THE VALUE-RELEVANCE OF FUNDAMENTAL SIGNALS AND THE IMPACT OF FINANCIAL REGULATIONS ON SECURITY VALUATION AND EARNINGS MANAGEMENT

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Abstract

This article investigates the value-relevance of earnings and financial analysts' fundamental signals, as identified by prior research. We document four primary findings. First, consistent with the claims in the accounting literature, the value-relevance of 'bottom line' earnings has declined over time. Second, the combined value-relevance of earnings and financial analysts' fundamental signals have also declined over time. Prior studies in this line of research have generated mixed evidence. In other words, some previous studies support an increase and some others find a decrease in the value-relevance of book values of net assets (common equity) over time. This study focuses on the financial analysts' fundamental signals, not the book values of net assets, and the change in the degree of the value-relevance of those signals over time. Third, we find a negative correlation between firms' excess returns and regulations, such as Sarbanes-Oxley (SOX) and Dodd-Frank, which are consistent with the claims of some prior studies that the implementation costs of the regulations may exceed their benefits for shareholders of the corporations affected by the regulations. Finally, we also report that the levels of opportunistic earnings management, reflected in some of those fundamental signals, have declined following these regulations.

Keywords: Fundamental Signals, Sarbanes-Oxley (SOX), Dodd-Frank, Earnings Management, Value-Relevance

1. INTRODUCTION

The purpose of this study is three-pronged: 1) to examine whether the value-relevance of both earnings and the financial analysts' fundamental signals (financial information other than earnings) has decreased over time; 2) to investigate whether financial regulations, such as the Sarbanes-Oxley Act (SOX) and the Dodd-Frank Wall Street Reform and Consumer Protection Act (Dodd-Frank), have negatively affected firms' excess returns; and 3) to evaluate whether the levels of opportunistic earnings management has decreased following these regulations[4].

Prior research has focused on fundamental analyses aimed at determining the value of corporate securities through a careful examination of key value-drivers, such as earnings, risk, growth, and competitive position. Lev and Thiagarajan (1993) identified a set of financial variables (fundamentals), claimed by financial analysts to be helpful in the valuation of corporate securities, and examined these claims by evaluating the incremental value-relevance of these fundamentals over earnings. Their findings support the incremental

[4] According to Schweitzer (2016). Financial analysts work with financial investments. They are hired by individuals and businesses.

value-relevance of most of the identified fundamentals; in fact, the fundamentals add approximately 60%, on average, to the explanatory power of earnings, with respect to excess returns for their sample period from 1974 to 1988.

Contemporary accounting literature frequently debates whether the financial data is less value relevant in an era that is characterized by information technology (IT). Trueman, Wong, and Zhang (2000) failed to find a significant positive association between net income and market prices for internet stocks in their sample. Hand (2000) asserted that the conventional assumption that accounting information maps into the equity market value in a linear and stationary manner is not relevant to technology-intensive firms.

Lev and Zarowin (1999) investigated the usefulness of financial information for investors, in comparison to the total information about the marketplace, and documented that the usefulness of reported earnings, cash flows, and book (equity) values have been deteriorating over the past 20 years. They claimed that the innovative activities of business enterprises, mostly in the form of investments in intangible assets such as R&D, IT, brands, and human resources, constantly alter firms' products, operations, economic conditions, and market values. More specifically, they noted that the large investments that generally drive change, such as restructuring costs and R&D expenditures, are immediately expensed, while the benefits of the change are recorded later and are not matched with previously expensed investments. Accordingly, the primary accounting measurement process of periodically matching costs with revenues is seriously distorted, adversely affecting the informativeness of financial information.

Twenty-five years after the introduction of the World Wide Web, which effectively initiated the Information Age, every business organization must now focus on how to cope with the rapid alteration of IT in this globalized economy. These rapid IT changes and the creation of more intangibles assets in this digital era can cause the value-relevance of both earnings and the analysts' signals, primarily dependent upon financial information, to further decrease than in the past.

Since financial accounting information has the characteristics of the public good, suppliers of such information do not always get compensated for the information they produce (Scott, 2015). Scott (2015) further noted that the suppliers of financial accounting information will, therefore, under-produce such information, relative to the first-best amount of information production. As a result, information asymmetry in the forms of adverse selection and moral hazard is greater than is socially desirable. This market failure justifies the regulation of financial disclosure. Since regulation has a cost, too much of it imposes a greater cost on society than the benefits of lower information asymmetry.

Romano (2005), the FEI (2005), and Solomon and Brian-Low (2004) claimed that the SOX was hastily put together in response to several corporate scandals and that it imposes substantial costs on firms without producing equivalent benefits. In conjunction with the above, Zhang (2007) investigated the economic consequences of SOX through the examination of market reactions to related legislative events. She found that U.S. firms experienced a statistically significant, negative cumulative abnormal return around key SOX events. Zhang attributed her results to the significant net costs imposed on firms by SOX. In addition, Engel, Hayes, and Wang (2007) documented a statistically significant increase in the number of firms undertaking going-private transactions in the post-SOX period, as compared to the pre-SOX period, and demonstrated that SOX compliance costs are more burdensome for smaller and less liquid firms.

