Enterprise Risk Management and Transparency: Evidence from Insider Trading

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ABSTRACT

This paper is the first study to examine whether enterprise risk management (ERM) can enhance transparency. We assess this by investigating the effects of ERM on abnormal returns of insider stock transactions. First, insiders in a firm with ERM are assumed to have better knowledge about their firm's operations and risks; thus, we would expect insider stock transactions in ERM firms to earn greater abnormal returns than insiders in non-ERM firms. However, ERM may also reduce information asymmetry between insiders and outsiders. In this case, we would expect insiders in ERM firms to earn smaller abnormal returns from their stock transactions. Our results show that ERM has negative (positive) effects on abnormal returns of insider stock purchases (sales), particularly for firms with higher stock volatility. Therefore, we provide new evidence that ERM can add value to a firm by reducing information asymmetry between insiders and outside investors, especially for firms with higher levels of information uncertainty.

Keywords: Insider Trading; Enterprise Risk Management; Information Asymmetry; Information Uncertainty

JEL Classification: G14

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Introduction

Using a novel approach, we examine a mechanism for mitigating information asymmetry between firms and the external capital market. In particular, we examine the degree to which enterprise risk management can reduce the opacity of a firm. An advantage often given of enterprise risk management (ERM) relates to the reduction of information asymmetry between non-inside investors (hereafter, investors) and insiders. Further, a well-known result in the academic literature shows insiders are able to accrue positive abnormal returns in their trading (e.g. Ke, Huddart, and Petroni, 2003). If ERM does reduce the information asymmetry, we would expect that these abnormal returns generated from

"insider trading" would be reduced.[1] Here, we examine how ERM adds value to a firm by investigating the effects of ERM on abnormal returns of insider stock transactions for 500 publicly-traded firms randomly chosen from an insider stock purchase and sale sample over the period 1996-2013. We use an event study approach and an ex-post regression model to test abnormal returns of insider trades conditioned on the existence of an ERM program. We show that abnormal returns of insider stock transactions are lower with the enactment of enterprise risk management programs. We further find that this result is strongest for firms with more inherent information asymmetry. This result suggests that enterprise risk management programs, in addition to providing other benefits, also may help to minimize information risk between firms and external market participants.

Broadly, firms with an ERM program combine all risk management activities into one central risk function that integrates decision making across all risk classes (e.g., financial, hazard, operational, and strategic risks), facilitates the identification of interdependencies between risks and provides better risk identification, and reduces information asymmetry among units and external capital markets (Liebenberg and Hoyt, 2003; Hoyt and Liebenberg, 2011). Therefore, several studies suggest that by reducing this asymmetry an ERM program can benefit a 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).

[1] Though we will use "insider trading," "insider trades," etc. throughout, we do not necessarily refer to illegal trading strategies. Indeed, our results are based on reported trades which may or may not be legal.

The paper is the first study to examine the degree to which ERM, by enhancing transparency, may mitigate against abnormal returns obtained via stock trading by insiders. Traditionally, insiders in a firm are assumed to have better knowledge regarding firm performance and future stock price movements. Insiders in a firm are generally shown to be able to earn greater positive (negative) abnormal returns from their stock purchases (sales). However, with the introduction of ERM, it is expected that the ERM program may reduce information asymmetry between insiders and outside investors. In this case, we would expect insiders in ERM firms to earn smaller positive (negative) abnormal returns from their stock purchases (sales) than insiders in non-ERM firms.

The results presented below show evidence that ERM indeed has these mitigating negative (positive) effects on abnormal returns of insider stock purchases (sales). This result is particularly pronounced in firms with higher levels of information uncertainty. Taken together, these results support the hypothesis that firms benefit from adopting ERM by reducing information asymmetry between insiders and outside investors. That is, insiders in firms with an ERM program earn smaller abnormal returns from their stock transactions, particularly for high stock volatility firms.

Our paper makes important contributions to the literature in several ways. It is the first study to provide empirical evidence that ERM reduces information asymmetry between insiders and outside investors. Also, our study does not focus on a single industry but instead includes 500 firms randomly drawn from a wide range of sectors (e.g., finance, healthcare, consumer services, energy, transportation, and public utilities). This method allows us to have a sample representative of all firms with insider stock transactions. Finally, while prior studies use yearly ERM data to examine the value of ERM to a firm,

we improve upon these approaches by using both yearly and daily data to investigate whether ERM has effects on abnormal returns of insider stock purchases and sales.

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 abnormal returns of insider trading activities. In section II we discuss 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.

Background and Hypothesis Development

A. Insider Trading

Consistent with prior literature (e.g., Lakonishok and Lee, 2001; Jeng et al., 2003; Jiang and Zaman, 2010) and the Securities Exchange Act of 1934 (SEA), we define insiders as officers, directors, and large shareholders who own 10 percent or more of their company's shares. Insider trading activities are regulated at both the federal level 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 a trading month. Since the enactment of Sarbanes-Oxley Act of 2002, insiders are required to report a change in ownership within two business days following the execution of their transactions. 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, see 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 firms and public information (Seyhun, 1998). For the purposes of this research, we incorporate 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.[2]

Prior literature shows mixed results of the informativeness of insider stock transactions. Early studies support the notion that insider trading is informative (e.g., Lorie and Niederhoffer, 1968; Jaffe, 1974; Finnerty, 1976), while more recent 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).

Similarly, a large stream of literature examines whether insiders make trades as part of contrarian investment strategies or based on their superior knowledge about a 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 activities around the Crash of 1987 and finds evidence that insiders who purchase their companies' stocks following significant declines in stock prices during the crash earn greater positive post-crash returns. Lakonishok and Lee (2001) show that insiders in aggregate are contrarian investors and may predict returns in small 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). Ke, Huddart, and Petroni (2003) show that net

[2] We are unable to distinguish between legal and illegal insider trading from the Thomson Reuters Insider Filing Data Feed (IFDF) due to data limitation.

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 levels of information uncertainty are more likely to have superior information about firm's future performance. Also, Jiang and Zaman (2010), using a first-order vector autoregressive (VAR) model based on quarterly insider trading data from 1978 to 2000, suggest insiders possess superior information to predict market-wide stock price movements.

One recent study, Manconi et al. (2017), considers financial hedging strategies and analyzes the impact of firms' use of those strategies on the returns available to insiders. That study is in line with our analysis in this paper and finds evidence that financial hedging strategies are associated with improved transparency within firms that utilize those.

B. Enterprise Risk Management (ERM)

According to Kleffner, Lee, and McGannon (2003), "ERM is the management of operational and financial risks simultaneously in order to maximize the cost-effectiveness of risk management within the constraints of the organization's tolerance for risk." Firms with ERM programs combine all risk management activities into one central risk function that integrates decision making across all risk classes (discussed above) facilitates the identification of interdependencies between risks and provides better risk identification, and reduces information asymmetries (e.g., Liebenberg and Hoyt, 2003; Hoyt and Liebenberg, 2011).

Prior literature examines the prevalence and determinants of ERM programs (e.g., Colquitt, Hoyt, and Lee, 1999; Hoyt, Merkley, and Thiessen, 2001; Kleffner, Lee, and McGannon, 2003; Liebenberg and Hoyt, 2003; Beasley, Clune, and Hermanson, 2005; Pagach and Warr, 2011; Altuntas, Berry-Stölzle, and Hoyt, 2011; Altuntas, Berry-Stölzle, and Hoyt, 2013). Firms that are more volatile are more likely to adopt ERM programs (Pagach and Warr, 2011). Also, firms with higher leverage ratios tend to appoint a Chief Risk Officer (CRO), which may suggest that firms adopt ERM to reduce information asymmetry between owners and lenders regarding firm's risks (Liebenberg and Hoyt, 2003). Altuntas, Berry-Stölzle, and Hoyt (2013) suggest that negative firm performance is a leading factor in the ERM-engagement based on data of property-liability insurers in Germany. Further, larger firms tend to have a greater ability to adopt ERM due to greater resources (Colquitt, Hoyt, and Lee, 1999; Beasley, Clune, and Hermanson, 2005; Pagach and Warr, 2011). Beasley, Clune, and Hermanson (2005) and Hoyt, Merkley, and Thiesse (2001) find that financial firms (specifically, banks and insurers) and those in the education and energy industries are more likely to enact ERM.

Several studies suggest that ERM can benefit a 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). Meulbroek (2002) suggests that an ERM program can benefit firms with a wide range of investment opportunities by providing a more accurate risk-adjusted rate, and an 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). Eckles, Hoyt, and Miller (2014) examine the impact of enterprise risk management on the marginal cost of reducing risks in the insurance industry. 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 ERM programs (Hoyt and Liebenberg, 2011).

Finally, ERM programs have been shown to be generally value enhancing (e.g., Hoyt and Liebenberg, 2011; Baxter et al., 2013; Grace et al., 2015). Using insurers, Hoyt and Liebenberg (2011) 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. Baxter et al. (2013) find that high-quality ERM programs are positively associated with operating performance for firms in the banking and insurance industries. Also using insurers, Grace et al. (2015) employ a frontier efficiency analysis to investigate the impact of each ERM component on firm value. Their results suggest that ERM improves efficiency (i.e., cost efficiency and revenue efficiency) and return on assets.

C. Hypotheses

We study the degree to which ERM reduces information asymmetry between firms and the market (e.g. outside investors) testing two primary hypotheses. First, if ERM reduces information asymmetry, then insiders in firms who have enacted ERM will earn lower abnormal returns from trading. That is, firm-specific information will be incorporated into firm prices in a way that inhibits the ability of insiders to profit from asymmetric information. Formally stated, our first hypothesis (written in null form) is given as:

H1 (Enterprise Risk Management): *The enactment of enterprise risk management by a firm has no effect on abnormal returns of insider stock transactions.*

ERM may have no effect on the abnormal returns of insiders. However, if ERM reduces the information asymmetry/increases transparency, we would expect the abnormal returns for insiders to be lower.

Next, if the reduction in insider abnormal returns truly is due to a reduction in asymmetry, we would expect the effect to be greater for those firms with higher levels of information uncertainty (i.e., less transparent). This leads to our second formal hypothesis (again written in the null):

H2 (Information Uncertainty): *The effects of enterprise risk management on abnormal returns of insider trading are the same for firms with higher levels of information uncertainty.*

Though we implement various robustness checks, we initially consider smaller firms and firms with higher stock volatility to have higher levels of information uncertainty. Higher levels of information uncertainty of a firm are associated with higher levels of information asymmetry between insiders and outsiders. Insiders would earn greater

abnormal returns from their stock transactions particularly in firms with higher levels of information uncertainty. Again, if ERM reduces information uncertainty, insiders in ERM firms with high levels of information uncertainty would earn smaller abnormal returns from their stock transactions compared to insiders in non-ERM firms with similar levels of information uncertainty.

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 comprises 17,393 firm-day observations for insider stock purchases and 39,539 firm-day observations for insider stock sales from 500 firms over the period 1996-2013.[3] The sample used in the ex-post regression model comprises 22,220 insider-firm-day observations for insider stock purchases and 49,170 insider-firm-day observations for insider stock sales from these 500 firms over the same time period.[4]

These 500 firms are publicly-traded firms randomly chosen from a broader insider stock purchase and sale sample during the sample period.[5] The Table One File of the Thomson Reuters Insider Filing Data Feed (IFDF) provided the initial sample. We limit

[3] We choose year 1996 as a starting point of our sample due to potential data problems related to insider trading data before year 1996.

[4] We aggregate insider stock transactions at the insider level. For example, if an insider makes more than one stock purchase on a day, we aggregate his/her dollar value and number of shares traded and view it as one observation in our models.

