < RET.
- RET refers to the cumulative daily stock returns from three days before the transaction date to the transaction date (i.e., four day past stock performance). We also use the cumulative daily stock returns from one day before the transaction date to the transaction date (i.e., two day past stock performance) to proxy RET and get similar results. Interestingly, the abnormal returns are slightly higher when we use two day past stock performance as stock return classification method.
- CAR(+1, +10), CAR(+1, +30), CAR(+1, +60), and CAR(+1, +90) refer to 10-day, 30-day, 60-day, and 90-day cumulative abnormal return of insider stock transactions, respectively. We employ the event study method based on the Fama-French-Momentum Time Series Model using CRSP value-weighted index. We also employ the event study using CRSP equal-weighted index as robustness checks and get similar results.
- The symbols (<, <<, <<< or >, >>, >>>) show the direction and significance at the 0.10, 0.05, 0.01 and 0.001 levels of the generalized sign test, respectively.

Table 5

Insider Stock Purchase

Cumulative Abnormal Return (CAR) Ordinary Least Squares Regression Model with Heteroscedasticity-Consistent Standard Errors

Number of Transactions= 20,268; Number of ERM Firms= 40; Number of NO-ERM Firms= 380; Sample Period= 1996 to 2013

| Event Study is based on the Market Model using: | | A. CRSP Value-Weighted Index | | | | B. CRSP Equal-Weighted Index | | | |
|---|------------------------|------------------------------|-----------------------|-----------------------|-----------------------|------------------------------|-----------------------|-----------------------|--|
| Dependent Variable | (1) CAR(+1,+10) | (2) CAR(+1,+30) | (3) CAR(+1,+60) | (4) CAR(+1,+90) | (5) CAR(+1,+10) | (6) CAR(+1,+30) | (7) CAR(+1,+60) | (8) CAR(+1,+90) | |
| Independent Variables | | | | | | | | | |
| ERM | 0.0276*** (0.0051) | 0.0229** (0.0097) | 0.0327** (0.0141) | 0.0116 (0.0188) | 0.0252*** (0.0050) | 0.0094 (0.0100) | 0.0088 (0.0148) | -0.0126 (0.0201) | |
| Insider Type | | | | | | | | | |
| CEO | 0.0024 (0.0033) | 0.0201*** (0.0054) | 0.0276*** (0.0080) | 0.0375*** (0.0108) | 0.0054* (0.0032) | 0.0232*** (0.0052) | 0.0296*** (0.0077) | 0.0394*** (0.0102) | |
| CFO | -0.0042 (0.0055) | 0.0246*** (0.0093) | 0.0583*** (0.0134) | 0.0899*** (0.0218) | 0.0020 (0.0050) | 0.0339*** (0.0088) | 0.0688*** (0.0125) | 0.0975*** (0.0208) | |
| Director | -0.0071*** (0.0025) | 0.0105** (0.0042) | 0.0249*** (0.0065) | 0.0347*** (0.0088) | -0.0042* (0.0023) | 0.0167*** (0.0039) | 0.0343*** (0.0060) | 0.0484*** (0.0078) | |