[5] We randomly chose firms from the sample to avoid a self-selection bias issue. 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. We also exclude firms which do not have more than five insider stock transactions and firms which do not have thirty consecutive past stock returns prior to the transaction date of insider trading in order to facilitate generation of some of our variables.

the sample to 500 firms to facilitate the hand collection of the ERM implementation data. The 500 randomly chosen firms are representative of all firms with insider trading. The average market capitalization ($4.6 billion) of the 500 randomly chosen firms is similar to the average market capitalization ($4.2 billion) of all firms from the insider trading database (IFDF) over the period 1996-2013. The earliest evidence of ERM in our sample is 1998 which is consistent with firms studied in prior literature (e.g., Hoyt and Liebenberg, 2011). Among the sample firms, exactly 25% (125) have an ERM announcement during the period 1998-2014.

Figure 1 presents the number of firms engaged in ERM by year, which shows that more than one-third of ERM firms in our sample (42 firms out of 125 firms) have an ERM announcement in 2010. This increase is not surprising due to emerging regulation and credit evaluations by rating agencies (Beasley, Branson, and Hancock, 2008). For example, the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank Act of 2010), in an attempt to prevent excessive risk-taking of institutions and build a more stable financial system encourage the adoption of enterprise risk management. Also, Standard & Poor's has explicitly noted ERM quality as one of their rating factors in credit evaluation since 2007 (Beasley, Branson, and Hancock, 2008).

[FIGURE 1 ABOUT HERE]

Similar to earlier studies, our data on ERM announcements are based on keyword searches from financial statements, governmental filings, and search engines such as Mergent Online, Factiva and LexisNexis (Hoyt and Liebenberg, 2011; Eckles, Hoyt, and Miller, 2014). ERM keywords 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 follow prior studies and employ an indicator variable (i.e., *ERM Year*) to identify whether a firm employs ERM in any given year over the sample period (Liebenberg and Hoyt, 2003; Hoyt and Liebenberg, 2011; Eckles, Hoyt, and Miller, 2014). For example, if a firm adopts ERM in 2004, the *ERM Year* indicator variable will be assigned a value of one for year 2004 and the following years. In addition, we use two measures to proxy ERM as robustness checks: *ERM Year +1* and *ERM Date*. The variable *ERM Year +1* refers to an indicator variable with a value of one for the ERM announcement year plus one year. For example, if a firm adopts ERM in 2004, the *ERM Year +1* indicator variable will be assigned with a value of one for year 2005 and the following years. As for *ERM Date* variable, we employ an indicator variable to identify whether a firm employs ERM on a specific date over the sample period. If we cannot find the precise announcement date of ERM, we use the SEC filing date (or report date) as the first evidence of ERM of a firm. For example, if a firm adopts ERM on March 1st 2004, the *ERM Date* indicator variable will be assigned with a value of one for March 1st 2014 and all subsequent dates.

As noted earlier, 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.[6] 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

[6] Form 3 includes details of initial statement of beneficial ownership. Form 4 includes details of statement of changes of beneficial ownership for non-derivative securities (Table One) and derivative securities (Table Two). Form 5 includes 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.

cleansing checks for reasonableness. Daily security price, stock return, volume data, analyst earnings forecasts data, and company financial information were obtained from the Center for Research in Security Prices (CRSP) database, the IBES summary database, and the Compustat database available from the Wharton Research Data Services (WRDS). Company financial information obtained from the Compustat database is based on calendar quarter data.[7,8]

B. Methodology

We use an event study approach and an ex-post regression model to investigate the effects of enterprise risk management on abnormal returns of insider stock transactions. We examine abnormal returns for insider stock purchases and sales, respectively. First, we conduct event studies for the 125 ERM firms and 375 non-ERM firms. We then separate the firms into two groups, *Before ERM Year* and *After ERM Year* (utilizing the three measures of ERM discussed above). As an example, if a firm employs ERM in 2004 (utilizing one measure of ERM), insider stock purchases made before 2004 are in the *Before ERM Year group*, and insider stock purchases made in 2004 and the following years are in the *After ERM Year group*. We then classify each group into six subgroups according to different levels of past stock performance: three subgroups for positive past stock returns and three subgroups for negative past stock returns.[9] The classification of stock return

[7] 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).

[8] We also include accrual quality and information quality of a firm in our regression model as robustness checks. We calculate accrual quality based on Francis, LaFond, Olsson, and Schipper (2005) and use it to proxy information risk of a firm (Eckles, Halek, and Zhang, 2013). As for information quality, we follow Wade, Hoyt, and Liebenberg (2015) and calculate dispersion (DISP) based on Diether, Malloy, and Scherbina (2002). Company financial information used to calculate accrual quality and the IBES data used to calculate information quality are based on annual data.

[9] We divide each ERM group into six subgroups based on cumulative daily stock returns (RET) and run the event study separately for each group to examine abnormal returns of insider stock transactions traded at

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).[10]

We conduct event study analyses of daily abnormal returns for each subgroup. 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 insider 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).[11]

As a second stage, 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 announcement, insider type, firm's past stock performance, firm size, stock volatility, and 2008 financial crisis.[12] We examine 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

different levels of past stock performance: RET ≤ -20%, -20% < RET ≤ -10%, -10% < RET ≤ 0%, 0% < RET ≤ 10%, 10% < RET ≤ 20%, and 20% < RET.

[10] 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.

[11] We also examine 90-day holding period returns of insider stock transactions traded at different levels of past stock performance as robustness checks and get similar results for insider stock purchases.

[12] We do not employ a maximum-likelihood treatment effects model or a propensity score matching treatment effects model since the data type (i.e., insider-firm-day level data) used in our research violates the overlap assumption required for these two models. For example, cumulative abnormal returns of insider stock transactions are daily data; however, factors affecting ERM such as leverage are quarterly data.

cumulative abnormal return for each firm is calculated based on the Cross-Sectional Analysis using the Market Model. Our regression model is as follows:

$$\begin{aligned}\mathbf{CAR_{i,j,t}} = {} & \boldsymbol{\beta_0} + \boldsymbol{\beta_1}\ \mathbf{ERM_{j,t}} + \boldsymbol{\beta_2}\ \mathbf{Insider\ type_{i,j,t}} + \boldsymbol{\beta_3}\ \mathbf{Past\ stock\ performance_{j,t}} \\ & + \boldsymbol{\beta_4}\ \mathbf{Firm\ size_{j,t}} + \boldsymbol{\beta_5}\ \mathbf{Stock\ volatility_{j,t}} + \boldsymbol{\beta_6}\ \mathbf{2008\ financial\ crisis_t} \\ & + \boldsymbol{\beta_7}\ \mathbf{Insider\ trading\ characteristics_{i,j,t}} \\ & + \boldsymbol{\beta_8}\ \mathbf{Firm\ characteristics_{j,t}} + \boldsymbol{\beta_9}\ \mathbf{Insurance\ industry_{j,t}} \\ & + \boldsymbol{\beta_{10}}\ \mathbf{Banking\ industry_{j,t}} + \boldsymbol{\beta_{11}}\ \mathbf{January_t} + \boldsymbol{\beta_{12}}\ \mathbf{Fourth\ quarter_t} \\ & + \boldsymbol{\beta_{13}}\ \mathbf{Year\ fixed\ effects} + \boldsymbol{\beta_{14}}\ \mathbf{Sector-Industry\ fixed\ effects} \\ & + \boldsymbol{\varepsilon_{i,j,t}}\end{aligned}$$

The dependent variable, $CAR_{i,j,t}$, is the cumulative daily abnormal return for each insider stock purchase and sale (i.e., insider *i*, firm *j*, and day *t*).[13] Key independent variables include ERM (i.e., *ERM Year*, *ERM Year +1*, and *ERM Date*), insider type, firm past stock performance, firm size, stock volatility of a firm, and an indicator variable for 2008. We also include interaction terms between ERM and these key independent variables. As for insider type, insiders with greater decision making authority such as CEOs and CFOs may have better knowledge about their firms' operations and earn greater abnormal returns from their stock transactions compared to other insiders. We use five binary variables with a value of one to proxy CEOs, CFOs, directors, officers, and large shareholders, respectively.[14] We also include an interaction term between ERM and CEOs.

[13] We also use 90-day holding period returns of insider stock transactions as the dependent variable in the regression model as robustness checks.

[14] 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

We use two binary variables for a firm's past stock performance to proxy significant increases or decreases in a firm's past stock returns: stock returns greater than 20% and stock returns less than -20%. We classify past stock return levels of individual firms based on cumulative daily stock returns three days prior to the transaction date of insider trades.[15] Our model also includes an interaction term between ERM and these performance variables.

We use two measures to proxy information uncertainty of a firm: firm size and stock volatility of a firm. Insider stock transactions made in firms with smaller firm size and higher stock volatility are expected to have higher levels of information uncertainty. For firm size, we divide the sample into three groups based on a firm's market capitalization to examine firm size effects of abnormal returns of insider stock transactions. Small firms are firms with market capitalization less than or equal to $202,158,805 (33.33 percentile of the insider stock purchase and sale sample), medium firms are firms with market capitalization between $202,158,805 and $1,068,003,868 (33.33 percentile to 66.66 percentile), and large firms are firms with market capitalization greater than $1,068,003,868 (66.66 percentile). We use two binary variables to examine firm size effects of abnormal returns of insider stock transactions (i.e., small firms and medium firms for insider stock purchase models; medium firms and large firms for insider stock sale models).

In addition to examining firm size effects of insider stock purchases and sales, we allow for a stock volatility effect. We again divide the sample into three groups based on different levels of stock volatility, measured by the standard deviation of daily stock returns

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.

[15] 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.

over the 30 days prior to the insider transaction. Low stock volatility firms are firms with stock volatility less than or equal to 0.019601 (33.33 percentile of the insider stock purchase and sale sample), medium stock volatility firms are firms with stock volatility between 0.019601 and 0.032981 (33.33 percentile to 66.66 percentile), and high stock volatility firms are firms with stock volatility greater than 0.032981 (66.66 percentile). We employ two binary variables for stock volatility of a firm (i.e., high stock volatility firms and medium stock volatility firms).

We also consider insider stock transactions made during the 2008 financial crisis. Stock transactions made during the recession are expected to have higher levels of information uncertainty. We include an indicator variable with a value of one for insider stock transactions made during the period of 2008 financial crisis. According to the National Bureau of Economic Research, the recession began in December 2007 and ended in June 2009. We then include the interaction terms between ERM and small firms, ERM and high stock volatility firms, ERM and 2008 financial crisis period to examine the effects of ERM on abnormal returns of insider stock transactions with high levels of information uncertainty. [16]

We include several additional control variables in our regression models since factors other than ERM, insider type, firm's past stock performance, firm size, stock volatility, and 2008 financial crisis may affect stock returns of insider trades. The control variables we consider are insider trading characteristics, firm characteristics, the fourth-quarter effect,

[16] For robustness, we also include a variable *Accrual Quality* based on Francis, LaFond, Olsson, and Schipper (2005) to proxy information uncertainty as robustness checks and get similar results (Eckles, Halek, and Zhang, 2013). Further, we include a variable *Information Quality* based on Diether, Malloy, and Scherbina (2002) to control for information transparency as robustness checks and get similar results (Wade, Hoyt, and Liebenberg, 2015).

the January effect, sector-industry fixed effects, and year fixed effects. We use two variables to proxy insider trading characteristics: the ratio of the number of insider shares traded to the number of shares outstanding of a firm, and number of shares traded by insiders.[17]

Other firm characteristics may also 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). 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 long-term debt to equity, and ROA refers to the ratio of net income to total assets.[18]

Finally, we consider the fourth-quarter effect, the January effect, sector-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 a year, particularly for the months 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 17 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) and 67 binary variables for sector-industry effects.[19]

[17] We also use the ratio of the dollar value of insider shares traded to market capitalization of a firm and the dollar value of shares traded by the insider to proxy insider trading characteristics as a robustness check.
[18] We also use the ratio of long-term debt to total assets to proxy leverage as a robustness check.
[19] The sector and industry classification is based on the Thomson Reuters Insider Filing Data Feed (IFDF).