| Officer | -0.0068** (0.0030) | 0.0134*** (0.0050) | 0.0338*** (0.0074) | 0.0491*** (0.0099) | -0.0034 (0.0028) | 0.0213*** (0.0047) | 0.0457*** (0.0070) | 0.0670*** (0.0091) | |
| Large Shareholders | -0.0219 (0.0250) | 0.0038 (0.0392) | 0.0326 (0.0430) | 0.0851* (0.0476) | -0.0210 (0.0176) | 0.0185 (0.0274) | 0.0339 (0.0441) | 0.0862* (0.0506) | |
| CEO * ERM | -0.0295* (0.0152) | -0.0221 (0.0273) | 0.0499 (0.0521) | 0.1341** (0.0652) | -0.0304** (0.0150) | -0.0095 (0.0269) | 0.0673 (0.0530) | 0.1291* (0.0713) | |
| Past Stock Performance | | | | | | | | | |
| RET <= -25% | 0.0287*** (0.0067) | 0.0570*** (0.0103) | 0.0532*** (0.0133) | 0.0312* (0.0184) | 0.0366*** (0.0064) | 0.0497*** (0.0099) | 0.0352*** (0.0134) | 0.0095 (0.0179) | |
| -25% < RET <= -20% | 0.0244*** (0.0088) | 0.0430*** (0.0144) | 0.0503*** (0.0193) | 0.0398 (0.0247) | 0.0353*** (0.0084) | 0.0363*** (0.0140) | 0.0335* (0.0194) | 0.0195 (0.0246) | |
| 20% < RET <= 25% | 0.0358* (0.0207) | 0.0332 (0.0270) | 0.0009 (0.0346) | -0.0189 (0.0425) | 0.0270 (0.0199) | 0.0321 (0.0269) | 0.0250 (0.0356) | 0.0240 (0.0439) | |
| RET > 25% | -0.0067 (0.0139) | 0.0106 (0.0207) | 0.1008*** (0.0312) | 0.0843** (0.0406) | -0.0266** (0.0134) | -0.0292 (0.0211) | 0.0444 (0.0333) | 0.0319 (0.0435) | |
| CEO * RET <= -25% | -0.0360** (0.0183) | -0.0183 (0.0273) | -0.0101 (0.0319) | -0.0393 (0.0452) | -0.0302* (0.0174) | -0.0142 (0.0278) | -0.0041 (0.0316) | -0.0202 (0.0439) | |
| CEO * RET > 25% | -0.0232 (0.0279) | -0.0932* (0.0524) | -0.0453 (0.0821) | -0.0600 (0.0983) | -0.0078 (0.0258) | -0.0778 (0.0490) | -0.0017 (0.0828) | -0.0367 (0.1036) | |
| Firm Size and Stock Volatility | | | | | | | | | |
| Small Firms | 0.0206*** (0.0027) | 0.0572*** (0.0045) | 0.1175*** (0.0064) | 0.1740*** (0.0083) | 0.0201*** (0.0027) | 0.0518*** (0.0045) | 0.1043*** (0.0066) | 0.1538*** (0.0085) | |
| Medium Firms | 0.0096*** (0.0018) | 0.0172*** (0.0030) | 0.0334*** (0.0047) | 0.0650*** (0.0061) | 0.0095*** (0.0018) | 0.0168*** (0.0031) | 0.0304*** (0.0048) | 0.0574*** (0.0064) | |
| High Stock Volatility Firms | 0.0167*** (0.0036) | 0.0441*** (0.0061) | 0.0895*** (0.0086) | 0.0832*** (0.0113) | 0.0132*** (0.0035) | 0.0311*** (0.0060) | 0.0346*** (0.0088) | -0.0056 (0.0116) | |
| Medium Stock Volatility Firms | 0.0113*** (0.0015) | 0.0161*** (0.0026) | 0.0265*** (0.0038) | 0.0271*** (0.0050) | 0.0134*** (0.0014) | 0.0219*** (0.0026) | 0.0291*** (0.0038) | 0.0269*** (0.0051) | |
| Small Size * High Stock Volatility Firms | 0.0613*** (0.0071) | 0.1030*** (0.0112) | 0.1701*** (0.0163) | 0.2329*** (0.0223) | 0.0540*** (0.0065) | 0.0871*** (0.0103) | 0.1647*** (0.0147) | 0.2299*** (0.0197) | |

Table 5 (cont.)