Empirical Results and Discussion

Table 1 presents summary details for the 125 ERM firms and 375 non-ERM firms.[20] Since these 500 firms are randomly chosen from the insider purchase and sale sample, the distribution of sector and industry is widely diversified (e.g., 92 firms are from the finance sector, 64 firms are from the healthcare sector, 82 firms are from the consumer services sector, and 96 firms are from the technology sector). Consistent with prior literature, firms in the finance sector are more likely to adopt ERM (Beasley, Clune, and Hermanson, 2005; Hoyt, Merkley, and Thiessen, 2001). Out of 92 firms from the finance sector in our sample, 40 firms adopt ERM over the period 1998-2014 (14 ERM firms are from the banking industry and five ERM firms are from the insurance industry).

[TABLE 1 ABOUT HERE]

Figure 2 illustrates the event study results for insider stock purchases and insider stock sales for the sample. Table 2 accompanies Figure 2 and provides details of the event study results. Firms which have ERM programs from 1998 to 2014 tend to earn lower positive (less negative) abnormal returns from their stock purchases (sales) than insiders in non-ERM firms. This result provides evidence that an ERM program is associated with reducing information asymmetry between insiders and outsiders.

[FIGURE 2 ABOUT HERE]

[TABLE 2 ABOUT HERE]

Figure 3 illustrates event study results for insider stock purchases and insider stock sales for the period before the ERM enactment and after the ERM enactment defining ERM enactment as of the year of enactment (the results are consistent (and available upon request)

[20] The 500 firms in the sample are firms randomly chosen from the insider stock purchase and sale sample over the period 1996 to 2013. ERM firms refer to firms with ERM over the period 1998 to 2014.

for other measures of ERM enactment including *Before and After ERM Year +1* and *Before and After ERM Date*).[21] Table 3 accompanies Figure 3 and provides the details of event study results. Results based on the ERM enactment measures provide evidence that the abnormal returns of insider stock transactions after firms have enacted ERM programs are smaller than those before firms have enacted ERM programs. Again, this result supports the idea that an ERM program is associated with reducing information asymmetry of a firm.[22]

[FIGURE 3 ABOUT HERE]

[TABLE 3 ABOUT HERE]

Table 4 shows the regression model results for the effects of ERM on abnormal returns of insider stock purchases conditional on insider trading and firm characteristics based on the *ERM Year* measure (again, the results are consistent, and available, for other definitions of ERM enactment). Our results show evidence that ERM is negatively associated with abnormal returns of insider stock purchases, consistent with the event study results presented above. Our results also support that insiders tend to earn greater abnormal returns from their stock purchases in firms with higher levels of information uncertainty (i.e., small firms, high stock volatility firms, and transactions made during the period of 2008 financial crisis). Also, our results indicate that insiders who make stock purchases

[21] *After ERM Year* refers to insider stock transactions made in and after the year of ERM enactment of a firm. For example, if a firm enacted an ERM program in 2004, insider stock purchases made in 2004 and the following years are in the group of *Insider Stock Purchase (After ERM Year)* (Figure 3 and Table 3).
After ERM Year +1 refers to insider stock transactions made after the year of ERM enactment of a firm. For example, if a firm enacted an ERM program in 2004, insider stock purchases made in 2005 and the following years are in the group of *Insider Stock Purchase (After ERM Year +1)*. *After ERM Date* refers to insider stock transactions made after the date of ERM enactment of a firm. For example, if a firm enacted an ERM program on March 1, 2004, insider stock purchases made on March 1, 2004 and the following dates are in the group of *Insider Stock Purchase (After ERM Date)*.

[22] We also examine 90-day holding period returns of insider stock transactions traded at different levels of past stock performance as robustness checks and get similar results for insider stock purchases.

following a more-than-20% stock price decrease over the past four days earn positive abnormal returns from their stock transactions. [23, 24]

[TABLE 4 ABOUT HERE]

Table 5 shows the regression model results for the interaction effects of ERM enactment and information uncertainty on insider stock purchases conditional on insider trading and firm characteristics using *ERM YEAR* as the enactment measure (again, results are consistent and available for other measures). Our results support the information uncertainty hypothesis by showing that ERM has greater negative effects on insider stock purchases, particularly for high stock volatility firms. The regression results also provide evidence that insiders tend to earn smaller abnormal returns from their stock purchases in firms with ERM programs during the period of 2008 financial crisis. These results support that insiders in firms with higher levels of information uncertainty earn smaller abnormal returns from their stock purchases when the firm has an ERM program in place. Thus, the findings suggest that ERM is associated with reducing a firm's information uncertainty and therefore reducing information asymmetry between insiders and outsiders.

[TABLE 5 ABOUT HERE]

Table 6 shows the regression results for the effects of ERM enactment on abnormal returns of insider stock sales conditional on insider trading and firm characteristics using *ERM YEAR* (results are again consistent using other definitions). The results show that an ERM program has positive effects on abnormal returns of insider stock sales, which

[23] All of our results are also robust to using alternative measures of information risk including *Accrual Quality* based on Francis, LaFond, Olsson, and Schipper (2005) and *Information Quality* based on Diether, Malloy, and Scherbina (2002).

[24] All results are also robust to using 90-day holding period returns of insider stock purchases as the dependent variable in the regression model.

suggests that insiders in firms with ERM programs earn smaller negative abnormal returns from stock sales. Also, insiders in firms with higher levels of information uncertainty tend to have greater negative abnormal returns from their stock sales.

The results also show that CEOs who are expected to have greater decision making authority tend to earn greater negative abnormal returns from their stock sales compared to other insiders. Further, insiders who make stock sales following stock price increases of more than twenty percent over the past four days tend to earn negative abnormal returns from their stock transactions.

[TABLE 6 ABOUT HERE]

Table 7 shows the regression model results for the interaction effects of ERM and information uncertainty on abnormal returns of insider stock sales conditional on insider trading and firm characteristics based on our ERM enactment measure (with consistent results from other enactment measures). The results do not show strong evidence that ERM has effects on abnormal returns of insider stock sales in firms with high levels of information uncertainty. However, the results support that CEOs in ERM firms are less likely to earn negative abnormal returns from their stock sales, which suggests that ERM may reduce the information asymmetry between insiders and outside investors.

[TABLE 7 ABOUT HERE]

Conclusion

Using a novel approach of examining insider trading, we show that enterprise risk management offers a mechanism for firms to reduce information asymmetry to external market participants. In particular, we show that insiders in firms that have implemented enterprise risk management earn lower abnormal returns from trading than insiders in firms

without enterprise risk management. We further show that the effect is especially pronounced in those firms where information asymmetry is particularly high.

Our event study results and regression results both suggest that insiders in firms with ERM programs tend to earn smaller positive (negative) abnormal returns from their stock purchases (sales) than insiders in firms without ERM programs, which suggests that an ERM program is associated with reducing information asymmetry between insiders and outsiders, especially for high stock volatility firms.

As the first paper to consider ERM and insider trading, our research contributes to the literature and suggests that enterprise risk management benefits a firm by reducing information asymmetry between insiders and outsiders, especially for firms with higher levels of information uncertainty. Enterprise risk management has played an important role in firms' decision making due to emerging regulation and credit rating evaluations in recent years (e.g., Dodd-Frank Act of 2010 and Standard and Poor's credit rating) . Our research provides firms with an incentive to enact and maintain enterprise risk management by showing that ERM can create value to a firm through increasing information transparency to outside investors, which is particularly important for opaque firms. Additionally, our results highlight the value that investors receive from broadened risk management approaches like ERM. From our results, it appears that regulatory and other external requirements around risk management such as Basel, ORSA, Solvency II, and rating agency requirements can lead to enhanced transparency and benefits to investors.

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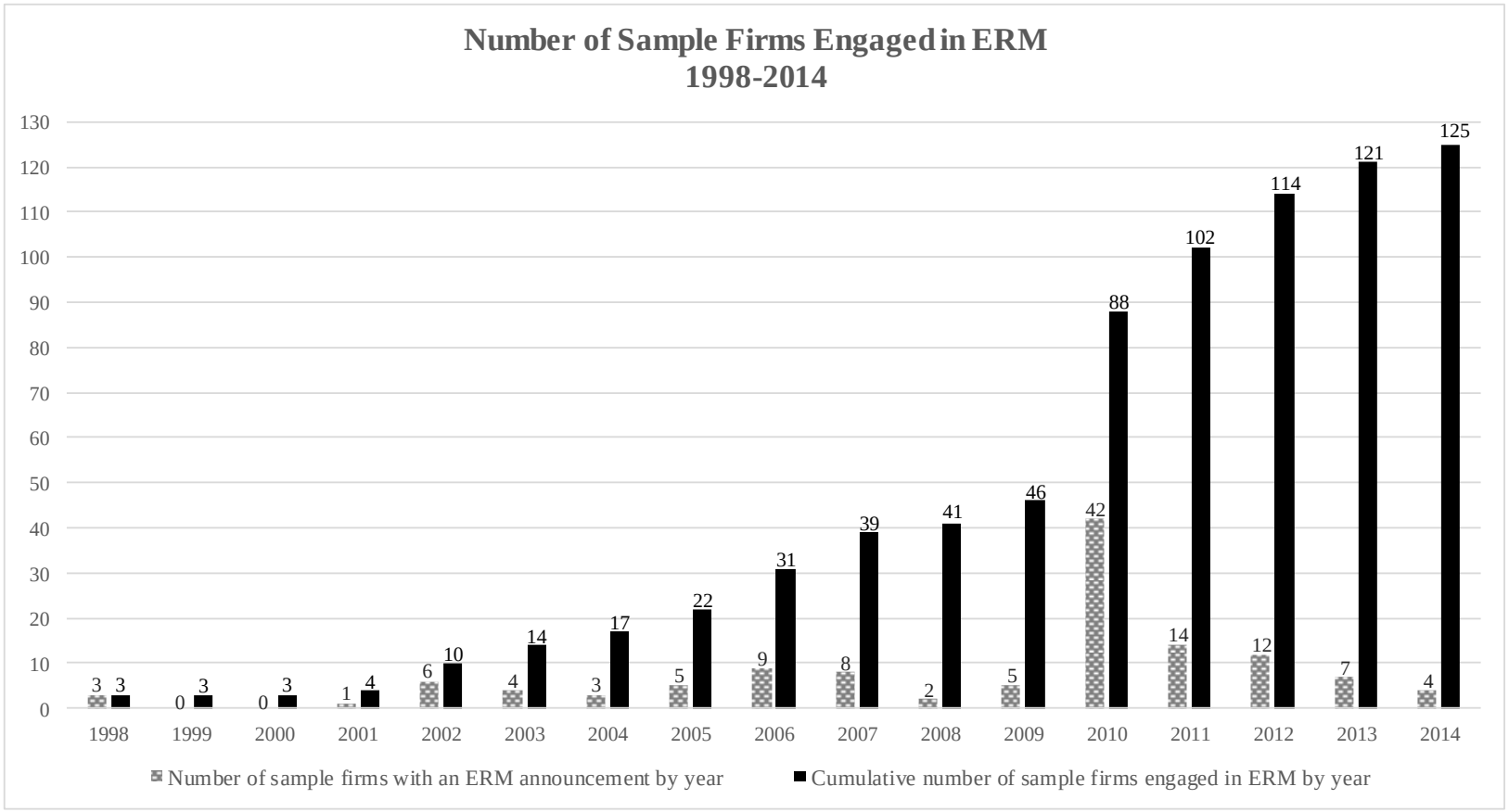

Figure 1: Number of Sample Firms Engaged in ERM

1. The 500 firms in the sample are firms randomly chosen from the insider stock purchase and sale sample over the period 1996 to 2013.
2. Out of 500 sample firms, 125 ERM firms have an ERM announcement over the period 1998 to 2014.

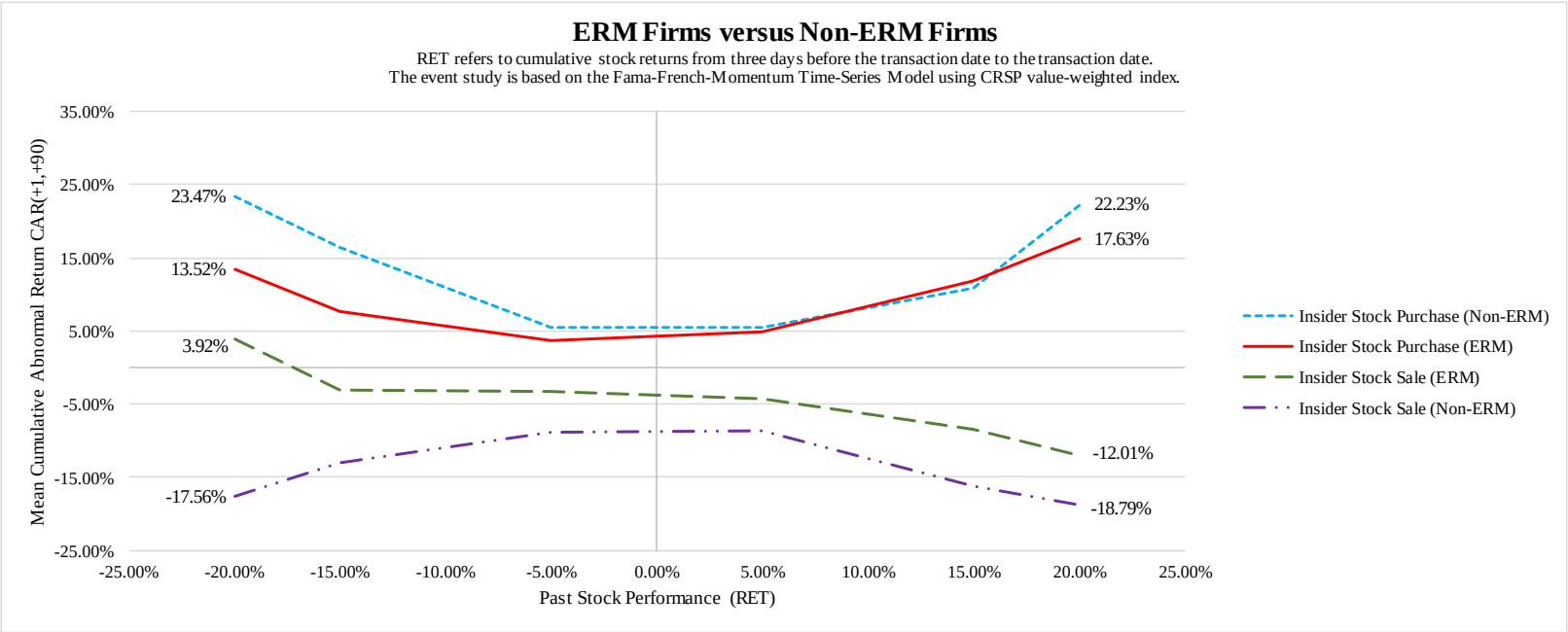

Figure 2: Event Study Results (ERM Firms versus Non-ERM Firms)

1. The 500 firms in the sample are firms randomly chosen from the insider stock purchase and sale sample over the period 1996 to 2013.
2. 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.
3. ERM firms refer to firms with the ERM announcement over the period 1998-2014.
4. We divide the insider stock purchase sample into two groups: ERM firms and non-ERM firms.
5. Likewise, we divide the insider stock sale sample into two groups: ERM firms and non-ERM firms.
6. The insider stock purchase sample is comprised of 4,869 firm-day observations for ERM firms and 12,524 firm-day observations for non-ERM firms from 1996 to 2013.
7. The insider stock sale sample is comprised of 14,929 firm-day observations for ERM firms and 24,610 firm-day observations for non-ERM firms from 1996 to 2013.
8. We divide each group into 6 subgroups 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: $RET \leq -20\%$, $-20\% < RET \leq -10\%$, $-10\% < RET \leq 0\%$, $0\% < RET \leq 10\%$, $10\% < RET \leq 20\%$, and $20\% < RET$.
9. 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.
10. Mean cumulative abnormal return (+1, +90) refers to a 90-day cumulative abnormal return of insider stock transactions. 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 the CRSP equal-weighted index as robustness checks and get similar results.

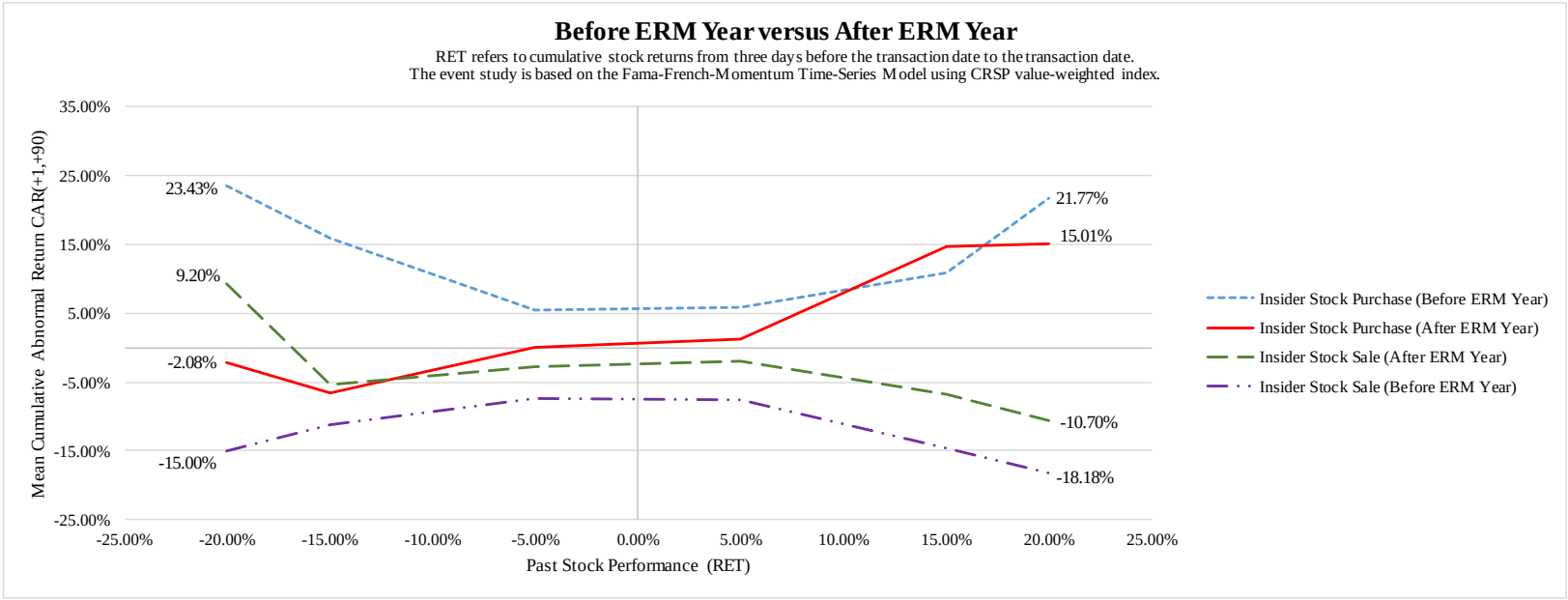

Figure 3: Event Study Results (Before ERM Year versus After ERM Year)

1. The 500 firms in the sample are firms randomly chosen from the insider stock purchase and sale sample over the period 1996 to 2013.
2. 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.
3. After ERM Year refers to insider stock transactions made in and after the year of the ERM enactment of a firm. For example, if a firm enacted an ERM program in 2004, insider stock purchases made in 2004 and the following years are in the group of Insider Stock Purchase (After ERM Year).
4. We divide the insider stock purchase sample into two groups: After ERM Year and Before ERM Year.
5. Likewise, we divide the insider stock sale sample into two groups: After ERM Year and Before ERM Year.
6. The insider stock purchase sample is comprised of 1,563 firm-day observations for After ERM Year and 15,830 firm-day observations for Before ERM Year from 1996 to 2013.
7. The insider stock sale sample is comprised of 4,832 firm-day observations for After ERM Year and 34,707 firm-day observations for Before ERM Year from 1996 to 2013.
8. We divide each group into 6 subgroups 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 $\leq$ -20%, -20% < RET $\leq$ -10%, -10% < RET $\leq$ 0%, 0% < RET $\leq$ 10%, 10% < RET $\leq$ 20%, and 20% < RET.
9. 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.
10. Mean cumulative abnormal return (+1, +90) refers to a 90-day cumulative abnormal return of insider stock transactions. 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 the CRSP equal-weighted index as robustness checks and get similar results.

Table 1

Sector and Industry: ERM Firms versus Non-ERM Firms

Panel A: 125 ERM Firms

Sector	Num. of Firms	Industry (Number of Firms)
01 Finance	40	Finance and Loan (3), Financial Services (5), Savings And Loans (1), Banking (14), Insurance (5), Investments (11), Multi-Industry Finance (1)
02 Healthcare	9	Drugs (1), Biotechnology (2), Medical Supplies (4), Services To Medical Prof (2)
03 Consumer Non-Durables	5	Clothing (2), Food Processors (1), Tobacco (2)
04 Consumer Services	15	Communications (2), Leisure (2), Retailing - Foods (1), Retailing - Goods (5), Industrial Services (1), Undesignated Conr Svc (4)
05 Consumer Durables	2	Automotive Mfg (2)
06 Energy	7	Oil (5), Coal (2)
07 Transportation	5	Airlines (1), Railroads (1), Trucking (1), Maritime (1), Multi-Ind Transport (1)
08 Technology	12	Computer Mfrs (1), Software & Edp Services (3), Other Computers (3), Semiconductors/Component (4), Electronic Syst/Devices (1)
09 Basic Industries	9	Chemicals (2), Metal Fabricators & Dist (1), Forest Products (2), Steel (2), Multi-Ind Basic (2)
10 Capital Goods	10	Defense (2), Electrical (2), Machinery (3), Office Products (1), Multi-Ind Cap Good (2)
11 Public Utilities	5	Electrical Utilities (4), Gas Utilities (1)
99 Miscellaneous	6	

Panel B: 375 Non-ERM Firms

Sector	Num. of Firms	Industry (Number of Firms)
01 Finance	52	Finance & Loan (4), Financial Services (3), Savings And Loans (8), Banking (14), Insurance (3), Investments (16), Multi-Industry Finance (4)
02 Healthcare	55	Drugs (6), Hospital Supplies (1), Hospitals (1), Biotechnology (23), Medical Supplies (18), Services To Medical Prof (4), Home Health Care (2)
03 Consumer Non-Durables	15	Clothing (3), Cosmetics (2), Food Processors (2), Beverages (2), Leisure Time (5), Undesignated Conr Non Du (1)
04 Consumer Services	67	Communications (20), Leisure (10), Retailing - Foods (7), Retailing - Goods (20), Industrial Services (4), Undesignated Control Service (6)
05 Consumer Durables	8	Auto Part Manufacturers (1), Home Building (3), Home Furnishings (1), Leisure Products (2), Recreational Vehicles (1)
06 Energy	20	Oil (16), Coal (1), Gas (2), Alternative Energy (1)
07 Transportation	4	Airlines (1), Trucking (1), Multi-Ind Transport (1), Undesignated Transport (1)
08 Technology	84	Computer Manufacturers (3), Electronics (1), Software & Edp Services (21), Other Computers (17), Semiconductors/Component (11), Photo-Optical Equipment (2), Electronic Syst/Devices (12), Office/Comm Equipment (16), Undesignated Technology (1)
09 Basic Industries	23	Building & Related (1), Chemicals (7), Containers (3), Metal Fabricators & Dist (5), Forest Products (1), Steel (1), Textiles (2), Nonferrous Base Metals (1), Precious Metals (2)
10 Capital Goods	27	Defense (3), Electrical (3), Machinery (11), Shipbuilding (1), Building Materials (4), Office Products (1), Multi-Ind Cap Good (3), Undesignated Capital (1)
11 Public Utilities	8	Telephone Utilities (6), Water Utilities (2)
99 Miscellaneous	12	

1. The 500 firms in the sample are firms randomly chosen from the insider stock purchase and sale sample over the period 1996 to 2013.