Insider Stock Purchase (cont.)

| Event Study is based on the Market Model using: | A. CRSP Value-Weighted Index | | | | B. CRSP Equal-Weighted Index | | | |
|--|------------------------------|------------------------|------------------------|------------------------|------------------------------|------------------------|------------------------|------------------------|
| | (1) CAR(+1,+10) | (2) CAR(+1,+30) | (3) CAR(+1,+60) | (4) CAR(+1,+90) | (5) CAR(+1,+10) | (6) CAR(+1,+30) | (7) CAR(+1,+60) | (8) CAR(+1,+90) |
| Control Variables | | | | | | | | |
| Number of insider shares traded at insider level | 0.0000 (0.0000) | 0.0000 (0.0000) | -0.0000*** (0.0000) | -0.0000*** (0.0000) | 0.0000 (0.0000) | -0.0000*** (0.0000) | -0.0000*** (0.0000) | -0.0000*** (0.0000) |
| Number of insider shares traded at company level (%) | 0.0001** (0.0000) | 0.0004*** (0.0001) | 0.0004*** (0.0001) | 0.0007*** (0.0002) | 0.0001** (0.0000) | 0.0006*** (0.0001) | 0.0005*** (0.0001) | 0.0008*** (0.0002) |
| Market to book ratio (MTB) | 0.0000 (0.0000) | -0.0000** (0.0000) | -0.0000*** (0.0000) | -0.0000* (0.0000) | -0.0000 (0.0000) | -0.0000** (0.0000) | -0.0000*** (0.0000) | -0.0000*** (0.0000) |
| Loss (binary variable for net income < 0) | -0.0025 (0.0023) | -0.0116*** (0.0042) | -0.0261*** (0.0058) | -0.0073 (0.0076) | -0.0021 (0.0022) | -0.0058 (0.0043) | -0.0241*** (0.0058) | -0.0088 (0.0074) |
| Return on assets (ROA) | -0.0765*** (0.0182) | -0.1756*** (0.0416) | -0.1761*** (0.0408) | -0.2290*** (0.0615) | -0.0853*** (0.0178) | -0.1140** (0.0460) | -0.0806* (0.0442) | -0.1334** (0.0568) |
| Leverage ratio (long-term debt/ equity) | -0.0001* (0.0000) | -0.0001 (0.0001) | -0.0001 (0.0001) | -0.0003** (0.0001) | -0.0001** (0.0000) | -0.0001 (0.0001) | 0.0000 (0.0001) | -0.0002* (0.0001) |
| Insurance industry | 0.0202*** (0.0036) | 0.0503*** (0.0050) | 0.0534*** (0.0073) | 0.0715*** (0.0093) | 0.0174*** (0.0034) | 0.0485*** (0.0050) | 0.0539*** (0.0075) | 0.0583*** (0.0094) |
| Banking industry | -0.0067*** (0.0024) | -0.0047 (0.0047) | 0.0224*** (0.0072) | 0.0326*** (0.0092) | -0.0076*** (0.0025) | -0.0052 (0.0049) | 0.0165** (0.0077) | 0.0206** (0.0099) |
| January | -0.0037 (0.0043) | -0.0608*** (0.0069) | -0.0068 (0.0100) | -0.0394*** (0.0136) | -0.0103** (0.0043) | -0.0086 (0.0071) | 0.0665*** (0.0102) | 0.0182 (0.0137) |
| Fourth Quarter | 0.0008 (0.0025) | 0.0328*** (0.0039) | 0.0042 (0.0055) | 0.0126* (0.0074) | -0.0071*** (0.0024) | -0.0209*** (0.0039) | -0.0582*** (0.0057) | -0.0542*** (0.0075) |
| Constant | 0.0084* (0.0051) | -0.0174** (0.0080) | -0.0602*** (0.0115) | -0.1229*** (0.0154) | 0.0125** (0.0049) | -0.0075 (0.0076) | -0.0384*** (0.0106) | -0.0760*** (0.0140) |
| Year Fixed Effects | YES | YES | YES | YES | YES | YES | YES | YES |
| R-squared | 5.74% | 9.55% | 11.31% | 10.74% | 5.58% | 7.07% | 9.54% | 9.90% |

1. Heteroscedasticity-consistent standard errors are in parentheses.

2. The symbols ***, **, * show the significance at the 0.01, 0.05, and 0.10 levels of the t-test, respectively.

3. CAR(+1, +10), CAR(+1, +30), CAR(+1, +60), and CAR(+1, +90) refer to 10-day, 30-day, 60-day, and 90-day cumulative abnormal return of insider stock purchases, respectively. We employ the event study method based on the Market Model using CRSP value-weighted index and CRSP equal-weighted index, respectively.