2. ERM firms refer to firms with an ERM announcement over the period 1998 to 2014.

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

Table 2

I. Insider Stock Purchase

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

Panel A: ERM Firms

A. Mean Cumulative Abnormal Return (CAR)

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	8.78%	3.88%	1.30%	1.46%	1.40%	4.05%
(+1,+30)	14.51%	6.57%	2.03%	2.09%	5.02%	7.59%
(+1,+60)	13.68%	6.37%	3.01%	3.59%	8.77%	11.65%
(+1,+90)	13.52%	7.67%	3.71%	4.96%	11.92%	17.63%

B. N+:N-

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	81:39>>>	185:96>>>	1275:966>>>	1090:893>>>	96:80)	31:25
(+1,+30)	75:45>>>	180:101>>>	1238:1003>>>	1108:875>>>	103:73>>	37:19>>
(+1,+60)	78:42>>>	176:105>>>	1183:1058>>>	1087:896>>>	110:66>>>	32:24)
(+1,+90)	75:45>>>	166:115>>>	1220:1021>>>	1072:911>>>	112:64>>>	35:21>

C. Number of Firms

	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
	45	88	123	124	72	31

Panel B: Non-ERM Firms

A. Mean Cumulative Abnormal Return (CAR)

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	9.51%	5.65%	1.84%	1.53%	3.61%	3.68%
(+1,+30)	14.62%	8.96%	3.50%	2.99%	4.29%	8.24%
(+1,+60)	20.93%	14.08%	5.48%	5.06%	8.65%	15.41%
(+1,+90)	23.47%	16.38%	5.49%	5.57%	10.86%	22.23%

B. N+:N-

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	281:122>>>	568:331>>>	2833:2247>>>	2726:2275>>>	410:347>>>	178:161>
(+1,+30)	264:139>>>	569:330>>>	2851:2229>>>	2769:2232>>>	404:353>>>	202:137>>>
(+1,+60)	288:115>>>	587:312>>>	2803:2277>>>	2787:2214>>>	444:313>>>	217:122>>>
(+1,+90)	269:134>>>	562:337>>>	2789:2291>>>	2728:2273>>>	429:328>>>	217:122>>>

C. Number of Firms

	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
	182	272	371	366	235	137

(continued on next page)

Table 2 (cont.)

II. Insider Stock Sale

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

Panel A: ERM Firms

A. Mean Cumulative Abnormal Return (CAR)

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	-0.34%	0.42%	-0.45%	-0.66%	-1.57%	-2.16%
(+1,+30)	-3.42%	-1.09%	-1.48%	-1.78%	-3.46%	-3.52%
(+1,+60)	-0.12%	-1.71%	-2.30%	-2.95%	-5.12%	-6.05%
(+1,+90)	3.92%	-3.14%	-3.30%	-4.26%	-8.38%	-12.01%

B. N+:N-

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	20:14	108:92>	2403:2759<	3959:4768<<<	291:396<<	44:44
(+1,+30)	15:19	101:99	2289:2873<<<	3795:4932<<<	285:402<<<	40:48
(+1,+60)	17:17	94:106	2275:2887<<<	3775:4952<<<	275:412<<<	35:53(
(+1,+90)	19:15	93:107	2258:2904<<<	3727:5000<<<	266:421<<<	36:52

C. Number of Firms

	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
	23	66	125	125	91	45

Panel B: Non-ERM Firms

A. Mean Cumulative Abnormal Return (CAR)

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	-1.63%	-0.85%	-1.10%	-1.37%	-2.41%	-2.74%
(+1,+30)	-8.44%	-3.89%	-3.29%	-3.47%	-6.39%	-4.98%
(+1,+60)	-11.89%	-8.67%	-5.90%	-6.24%	-11.18%	-14.86%
(+1,+90)	-17.56%	-12.99%	-8.87%	-8.69%	-16.29%	-18.79%

B. N+:N-

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	82:103	382:437	3794:4834<<<	5132:7443<<<	684:1088<<<	242:348<<
(+1,+30)	74:111(	360:459(	3649:4979<<<	5033:7542<<<	637:1135<<<	250:340<
(+1,+60)	73:112(	339:480<<	3533:5095<<<	4949:7626<<<	616:1156<<<	206:384<<<
(+1,+90)	71:114<	316:503<<<	3409:5219<<<	4953:7622<<<	600:1172<<<	218:372<<<

C. Number of Firms

	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
	89	223	373	373	281	178

1. This table accompanies Figure 2.
2. The 500 firms in the sample are firms randomly chosen from the insider stock purchase and sale sample 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. ERM firms refer to firms with the ERM announcement over the period 1998-2014.
5. We divide the insider stock purchase sample into two groups: ERM firms and non-ERM firms.
6. The insider stock purchase sample is comprised of 4,869 firm-day observations for ERM firms and 12,524 firm-day observations for non-ERM firms from 1996 to 2013.
7. The insider stock sale sample is comprised of 14,929 firm-day observations for ERM firms and 24,610 firm-day observations for non-ERM firms from 1996 to 2013.
8. We divide each group into 6 subgroups 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 ≤ -20%, -20% < RET ≤ -10%, -10% < RET ≤ 0%, 0% < RET ≤ 10%, 10% < RET ≤ 20%, and 20% < RET.
9. 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.
10. 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 the CRSP equal-weighted index as robustness checks and get similar results.
11. 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

I. Insider Stock Purchase

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

Panel A: After ERM Year

A. Mean Cumulative Abnormal Return (CAR)

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	6.58%	3.64%	1.24%	0.48%	1.73%	0.44%
(+1,+30)	7.09%	3.37%	0.84%	0.57%	4.56%	0.33%
(+1,+60)	5.22%	-3.50%	0.29%	0.58%	8.45%	11.75%
(+1,+90)	-2.08%	-6.56%	0.08%	1.30%	14.65%	15.01%

B. N+:N-

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	33:13>>>	51:35>	455:310>>>	297:308	28:19)	7:4
(+1,+30)	26:20	44:42	425:340>>>	302:303	26:21	7:4
(+1,+60)	24:22	44:42	394:371>	285:320	25:22	5:6
(+1,+90)	24:22	41:45	401:364>	288:317	32:15>>	3:8

C. Number of Firms

RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
19	43	90	80	23	7

Panel B: Before ERM Year

A. Mean Cumulative Abnormal Return (CAR)

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	9.61%	5.35%	1.72%	1.60%	3.27%	3.83%
(+1,+30)	15.32%	8.78%	3.30%	2.94%	4.42%	8.37%
(+1,+60)	20.62%	13.48%	5.24%	5.03%	8.68%	14.97%
(+1,+90)	23.43%	15.95%	5.51%	5.78%	10.87%	21.77%

B. N+:N-

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	329:148>>>	702:392>>>	3663:2893>>>	3519:2860>>>	478:408>>>	202:182>
(+1,+30)	313:164>>>	705:389>>>	3673:2883>>>	3575:2804>>>	481:405>>>	232:152>>>
(+1,+60)	342:135>>>	719:375>>>	3610:2946>>>	3589:2790>>>	529:357>>>	244:140>>>
(+1,+90)	320:157>>>	687:407>>>	3616:2940>>>	3512:2867>>>	509:377>>>	249:135>>>

C. Number of Firms

RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
215	337	482	479	293	162

(continued on next page)

Table 3 (cont.)

II. Insider Stock Sale

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

Panel A: After ERM Year

A. Mean Cumulative Abnormal Return (CAR)

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	5.83%	0.50%	-0.28%	-0.50%	-0.97%	-1.98%
(+1,+30)	1.68%	-1.35%	-0.88%	-0.92%	-3.17%	5.79%
(+1,+60)	12.69%	0.32%	-2.22%	-1.55%	-4.20%	2.78%
(+1,+90)	9.20%	-5.37%	-2.78%	-1.99%	-6.78%	-10.70%

B. N+:N-

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	5:2)	19:20	779:896(	1310:1587<<<	77:98	13:11
(+1,+30)	4:3	19:20	754:921<<	1312:1585<<<	68:107<<	13:11
(+1,+60)	5:2)	18:21	711:964<<<	1315:1582<<<	72:103<	12:12
(+1,+90)	5:2)	14:25(	715:960<<<	1346:1551<	57:118<<<	11:13

C. Number of Firms

RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
6	25	106	107	57	17

Panel B: Before ERM Year

A. Mean Cumulative Abnormal Return (CAR)

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	-1.67%	-0.65%	-0.94%	-1.17%	-2.26%	-2.69%
(+1,+30)	-7.97%	-3.42%	-2.85%	-3.07%	-5.76%	-5.18%
(+1,+60)	-10.82%	-7.61%	-4.87%	-5.42%	-9.90%	-14.33%
(+1,+90)	-15.00%	-11.28%	-7.34%	-7.64%	-14.64%	-18.18%

B. N+:N-

Days	RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
(+1,+10)	97:115	471:509	5418:6697<<<	7781:10624<<<	898:1386<<<	273:381<
(+1,+30)	85:127<	442:538	5184:6931<<<	7516:10889<<<	854:1430<<<	277:377<
(+1,+60)	85:127<	415:565<<	5097:7018<<<	7409:10996<<<	819:1465<<<	229:425<<<
(+1,+90)	85:127<	395:585<<<	4952:7163<<<	7334:11071<<<	809:1475<<<	243:411<<<