4. We employ an indicator variable to identify whether the firm employs the ERM in any given year over the sample period. For example, if the firm adopts the ERM in 2004, the ERM indicator variable will be assigned with a value of one for year 2005 and the following years. We do not assign ERM indicator variable with a value of one for year 2004 to avoid the situation that the firm adopts the ERM at the end of the year.

5. As in the Securities Exchange Act of 1934, we define insiders as officers, directors, and large shareholders who own 10 percent or more of their company's shares. We employ five binary variables to proxy CEO, CFO, director, officer, and large shareholders who purchased the firm's stocks from 1996 to 2013, respectively.

6. We use four binary variables to proxy significant changes in firm's stock prices (i.e., past stock performance): RET is less than -25%, RET lies between -25% and -20%, RET lies between 20% and 25%, and RET is greater than 25%. RET refers to the cumulative daily stock returns from three days before the transaction date to the transaction date (i.e., 4 day past stock performance). We also use the cumulative daily stock returns from one day before the transaction date to the transaction date.

7. We employ two binary variables for firm size based on market capitalization: small firms with market capitalization less than or equal to \$332,796,509 (25 percentile), medium firms with market capitalization between \$332,796,509 and \$1,963,293,258 (25 percentile to 75 percentile), and large firms with market capitalization greater than \$1,963,293,258 (75 percentile).

8. We employ two binary variables for stock volatility of the firm which is measured by the standard deviation of daily stock returns over the 30 days prior to the insider transaction: low stock volatility firms with stock volatility less than or equal to 0.01954 (25 percentile), medium stock volatility firms with stock volatility between 0.01954 and 0.04950 (25 percentile to 75 percentile), and high stock volatility firms with stock volatility greater than 0.04950 (75 percentile).

9. We also employ several robustness checks and get similar results: models including dollar value of insider stock purchase traded at insider level and at company level, models using the ratio of long-term debt to total assets to proxy the leverage variable, and models with autocorrelation corrections (i.e., Yule-Walker Estimates).

10. Variance inflation factors for all independent variables are less than 10, and thus collinearity does not appear to be problematic for any of the models.

Table 6

Insider Stock Sale

Cumulative Abnormal Return (CAR) Ordinary Least Squares Regression Model with Heteroscedasticity-Consistent Standard Errors

Number of Transactions= 65,412; Number of ERM Firms= 40; Number of NO-ERM Firms= 380; Sample Period= 1996 to 2013