C. Number of Firms

RET ≤ -20%	-20% < RET ≤ -10%	-10% < RET ≤ 0%	0% < RET ≤ 10%	10% < RET ≤ 20%	20% < RET
107	274	481	483	358	208

1. This table accompanies Figure 3.
2. The 500 firms in the sample are firms randomly chosen from the insider stock purchase and sale sample 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. After ERM Year refers to insider stock transactions made in and after the year of the ERM enactment of a firm. For example, if a firm enacted an ERM program in 2004, insider stock sales made in 2004 and the following years are in the group of Insider Stock Sale (After ERM Year).
5. We divide the insider stock sale sample into two groups: After ERM Year and Before ERM Year.
6. The insider stock purchase sample is comprised of 1,563 firm-day observations for After ERM Year and 15,830 firm-day observations for Before ERM Year from 1996 to 2013.
7. The insider stock sale sample is comprised of 4,832 firm-day observations for After ERM Year and 34,707 firm-day observations for Before ERM Year from 1996 to 2013.
8. We divide each group into 6 subgroups 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 ≤ -20%, -20% < RET ≤ -10%, -10% < RET ≤ 0%, 0% < RET ≤ 10%, 10% < RET ≤ 20%, and 20% < RET.
9. 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.
10. 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 the CRSP equal-weighted index as robustness checks and get similar results.
11. 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: ERM Year
Cumulative Abnormal Return (CAR) Ordinary Least Squares Regression Model with Heteroscedasticity-Consistent Standard Errors
Number of Transactions = 22,220 (Insider-Firm-Day Level Data); 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 Year	-0.0061**	-0.0152***	-0.0133*	-0.0151	-0.0045*	-0.0117***	-0.0117*	-0.0121
	(0.0025)	(0.0046)	(0.0071)	(0.0093)	(0.0025)	(0.0045)	(0.0071)	(0.0094)
Insider Type								
CEO	0.0175***	0.0426***	0.0508***	0.0629***	0.0201***	0.0450***	0.0549***	0.0719***
	(0.0033)	(0.0056)	(0.0084)	(0.0110)	(0.0033)	(0.0054)	(0.0082)	(0.0108)
CFO	0.0221***	0.0576***	0.0720***	0.0701***	0.0257***	0.0593***	0.0752***	0.0789***
	(0.0051)	(0.0088)	(0.0123)	(0.0155)	(0.0050)	(0.0086)	(0.0121)	(0.0153)
Director	0.0124***	0.0275***	0.0222***	0.0189**	0.0132***	0.0278***	0.0251***	0.0298***
	(0.0023)	(0.0041)	(0.0062)	(0.0080)	(0.0023)	(0.0039)	(0.0059)	(0.0077)
Officer	0.0150***	0.0294***	0.0324***	0.0230**	0.0143***	0.0278***	0.0315***	0.0296***
	(0.0031)	(0.0054)	(0.0079)	(0.0102)	(0.0029)	(0.0051)	(0.0076)	(0.0100)
Large Shareholders	0.0216	0.0314**	0.0973***	0.2212***	0.0287	0.0400***	0.1419***	0.3026***
	(0.0293)	(0.0153)	(0.0316)	(0.0464)	(0.0261)	(0.0150)	(0.0307)	(0.0428)
Past Stock Performance								
RET <= -20%	0.0575***	0.0760***	0.0950***	0.0693***	0.0618***	0.0665***	0.0612***	0.0206
	(0.0081)	(0.0133)	(0.0169)	(0.0223)	(0.0079)	(0.0126)	(0.0168)	(0.0218)
RET > 20%	0.0063	0.0080	0.0201	0.0630**	-0.0009	-0.0117	0.0005	0.0409*
	(0.0089)	(0.0131)	(0.0185)	(0.0254)	(0.0086)	(0.0125)	(0.0181)	(0.0246)
Information Uncertainty								
Small Firms	0.0162***	0.0478***	0.0808***	0.1076***	0.0154***	0.0432***	0.0843***	0.1089***
	(0.0023)	(0.0041)	(0.0063)	(0.0084)	(0.0023)	(0.0041)	(0.0063)	(0.0084)
Medium Firms	0.0089***	0.0293***	0.0404***	0.0534***	0.0085***	0.0269***	0.0474***	0.0607***
	(0.0022)	(0.0038)	(0.0059)	(0.0076)	(0.0022)	(0.0038)	(0.0059)	(0.0076)
High Stock Volatility Firms	0.0179***	0.0153***	0.0371***	0.0534***	0.0146***	0.0087**	0.0158***	0.0232***
	(0.0022)	(0.0038)	(0.0057)	(0.0075)	(0.0021)	(0.0037)	(0.0057)	(0.0074)
Medium Stock Volatility Firms	0.0068***	-0.0028	0.0058	0.0077	0.0067***	-0.0028	0.0035	0.0067
	(0.0015)	(0.0027)	(0.0040)	(0.0052)	(0.0014)	(0.0026)	(0.0040)	(0.0051)
Financial Crisis Period (December 2007 to June 2009)	0.0094	0.1036***	0.2349***	0.2502***	-0.0041	0.0404***	0.1021***	0.0777***
	(0.0065)	(0.0129)	(0.0188)	(0.0244)	(0.0062)	(0.0116)	(0.0169)	(0.0224)

(continued on next page)

Table 4 (cont.)

Insider Stock Purchase: ERM Year (cont.)

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)**
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 (%)	0.0097**	-0.0047	-0.0176***	-0.0459***	0.0119***	0.0018	-0.0141***	-0.0397***
	(0.0038)	(0.0030)	(0.0055)	(0.0110)	(0.0039)	(0.0029)	(0.0051)	(0.0102)
Market to book ratio (MTB)	0.0001	-0.0001	-0.0004	-0.0005	0.0001	-0.0000	-0.0003	-0.0006
	(0.0001)	(0.0002)	(0.0003)	(0.0004)	(0.0001)	(0.0002)	(0.0003)	(0.0004)
Loss (binary variable for net income < 0)	-0.0015	-0.0080**	-0.0243***	-0.0218***	-0.0000	-0.0071*	-0.0210***	-0.0211***
	(0.0024)	(0.0040)	(0.0057)	(0.0075)	(0.0023)	(0.0038)	(0.0055)	(0.0074)
Return on assets (ROA)	-0.0010	-0.1003***	-0.1182***	-0.0425	-0.0035	-0.0764***	-0.0962***	-0.0373
	(0.0182)	(0.0292)	(0.0309)	(0.0442)	(0.0156)	(0.0237)	(0.0288)	(0.0430)
Leverage ratio (long-term debt/ equity)	-0.0001	0.0001	0.0002	0.0003	-0.0002*	-0.0000	0.0001	0.0002
	(0.0001)	(0.0003)	(0.0005)	(0.0006)	(0.0001)	(0.0002)	(0.0004)	(0.0006)
Insurance industry	0.0292***	0.0901***	0.1460***	0.2292***	0.0298***	0.0886***	0.1291***	0.1879***
	(0.0055)	(0.0092)	(0.0132)	(0.0181)	(0.0054)	(0.0093)	(0.0131)	(0.0178)
Banking industry	-0.0070	0.0050	0.0323***	0.0342***	-0.0071	0.0055	0.0215**	0.0175
	(0.0044)	(0.0074)	(0.0097)	(0.0131)	(0.0043)	(0.0075)	(0.0100)	(0.0137)
January	-0.0128***	-0.0549***	-0.0538***	-0.0666***	-0.0121***	-0.0164***	0.0027	-0.0216*
	(0.0038)	(0.0062)	(0.0088)	(0.0113)	(0.0036)	(0.0061)	(0.0087)	(0.0112)
Fourth Quarter	0.0091***	0.0386***	0.0463***	0.0646***	-0.0018	-0.0040	-0.0064	0.0089
	(0.0024)	(0.0040)	(0.0055)	(0.0072)	(0.0023)	(0.0038)	(0.0055)	(0.0070)
Constant	-0.0297***	-0.0725***	-0.1384***	-0.1847***	-0.0238***	-0.0575***	-0.1141***	-0.1443***
	(0.0062)	(0.0106)	(0.0152)	(0.0205)	(0.0062)	(0.0106)	(0.0153)	(0.0207)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Sector Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	6.21%	9.70%	11.48%	11.02%	5.78%	6.54%	7.94%	7.85%

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 transactions, 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 (ERM Year) to identify whether a firm employs ERM in any given year over the sample period. For example, if a firm adopts ERM in 2004, the ERM indicator variable will be assigned with a value of one for year 2004 and the following years.

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 made stock transactions of a firm from 1996 to 2013, respectively.

6. We use two binary variables to proxy significant changes in firm's stock prices (i.e., past stock performance): RET is less than -20% and RET is greater than 20%. 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 $202,158,805 (33.33th percentile of the insider stock purchase and sale sample), medium firms with market capitalization between $202,158,805 and $1,068,003,868 (33.33th percentile to 66.66th percentile), and large firms with market capitalization greater than $1,068,003,868 (66.66th percentile).

8. We employ two binary variables for stock volatility of a 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 0.019601 (33.33th percentile of the insider stock purchase and sale sample), medium stock volatility firms with stock volatility between 0.019601 and 0.032981 (33.33th percentile to 66.66th percentile), and high stock volatility firms with stock volatility greater than 0.032981 (66.66th percentile).

9. We employ a binary variable for the period of 2008 financial crisis (December 2007 to June 2009).

10. 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).

11. 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 5

Insider Stock Purchase: ERM Year
Cumulative Abnormal Return (CAR) Ordinary Least Squares Regression Model with Heteroscedasticity-Consistent Standard Errors
Number of Transactions = 22,220 (Insider-Firm-Day Level Data); 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								
ERM Year	0.0038	0.0094**	0.0281***	0.0521***	0.0045*	0.0095**	0.0248***	0.0497***
	(0.0026)	(0.0043)	(0.0065)	(0.0085)	(0.0027)	(0.0044)	(0.0066)	(0.0087)
ERM Year * Small Firms	-0.0099*	-0.0111	-0.0234	-0.0265	-0.0110**	-0.0101	-0.0054	-0.0018
	(0.0051)	(0.0094)	(0.0148)	(0.0199)	(0.0049)	(0.0091)	(0.0143)	(0.0197)
ERM Year * High Stock Volatility Firms	-0.0162***	-0.0810***	-0.1087***	-0.1255***	-0.0093*	-0.0686***	-0.0937***	-0.1153***
	(0.0058)	(0.0119)	(0.0193)	(0.0265)	(0.0056)	(0.0117)	(0.0189)	(0.0264)
ERM Year * Financial Crisis Period	-0.0118	0.0046	-0.0425*	-0.1607***	-0.0114	0.0065	-0.0546**	-0.1676***
	(0.0073)	(0.0138)	(0.0225)	(0.0297)	(0.0070)	(0.0134)	(0.0218)	(0.0301)
ERM Year * RET <= -20%	-0.0321	-0.0178	0.0940*	0.1188	-0.0412*	-0.0126	0.0491	0.0343
	(0.0230)	(0.0367)	(0.0560)	(0.0753)	(0.0222)	(0.0327)	(0.0531)	(0.0686)
ERM Year * RET > 20%	-0.0088	-0.0361	0.1028	0.1646	-0.0242	-0.0636	0.0656	0.1263
	(0.0297)	(0.0524)	(0.1128)	(0.2413)	(0.0214)	(0.0426)	(0.1095)	(0.2408)
ERM Year * CEO	0.0089	0.0013	-0.0243	-0.0307	0.0052	-0.0066	-0.0359	-0.0420
	(0.0084)	(0.0155)	(0.0266)	(0.0326)	(0.0084)	(0.0154)	(0.0268)	(0.0327)
Insider Type								
CEO	0.0166***	0.0411***	0.0501***	0.0617***	0.0196***	0.0442***	0.0552***	0.0715***
	(0.0034)	(0.0058)	(0.0085)	(0.0113)	(0.0034)	(0.0056)	(0.0084)	(0.0110)
CFO	0.0218***	0.0562***	0.0703***	0.0676***	0.0255***	0.0582***	0.0734***	0.0760***
	(0.0051)	(0.0088)	(0.0123)	(0.0155)	(0.0050)	(0.0086)	(0.0121)	(0.0153)
Director	0.0121***	0.0264***	0.0209***	0.0171**	0.0131***	0.0269***	0.0237***	0.0277***
	(0.0023)	(0.0041)	(0.0062)	(0.0080)	(0.0023)	(0.0039)	(0.0060)	(0.0077)
Officer	0.0147***	0.0278***	0.0304***	0.0203**	0.0140***	0.0265***	0.0296***	0.0268***
	(0.0031)	(0.0053)	(0.0079)	(0.0103)	(0.0029)	(0.0051)	(0.0076)	(0.0100)
Large Shareholders	0.0210	0.0297**	0.0943***	0.2158***	0.0282	0.0386***	0.1391***	0.2974***
	(0.0293)	(0.0148)	(0.0316)	(0.0473)	(0.0261)	(0.0148)	(0.0308)	(0.0434)
Past Stock Performance								
RET <= -20%	0.0608***	0.0792***	0.0889***	0.0628***	0.0658***	0.0691***	0.0596***	0.0225
	(0.0087)	(0.0142)	(0.0179)	(0.0235)	(0.0084)	(0.0135)	(0.0178)	(0.0231)
RET > 20%	0.0060	0.0068	0.0140	0.0542**	-0.0007	-0.0120	-0.0040	0.0339
	(0.0091)	(0.0134)	(0.0188)	(0.0253)	(0.0088)	(0.0127)	(0.0183)	(0.0245)
Information Uncertainty								
Small Firms	0.0169***	0.0483***	0.0827***	0.1087***	0.0163***	0.0437***	0.0838***	0.1067***
	(0.0024)	(0.0042)	(0.0065)	(0.0087)	(0.0024)	(0.0042)	(0.0066)	(0.0086)
Medium Firms	0.0088***	0.0290***	0.0403***	0.0520***	0.0085***	0.0267***	0.0464***	0.0580***
	(0.0022)	(0.0038)	(0.0059)	(0.0076)	(0.0022)	(0.0038)	(0.0059)	(0.0076)
High Stock Volatility Firms	0.0199***	0.0234***	0.0485***	0.0691***	0.0159***	0.0154***	0.0261***	0.0384***
	(0.0023)	(0.0039)	(0.0058)	(0.0076)	(0.0023)	(0.0038)	(0.0058)	(0.0076)
Medium Stock Volatility Firms	0.0075***	-0.0008	0.0088**	0.0128**	0.0073***	-0.0011	0.0063	0.0116**
	(0.0015)	(0.0026)	(0.0040)	(0.0052)	(0.0015)	(0.0026)	(0.0039)	(0.0051)
Financial Crisis Period (December 2007 to June 2009)	0.0116*	0.1036***	0.2405***	0.2732***	-0.0018	0.0401***	0.1101***	0.1029***
	(0.0067)	(0.0131)	(0.0191)	(0.0249)	(0.0063)	(0.0118)	(0.0172)	(0.0227)