| Event Study is based on the Market Model using: | A. CRSP Value-Weighted Index | | | | B. CRSP Equal-Weighted Index | | | |
|---|------------------------------|------------------------|------------------------|------------------------|------------------------------|------------------------|------------------------|------------------------|
| | (1) | (2) | (3) | (4) | (5) | (6) | (7) | (8) |
| Dependent Variable | CAR(+1,+10) | CAR(+1,+30) | CAR(+1,+60) | CAR(+1,+90) | CAR(+1,+10) | CAR(+1,+30) | CAR(+1,+60) | CAR(+1,+90) |
| Independent Variables | | | | | | | | |
| ERM | 0.0049*** (0.0016) | 0.0079*** (0.0026) | 0.0325*** (0.0042) | 0.0348*** (0.0055) | 0.0054*** (0.0017) | 0.0101*** (0.0027) | 0.0330*** (0.0043) | 0.0361*** (0.0055) |
| Insider Type | | | | | | | | |
| CEO | -0.0061*** (0.0016) | -0.0160*** (0.0030) | -0.0264*** (0.0044) | -0.0542*** (0.0057) | -0.0069*** (0.0016) | -0.0201*** (0.0031) | -0.0311*** (0.0045) | -0.0480*** (0.0058) |
| CFO | -0.0059*** (0.0020) | -0.0134*** (0.0037) | -0.0337*** (0.0055) | -0.0586*** (0.0072) | -0.0071*** (0.0020) | -0.0166*** (0.0040) | -0.0391*** (0.0057) | -0.0536*** (0.0074) |
| Director | -0.0043*** (0.0014) | -0.0101*** (0.0026) | -0.0146*** (0.0038) | -0.0348*** (0.0049) | -0.0071*** (0.0014) | -0.0189*** (0.0027) | -0.0253*** (0.0039) | -0.0397*** (0.0050) |
| Officer | -0.0031** (0.0013) | -0.0083*** (0.0025) | -0.0148*** (0.0036) | -0.0312*** (0.0047) | -0.0051*** (0.0013) | -0.0162*** (0.0026) | -0.0233*** (0.0038) | -0.0323*** (0.0048) |
| Large Shareholders | -0.0141* (0.0085) | 0.0532*** (0.0206) | 0.0942*** (0.0253) | 0.0708** (0.0323) | -0.0156* (0.0094) | 0.0319 (0.0210) | 0.0589** (0.0286) | 0.0655** (0.0329) |
| CEO * ERM | 0.0048 (0.0043) | 0.0129** (0.0059) | 0.0057 (0.0086) | 0.0451*** (0.0136) | 0.0035 (0.0046) | 0.0039 (0.0065) | -0.0094 (0.0092) | 0.0307** (0.0142) |
| Past Stock Performance | | | | | | | | |
| RET <= -25% | 0.0232 (0.0162) | 0.0250 (0.0280) | 0.1051*** (0.0340) | 0.1196*** (0.0403) | 0.0357** (0.0160) | 0.0353 (0.0281) | 0.0439 (0.0360) | 0.0463 (0.0424) |
| -25% < RET <= -20% | 0.0115 (0.0160) | 0.0234 (0.0255) | 0.0253 (0.0341) | 0.0384 (0.0444) | 0.0241 (0.0158) | 0.0133 (0.0267) | -0.0063 (0.0370) | 0.0188 (0.0463) |
| 20% < RET <= 25% | 0.0079 (0.0052) | 0.0458*** (0.0088) | 0.0499*** (0.0144) | 0.0612*** (0.0177) | -0.0032 (0.0050) | 0.0219** (0.0090) | 0.0450*** (0.0145) | 0.0652*** (0.0184) |
| RET > 25% | 0.0051 (0.0070) | 0.0263** (0.0115) | 0.0378** (0.0181) | 0.0397* (0.0214) | 0.0010 (0.0068) | 0.0000 (0.0124) | 0.0129 (0.0188) | 0.0320 (0.0218) |
| CEO * RET <= -25% | 0.0500 (0.0387) | -0.0320 (0.0550) | 0.0050 (0.0735) | -0.1446 (0.0904) | 0.0645 (0.0446) | -0.0179 (0.0581) | -0.0316 (0.0837) | -0.1688* (0.0973) |
| CEO * RET > 25% | -0.0159 (0.0199) | -0.0369 (0.0324) | -0.1168** (0.0497) | -0.1382** (0.0617) | -0.0083 (0.0193) | -0.0342 (0.0345) | -0.1122** (0.0512) | -0.1407** (0.0625) |
| Firm Size and Stock Volatility | | | | | | | | |
| Large Firms | -0.0165*** (0.0012) | -0.0446*** (0.0022) | -0.0956*** (0.0034) | -0.1231*** (0.0044) | -0.0173*** (0.0012) | -0.0466*** (0.0023) | -0.0948*** (0.0034) | -0.1155*** (0.0044) |
| Medium Firms | -0.0128*** (0.0013) | -0.0383*** (0.0023) | -0.0767*** (0.0034) | -0.1019*** (0.0045) | -0.0141*** (0.0012) | -0.0436*** (0.0024) | -0.0812*** (0.0034) | -0.1018*** (0.0045) |
| High Stock Volatility Firms | -0.0133*** (0.0017) | -0.0185*** (0.0031) | -0.0374*** (0.0047) | -0.0488*** (0.0060) | -0.0148*** (0.0017) | -0.0186*** (0.0032) | -0.0473*** (0.0047) | -0.0630*** (0.0060) |
| Medium Stock Volatility Firms | -0.0082*** (0.0007) | -0.0224*** (0.0012) | -0.0428*** (0.0019) | -0.0602*** (0.0025) | -0.0070*** (0.0007) | -0.0185*** (0.0012) | -0.0382*** (0.0019) | -0.0549*** (0.0025) |
| Large Size * High Stock Volatility Firms | -0.0129*** (0.0031) | -0.0391*** (0.0058) | -0.0831*** (0.0087) | -0.1580*** (0.0113) | -0.0251*** (0.0032) | -0.0422*** (0.0062) | -0.0800*** (0.0094) | -0.1648*** (0.0120) |