(continued on next page)

Table 5 (cont.)

Insider Stock Purchase: ERM Year (cont.)

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)**
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 (%)	0.0095**	-0.0050*	-0.0181***	-0.0465***	0.0118***	0.0015	-0.0144***	-0.0402***
	(0.0037)	(0.0030)	(0.0055)	(0.0112)	(0.0038)	(0.0029)	(0.0051)	(0.0104)
Market to book ratio (MTB)	0.0001	-0.0001	-0.0004	-0.0006	0.0001	-0.0001	-0.0003	-0.0006
	(0.0001)	(0.0002)	(0.0003)	(0.0004)	(0.0001)	(0.0002)	(0.0003)	(0.0004)
Loss (binary variable for net income < 0)	-0.0012	-0.0075*	-0.0241***	-0.0218***	0.0003	-0.0065*	-0.0208***	-0.0209***
	(0.0024)	(0.0040)	(0.0057)	(0.0075)	(0.0023)	(0.0038)	(0.0055)	(0.0074)
Return on assets (ROA)	0.0008	-0.0954***	-0.1118***	-0.0322	-0.0018	-0.0722***	-0.0900***	-0.0267
	(0.0182)	(0.0290)	(0.0306)	(0.0438)	(0.0156)	(0.0234)	(0.0284)	(0.0425)
Leverage ratio (long-term debt/ equity)	-0.0001	0.0001	0.0003	0.0004	-0.0001	0.0000	0.0001	0.0003
	(0.0001)	(0.0003)	(0.0005)	(0.0006)	(0.0001)	(0.0002)	(0.0004)	(0.0006)
Insurance industry	0.0301***	0.0933***	0.1490***	0.2336***	0.0305***	0.0914***	0.1323***	0.1929***
	(0.0055)	(0.0093)	(0.0133)	(0.0183)	(0.0054)	(0.0093)	(0.0132)	(0.0180)
Banking industry	-0.0069	0.0049	0.0325***	0.0383***	-0.0073*	0.0051	0.0234**	0.0238*
	(0.0044)	(0.0073)	(0.0097)	(0.0131)	(0.0044)	(0.0075)	(0.0100)	(0.0137)
January	-0.0128***	-0.0549***	-0.0543***	-0.0668***	-0.0121***	-0.0164***	0.0028	-0.0210*
	(0.0038)	(0.0062)	(0.0088)	(0.0112)	(0.0036)	(0.0061)	(0.0087)	(0.0111)
Fourth Quarter	0.0089***	0.0379***	0.0453***	0.0632***	-0.0019	-0.0046	-0.0074	0.0074
	(0.0024)	(0.0040)	(0.0056)	(0.0072)	(0.0023)	(0.0038)	(0.0055)	(0.0070)
Constant	-0.0303***	-0.0734***	-0.1401***	-0.1881***	-0.0243***	-0.0581***	-0.1153***	-0.1470***
	(0.0062)	(0.0106)	(0.0153)	(0.0206)	(0.0062)	(0.0106)	(0.0154)	(0.0208)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Sector Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	6.32%	9.97%	11.76%	11.46%	5.88%	6.75%	8.19%	8.31%

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 transactions, 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 (ERM Year) to identify whether a firm employs ERM in any given year over the sample period. For example, if a firm adopts ERM in 2004, the ERM indicator variable will be assigned with a value of one for year 2004 and the following years.
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 made stock transactions of a firm from 1996 to 2013, respectively.
6. We use two binary variables to proxy significant changes in firm's stock prices (i.e., past stock performance): RET is less than -20% and RET is greater than 20%. 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 $202,158,805 (33.33th percentile of the insider stock purchase and sale sample), medium firms with market capitalization between $202,158,805 and $1,068,003,868 (33.33th percentile to 66.66th percentile), and large firms with market capitalization greater than $1,068,003,868 (66.66th percentile).
8. We employ two binary variables for stock volatility of a 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 0.019601 (33.33th percentile of the insider stock purchase and sale sample), medium stock volatility firms with stock volatility between 0.019601 and 0.032981 (33.33th percentile to 66.66th percentile), and high stock volatility firms with stock volatility greater than 0.032981 (66.66th percentile).
9. We employ a binary variable for the period of 2008 financial crisis (December 2007 to June 2009).
10. 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).
11. 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: ERM Year
Cumulative Abnormal Return (CAR) Ordinary Least Squares Regression Model with Heteroscedasticity-Consistent Standard Errors
Number of Transactions = 49,170 (Insider-Firm-Day Level Data); 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 Year	0.0040***	0.0091***	0.0127***	0.0132***	0.0033***	0.0072***	0.0086***	0.0094**
	(0.0011)	(0.0020)	(0.0030)	(0.0039)	(0.0011)	(0.0020)	(0.0031)	(0.0040)
Insider Type								
CEO	-0.0116***	-0.0274***	-0.0511***	-0.0783***	-0.0099***	-0.0263***	-0.0457***	-0.0678***
	(0.0020)	(0.0035)	(0.0052)	(0.0067)	(0.0020)	(0.0034)	(0.0052)	(0.0066)
CFO	-0.0081***	-0.0161***	-0.0353***	-0.0668***	-0.0072***	-0.0176***	-0.0329***	-0.0588***
	(0.0022)	(0.0040)	(0.0062)	(0.0080)	(0.0022)	(0.0040)	(0.0064)	(0.0079)
Director	-0.0066***	-0.0168***	-0.0333***	-0.0580***	-0.0046***	-0.0158***	-0.0297***	-0.0499***
	(0.0017)	(0.0031)	(0.0045)	(0.0058)	(0.0017)	(0.0030)	(0.0044)	(0.0057)
Officer	-0.0039**	-0.0129***	-0.0286***	-0.0529***	-0.0027*	-0.0139***	-0.0293***	-0.0499***
	(0.0016)	(0.0029)	(0.0043)	(0.0057)	(0.0016)	(0.0029)	(0.0042)	(0.0055)
Large Shareholders	0.0154	0.0212	0.0025	-0.0390	0.0134	0.0290	0.0263	0.0083
	(0.0148)	(0.0283)	(0.0360)	(0.0520)	(0.0139)	(0.0305)	(0.0408)	(0.0555)
Past Stock Performance								
RET <= -20%	0.0089	-0.0221	0.0184	0.0208	0.0117	-0.0215	-0.0127	0.0034
	(0.0141)	(0.0252)	(0.0374)	(0.0469)	(0.0134)	(0.0264)	(0.0376)	(0.0448)
RET > 20%	-0.0177***	-0.0044	-0.0595***	-0.0638***	-0.0191***	-0.0056	-0.0587***	-0.0610***
	(0.0067)	(0.0125)	(0.0153)	(0.0194)	(0.0065)	(0.0118)	(0.0146)	(0.0183)
Information Uncertainty								
Large Firms	-0.0129***	-0.0332***	-0.0628***	-0.0837***	-0.0154***	-0.0377***	-0.0665***	-0.0848***
	(0.0016)	(0.0029)	(0.0044)	(0.0058)	(0.0016)	(0.0028)	(0.0044)	(0.0057)
Medium Firms	-0.0086***	-0.0234***	-0.0534***	-0.0708***	-0.0100***	-0.0269***	-0.0571***	-0.0706***
	(0.0016)	(0.0029)	(0.0045)	(0.0058)	(0.0016)	(0.0028)	(0.0044)	(0.0057)
High Stock Volatility Firms	-0.0128***	-0.0323***	-0.0558***	-0.0826***	-0.0161***	-0.0417***	-0.0755***	-0.1060***
	(0.0013)	(0.0025)	(0.0037)	(0.0048)	(0.0014)	(0.0024)	(0.0037)	(0.0048)
Medium Stock Volatility Firms	-0.0049***	-0.0123***	-0.0241***	-0.0331***	-0.0055***	-0.0129***	-0.0254***	-0.0369***
	(0.0008)	(0.0015)	(0.0022)	(0.0029)	(0.0008)	(0.0015)	(0.0022)	(0.0029)
Financial Crisis Period (December 2007 to June 2009)	-0.0066	-0.0210***	-0.0267**	0.0018	-0.0250***	-0.0911***	-0.1890***	-0.2238***
	(0.0042)	(0.0073)	(0.0110)	(0.0148)	(0.0044)	(0.0076)	(0.0116)	(0.0153)

(continued on next page)

Table 6 (cont.)

Insider Stock Sale: ERM Year (cont.)

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)**
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 (%)	-0.0000	-0.0010	-0.0028**	-0.0050***	0.0000	-0.0010	-0.0024**	-0.0046***
	(0.0005)	(0.0008)	(0.0013)	(0.0018)	(0.0005)	(0.0008)	(0.0012)	(0.0016)
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)	0.0032**	-0.0089***	-0.0183***	-0.0130**	0.0020	-0.0072***	-0.0193***	-0.0164***
	(0.0016)	(0.0029)	(0.0042)	(0.0056)	(0.0016)	(0.0028)	(0.0042)	(0.0055)
Return on assets (ROA)	-0.0148	-0.0473***	-0.0749***	-0.1110***	-0.0127	-0.0452***	-0.0708***	-0.1086***
	(0.0107)	(0.0153)	(0.0204)	(0.0267)	(0.0096)	(0.0145)	(0.0207)	(0.0294)
Leverage ratio (long-term debt/ equity)	-0.0001	-0.0000	-0.0000	0.0001	-0.0001*	-0.0001	-0.0001	-0.0001
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
Insurance industry	-0.0035	0.0021	0.0172	0.0268	0.0009	0.0029	0.0113	0.0254
	(0.0044)	(0.0088)	(0.0130)	(0.0178)	(0.0047)	(0.0090)	(0.0136)	(0.0184)
Banking industry	0.0007	0.0194***	0.0408***	0.0700***	0.0023	0.0177**	0.0377***	0.0704***
	(0.0037)	(0.0075)	(0.0105)	(0.0142)	(0.0039)	(0.0077)	(0.0108)	(0.0148)
January	0.0026	-0.0108***	-0.0089	-0.0178**	-0.0014	0.0106***	0.0306***	0.0083
	(0.0020)	(0.0041)	(0.0057)	(0.0071)	(0.0020)	(0.0040)	(0.0056)	(0.0071)
Fourth Quarter	0.0069***	0.0220***	0.0319***	0.0344***	0.0021*	-0.0067***	-0.0193***	-0.0086*
	(0.0012)	(0.0022)	(0.0033)	(0.0044)	(0.0012)	(0.0022)	(0.0035)	(0.0044)
Constant	0.0092**	0.0068	0.0029	-0.0034	0.0106**	0.0206**	0.0363***	0.0411**
	(0.0046)	(0.0088)	(0.0125)	(0.0166)	(0.0048)	(0.0089)	(0.0127)	(0.0170)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Sector Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	2.21%	4.53%	6.83%	7.29%	2.66%	5.14%	7.57%	7.99%

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 transactions, 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 (ERM Year) to identify whether a firm employs ERM in any given year over the sample period. For example, if a firm adopts ERM in 2004, the ERM indicator variable will be assigned with a value of one for year 2004 and the following years.