Table 6 (cont.)

Insider Stock Sale (cont.)

| Event Study is based on the Market Model using: | A. CRSP Value-Weighted Index | | | | B. CRSP Equal-Weighted Index | | | |
|--|------------------------------|------------------------|------------------------|------------------------|------------------------------|------------------------|------------------------|------------------------|
| | (1) CAR(+1,+10) | (2) CAR(+1,+30) | (3) CAR(+1,+60) | (4) CAR(+1,+90) | (5) CAR(+1,+10) | (6) CAR(+1,+30) | (7) CAR(+1,+60) | (8) CAR(+1,+90) |
| Control Variables | | | | | | | | |
| Number of insider shares traded at insider level | 0.0000** (0.0000) | 0.0000*** (0.0000) | 0.0000*** (0.0000) | 0.0000*** (0.0000) | 0.0000** (0.0000) | 0.0000*** (0.0000) | 0.0000*** (0.0000) | 0.0000*** (0.0000) |
| Number of insider shares traded at company level (%) | -0.0008*** (0.0002) | -0.0036*** (0.0007) | -0.0043*** (0.0007) | -0.0071*** (0.0011) | -0.0005*** (0.0001) | -0.0029*** (0.0005) | -0.0034*** (0.0005) | -0.0058*** (0.0007) |
| Market to book ratio (MTB) | -0.0000*** (0.0000) | -0.0000*** (0.0000) | -0.0000*** (0.0000) | -0.0000*** (0.0000) | -0.0000*** (0.0000) | -0.0000*** (0.0000) | -0.0000*** (0.0000) | -0.0000*** (0.0000) |
| Loss (binary variable for net income < 0) | -0.0046*** (0.0012) | -0.0192*** (0.0024) | -0.0471*** (0.0039) | -0.0503*** (0.0055) | -0.0050*** (0.0012) | -0.0244*** (0.0026) | -0.0553*** (0.0038) | -0.0547*** (0.0055) |
| Return on assets (ROA) | -0.0008 (0.0058) | -0.0487*** (0.0173) | -0.1602*** (0.0297) | -0.3301*** (0.0506) | 0.0181*** (0.0055) | 0.0210 (0.0204) | -0.1097*** (0.0255) | -0.2998*** (0.0490) |
| Leverage ratio (long-term debt/ equity) | 0.0000 (0.0000) | 0.0000 (0.0000) | 0.0002*** (0.0001) | 0.0003*** (0.0001) | 0.0000 (0.0000) | -0.0000 (0.0000) | 0.0001* (0.0001) | 0.0000 (0.0001) |
| Insurance industry | 0.0005 (0.0016) | 0.0077*** (0.0025) | 0.0071* (0.0040) | 0.0154*** (0.0056) | -0.0004 (0.0016) | 0.0007 (0.0026) | -0.0085** (0.0041) | -0.0103* (0.0056) |
| Banking industry | 0.0072*** (0.0013) | 0.0214*** (0.0026) | 0.0354*** (0.0043) | 0.0497*** (0.0058) | 0.0075*** (0.0014) | 0.0159*** (0.0028) | 0.0185*** (0.0046) | 0.0196*** (0.0061) |
| January | 0.0039** (0.0017) | -0.0048 (0.0035) | -0.0082 (0.0051) | -0.0198*** (0.0068) | -0.0027 (0.0017) | 0.0189*** (0.0034) | 0.0518*** (0.0050) | 0.0340*** (0.0066) |
| Fourth Quarter | -0.0022** (0.0010) | 0.0042** (0.0018) | 0.0178*** (0.0028) | 0.0222*** (0.0035) | -0.0077*** (0.0010) | -0.0369*** (0.0020) | -0.0536*** (0.0029) | -0.0413*** (0.0037) |
| Constant | 0.0066** (0.0026) | 0.0226*** (0.0046) | 0.0460*** (0.0069) | 0.0414*** (0.0092) | 0.0089*** (0.0026) | 0.0388*** (0.0048) | 0.0838*** (0.0071) | 0.0941*** (0.0095) |
| Year Fixed Effects | YES | YES | YES | YES | YES | YES | YES | YES |
| R-squared | 1.47% | 3.49% | 6.88% | 8.30% | 2.77% | 4.73% | 7.20% | 8.13% |

1. Heteroscedasticity-consistent standard errors are in parentheses.

2. The symbols ***, **, * show the significance at the 0.01, 0.05, and 0.10 levels of the t-test, respectively.

3. CAR(+1, +10), CAR(+1, +30), CAR(+1, +60), and CAR(+1, +90) refer to 10-day, 30-day, 60-day, and 90-day cumulative abnormal return of insider stock sales, respectively. We employ the event study method based on the Market Model using CRSP value-weighted index and CRSP equal-weighted index, respectively.

4. We employ an indicator variable to identify whether the firm employs the ERM in any given year over the sample period. For example, if the firm adopts the ERM in 2004, the ERM indicator variable will be assigned with a value of one for year 2005 and the following years. We do not assign ERM indicator variable with a value of one for year 2004 to avoid the situation that the firm adopts the ERM at the end of the year.

5. As in the Securities Exchange Act of 1934, we define insiders as officers, directors, and large shareholders who own 10 percent or more of their company's shares. We employ five binary variables to proxy CEO, CFO, director, officer, and large shareholders who sold the firm's stocks from 1996 to 2013, respectively.

6. We use four binary variables to proxy significant changes in firm's stock prices (i.e., past stock performance): RET is less than -25%, RET lies between -25% and -20%, RET lies between 20% and 25%, and RET is greater than 25%. RET refers to the cumulative daily stock returns from three days before the transaction date to the transaction date (i.e., 4 day past stock performance). We also use the cumulative daily stock returns from one day before the transaction date to the transaction date (i.e., 2 day past stock performance) to proxy RET and get similar results.

7. We employ two binary variables for firm size based on market capitalization: small firms with market capitalization less than or equal to \$626,650,226 (25 percentile), medium firms with market capitalization between \$626,650,226 and \$4,560,525,154 (25 percentile to 75 percentile), and large firms with market capitalization greater than \$4,560,525,154 (75 percentile).

8. We employ two binary variables for stock volatility of the firm which is measured based on the standard deviation of daily stock returns over the 30 days prior to the insider transaction: low stock volatility firms with stock volatility less than or equal to 0.01831 (25 percentile), medium stock volatility firms with stock volatility between 0.01831 and 0.04088 (25 percentile to 75 percentile), and high stock volatility firms with stock volatility greater than 0.04088 (75 percentile).

9. We also employ several robustness checks and get similar results: models including dollar value of insider stock sale traded at insider level and at company level, models using the ratio of long-term debt to total assets to proxy the leverage variable, and models with autocorrelation corrections (i.e., Yule-Walker Estimates).

10. Variance inflation factors for all independent variables are less than 10, and thus collinearity does not appear to be problematic for any of the models.