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 made stock transactions of a firm from 1996 to 2013, respectively.

6. We use two binary variables to proxy significant changes in firm's stock prices (i.e., past stock performance): RET is less than -20% and RET is greater than 20%. 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 $202,158,805 (33.33th percentile of the insider stock purchase and sale sample), medium firms with market capitalization between $202,158,805 and $1,068,003,868 (33.33th percentile to 66.66th percentile), and large firms with market capitalization greater than $1,068,003,868 (66.66th percentile).

8. We employ two binary variables for stock volatility of a 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 0.019601 (33.33th percentile of the insider stock purchase and sale sample), medium stock volatility firms with stock volatility between 0.019601 and 0.032981 (33.33th percentile to 66.66th percentile), and high stock volatility firms with stock volatility greater than 0.032981 (66.66th percentile).

9. We employ a binary variable for the period of 2008 financial crisis (December 2007 to June 2009).

10. 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).

11. 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 7

Insider Stock Sale: ERM Year
Cumulative Abnormal Return (CAR) Ordinary Least Squares Regression Model with Heteroscedasticity-Consistent Standard Errors
Number of Transactions = 49,170 (Insider-Firm-Day Level Data); 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								
ERM Year	0.0028**	0.0101***	0.0150***	0.0121***	0.0026**	0.0087***	0.0134***	0.0133***
	(0.0011)	(0.0021)	(0.0032)	(0.0041)	(0.0011)	(0.0021)	(0.0033)	(0.0041)
ERM Year * Small Firms	-0.0203***	-0.0510***	-0.0728***	-0.0793***	-0.0227***	-0.0534***	-0.0792***	-0.0866***
	(0.0039)	(0.0072)	(0.0113)	(0.0166)	(0.0040)	(0.0071)	(0.0112)	(0.0165)
ERM Year * High Stock Volatility Firms	0.0098**	0.0071	-0.0216*	0.0221	0.0117***	0.0164**	-0.0132	0.0121
	(0.0041)	(0.0077)	(0.0115)	(0.0151)	(0.0045)	(0.0082)	(0.0122)	(0.0161)
ERM Year * Financial Crisis Period	0.0024	-0.0084	0.0120	0.0050	-0.0008	-0.0168**	-0.0074	-0.0136
	(0.0041)	(0.0075)	(0.0117)	(0.0154)	(0.0044)	(0.0082)	(0.0122)	(0.0159)
ERM Year * RET <= -20%	0.0857***	0.1289**	0.1732	0.1213	0.0545	0.1037	0.1506	0.1207
	(0.0328)	(0.0570)	(0.1102)	(0.1800)	(0.0390)	(0.0744)	(0.1207)	(0.1896)
ERM Year * RET > 20%	0.0211	0.0840	0.1397**	0.0264	0.0219	0.0806	0.1251*	-0.0146
	(0.0247)	(0.0569)	(0.0692)	(0.0734)	(0.0250)	(0.0621)	(0.0710)	(0.0821)
ERM Year * CEO	0.0082***	0.0163***	0.0179**	0.0252***	0.0073***	0.0140***	0.0145**	0.0171*
	(0.0024)	(0.0043)	(0.0070)	(0.0094)	(0.0025)	(0.0043)	(0.0071)	(0.0093)
Insider Type								
CEO	-0.0123***	-0.0290***	-0.0527***	-0.0806***	-0.0106***	-0.0277***	-0.0471***	-0.0694***
	(0.0021)	(0.0037)	(0.0056)	(0.0071)	(0.0021)	(0.0036)	(0.0056)	(0.0070)
CFO	-0.0080***	-0.0161***	-0.0349***	-0.0665***	-0.0071***	-0.0176***	-0.0328***	-0.0587***
	(0.0022)	(0.0040)	(0.0062)	(0.0080)	(0.0022)	(0.0040)	(0.0064)	(0.0079)
Director	-0.0063***	-0.0161***	-0.0324***	-0.0569***	-0.0043**	-0.0151***	-0.0288***	-0.0488***
	(0.0017)	(0.0031)	(0.0045)	(0.0058)	(0.0017)	(0.0030)	(0.0044)	(0.0057)
Officer	-0.0037**	-0.0127***	-0.0282***	-0.0523***	-0.0025	-0.0137***	-0.0289***	-0.0495***
	(0.0016)	(0.0029)	(0.0043)	(0.0057)	(0.0016)	(0.0029)	(0.0042)	(0.0055)
Large Shareholders	0.0157	0.0217	0.0033	-0.0380	0.0137	0.0296	0.0271	0.0093
	(0.0149)	(0.0283)	(0.0362)	(0.0522)	(0.0140)	(0.0306)	(0.0410)	(0.0556)
Past Stock Performance								
RET <= -20%	0.0060	-0.0265	0.0126	0.0168	0.0099	-0.0252	-0.0178	-0.0006
	(0.0145)	(0.0260)	(0.0385)	(0.0481)	(0.0139)	(0.0272)	(0.0386)	(0.0459)
RET > 20%	-0.0186***	-0.0078	-0.0649***	-0.0651***	-0.0200***	-0.0089	-0.0636***	-0.0607***
	(0.0069)	(0.0128)	(0.0157)	(0.0200)	(0.0067)	(0.0120)	(0.0149)	(0.0187)
Information Uncertainty								
Large Firms	-0.0142***	-0.0363***	-0.0671***	-0.0885***	-0.0168***	-0.0409***	-0.0711***	-0.0898***
	(0.0017)	(0.0030)	(0.0046)	(0.0060)	(0.0016)	(0.0029)	(0.0046)	(0.0059)
Medium Firms	-0.0095***	-0.0254***	-0.0563***	-0.0741***	-0.0110***	-0.0291***	-0.0601***	-0.0740***
	(0.0016)	(0.0030)	(0.0046)	(0.0060)	(0.0016)	(0.0029)	(0.0046)	(0.0058)
High Stock Volatility Firms	-0.0136***	-0.0332***	-0.0553***	-0.0845***	-0.0170***	-0.0430***	-0.0753***	-0.1071***
	(0.0014)	(0.0025)	(0.0038)	(0.0050)	(0.0014)	(0.0025)	(0.0038)	(0.0050)
Medium Stock Volatility Firms	-0.0051***	-0.0124***	-0.0241***	-0.0334***	-0.0057***	-0.0130***	-0.0253***	-0.0368***
	(0.0008)	(0.0015)	(0.0022)	(0.0029)	(0.0008)	(0.0015)	(0.0022)	(0.0029)
Financial Crisis Period (December 2007 to June 2009)	-0.0071*	-0.0195***	-0.0268**	0.0012	-0.0251***	-0.0888***	-0.1868***	-0.2217***
	(0.0043)	(0.0075)	(0.0112)	(0.0150)	(0.0045)	(0.0077)	(0.0117)	(0.0154)

(continued on next page)

Table 7 (cont.)

Insider Stock Sale: ERM Year (cont.)

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)**
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 (%)	-0.0000	-0.0010	-0.0027**	-0.0050***	0.0000	-0.0010	-0.0024**	-0.0046***
	(0.0005)	(0.0008)	(0.0013)	(0.0018)	(0.0005)	(0.0008)	(0.0012)	(0.0016)
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)	0.0032*	-0.0091***	-0.0185***	-0.0132**	0.0019	-0.0075***	-0.0197***	-0.0169***
	(0.0016)	(0.0029)	(0.0042)	(0.0056)	(0.0016)	(0.0028)	(0.0042)	(0.0055)
Return on assets (ROA)	-0.0149	-0.0470***	-0.0743***	-0.1108***	-0.0128	-0.0449***	-0.0700***	-0.1078***
	(0.0108)	(0.0153)	(0.0203)	(0.0267)	(0.0096)	(0.0145)	(0.0207)	(0.0294)
Leverage ratio (long-term debt/ equity)	-0.0001	-0.0000	0.0000	0.0001	-0.0001*	-0.0001	-0.0001	-0.0000
	(0.0001)	(0.0001)	(0.0001)	(0.0002)	(0.0001)	(0.0001)	(0.0001)	(0.0002)
Insurance industry	-0.0033	0.0023	0.0172	0.0274	0.0012	0.0033	0.0113	0.0258
	(0.0044)	(0.0088)	(0.0131)	(0.0178)	(0.0047)	(0.0090)	(0.0136)	(0.0184)
Banking industry	0.0006	0.0192**	0.0401***	0.0700***	0.0023	0.0177**	0.0372***	0.0704***
	(0.0037)	(0.0075)	(0.0105)	(0.0142)	(0.0040)	(0.0078)	(0.0108)	(0.0148)
January	0.0025	-0.0110***	-0.0093*	-0.0182**	-0.0015	0.0104***	0.0302***	0.0080
	(0.0020)	(0.0041)	(0.0057)	(0.0071)	(0.0020)	(0.0040)	(0.0056)	(0.0071)
Fourth Quarter	0.0070***	0.0222***	0.0322***	0.0347***	0.0022*	-0.0065***	-0.0190***	-0.0083*
	(0.0012)	(0.0022)	(0.0033)	(0.0044)	(0.0012)	(0.0022)	(0.0035)	(0.0044)
Constant	0.0097**	0.0078	0.0044	-0.0017	0.0111**	0.0216**	0.0377***	0.0425**
	(0.0046)	(0.0088)	(0.0125)	(0.0167)	(0.0048)	(0.0090)	(0.0128)	(0.0170)
Year Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
Sector Industry Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES
R-squared	2.28%	4.61%	6.91%	7.33%	2.72%	5.23%	7.65%	8.03%

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 transactions, 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 (ERM Year) to identify whether a firm employs ERM in any given year over the sample period. For example, if a firm adopts ERM in 2004, the ERM indicator variable will be assigned with a value of one for year 2004 and the following years.
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 made stock transactions of a firm from 1996 to 2013, respectively.
6. We use two binary variables to proxy significant changes in firm's stock prices (i.e., past stock performance): RET is less than -20% and RET is greater than 20%. 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 $202,158,805 (33.33th percentile of the insider stock purchase and sale sample), medium firms with market capitalization between $202,158,805 and $1,068,003,868 (33.33th percentile to 66.66th percentile), and large firms with market capitalization greater than $1,068,003,868 (66.66th percentile).
8. We employ two binary variables for stock volatility of a 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 0.019601 (33.33th percentile of the insider stock purchase and sale sample), medium stock volatility firms with stock volatility between 0.019601 and 0.032981 (33.33th percentile to 66.66th percentile), and high stock volatility firms with stock volatility greater than 0.032981 (66.66th percentile).
9. We employ a binary variable for the period of 2008 financial crisis (December 2007 to June 2009).
10. 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).
11. 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.