Dimitrov, Palia, and Tang (2015) examined the impact of the Dodd-Frank on corporate bond ratings, issued by credit rating agencies (CRAs). They found that due to the Dodd-Frank, CRAs were issuing lower ratings, more false warnings, and less informative downgrades. These lower ratings may result in higher borrowing costs and the cost of capital for affected firms. In addition, more false warnings that are disclosed in the financial statements of affected corporations will also lead to higher costs of their debts, because inaccurate information affects their disclosure quality. Sengupta (1998) documented that his sample firms showed a negative correlation between the interest cost and their disclosure quality.

Healy, Hutton, and Palepu (1999) showed that firms with improved disclosure quality were associated with a significantly increased share price in the year following the disclosure-quality rating increase, compared to other firms in their same industry. Therefore, it is expected that there is a negative correlation between SOX or the Dodd-Frank regulations and firm-specific returns.

Lobo and Zhou (2006), Cohen et al. (2008), Li et al. (2008), and Carter et al. (2009) demonstrated that the reforms associated with the 2002's SOX have considerably altered the financial reporting environment in which managers operate, and documented an increase in accounting conservatism, a decrease in financial flexibility in financial reporting, and an ensuing decrease in opportunistic earnings management, following the implementation of SOX. In case of the Dodd-Frank, Section 748 includes complicated provisions to protect and subsidize "whistle-blowers" who report misconduct to the SEC (Coffee, 2012), which can reduce opportunistic earnings management on the part of corporate executives. Accordingly, we expect that the levels of opportunistic earnings management reflected in some fundamental signals have decreased after these regulations.

The empirical results from the heteroscedasticity-corrected regressions based on 9,360 firm-year observations, spanning 15 years from 1999 to 2013, collected from the COMPUSTAT and CRSP databases, support the following conclusions: 1) the value-relevance of both earnings and the analysts' fundamental signals (other financial information) have decreased over time, at least from the period of 1974–1988 to the period of 1999–2013; 2) SOX and Dodd-Frank negatively affected firms' excess returns; and 3) the levels of earnings manipulation decreased after these two significant regulations.

This study makes several contributions. First, we add to the fundamental analysis literature by documenting that the value-relevance of fundamental signals, used by financial analysts in determining the value of corporate securities, can vary over time. To our knowledge, this paper is the first to document a decrease in the value-relevance of the analysts' fundamental signals. Second, we add to the existing studies that explain economic consequences of regulations (SOX and Dodd-Frank) by documenting significant, negative correlations between the regulations and the firms' excess returns, which supports prior research claims of excessive costs of those regulations. Finally, this study contributes to the earnings management literature by examining the relationships between the levels of earnings manipulation, which is reflected in some fundamental signals, and regulations.

Section 2 describes twelve fundamental signals used by financial analysts. Section 3 develops our hypotheses and predictions along with the literature review. Section 4 explains the research design and sample selection. Section 5 discusses empirical results, and Section 6 deals with sensitivity analyses, while Section 7 includes concluding remarks.

2. TWELVE FUNDAMENTAL SIGNALS USED BY FINANCIAL ANALYSTS

To identify a set of fundamentals (financial variables) used to evaluate firm performances and estimate future earnings, we adopt the same set of fundamental signals like the ones recognized by Lev and Thiagarajan (1993)[5]. The fundamental signals (a signal refers to a specific configuration of several fundamental variables) are described below and summarized in Table 2[6].

Inventories (INVSIG)

Disproportionate inventory increases, relative to sales increases, may indicate the existence of slow-moving or obsolete items that will be written off in the future. In other words, excessive inventory build-ups increase current earnings at the expense of future earnings by absorbing overhead costs, and therefore, such increases are considered to be bad news.

Accounts Receivable (ARSIG)

Disproportionate (to sales) increases in receivable accounts may suggest difficulties in selling the firm's products and ensuing credit extensions as well as increase the likelihood of future earnings decreasing through the growth of accounts receivables' allowance provisions. An increase in the disproportionate accounts receivables might also suggest earnings manipulation because unrealized revenues are recorded as sales. Accordingly, such increases are considered to be bad news.

Capital Expenditures (CESIG)

Disproportionate (to an industry benchmark) decreases in capital expenditures may indicate managers' concerns with the adequacy of current and future cash flows to sustain the previous investment level. Therefore, such decreases are bad news.

R&D (R&DSIG)

Disproportionate (to an industry benchmark) decreases in R&D expenditures may indicate managers' concerns with the adequacy of current and future cash flows to sustain the previous investment level. Therefore, such decreases are bad news.

Gross Margin (GMSIG)

Disproportionate (to sales) decreases in the gross margin balance (sales minus cost of goods sold) may indicate the greater intensity of competition and higher operating leverage. Accordingly, such decreases are considered to be bad news by analysts.

Selling and Administrative (S&A) Expenses (XSGASIG)

Disproportionate (to sales) increases in these fixed costs may reflect a loss of managerial cost control or an unusual sales effort [(Bernstein (1988)]. Therefore, such increases are considered to be bad news.

Provision for Doubtful Receivables (PDRSIG)

Firms with insufficient provisions for doubtful receivables are expected to suffer decreases in future earnings from inevitable provision increases. Accordingly, such decreases are considered to be bad news by analysts.

Effective Tax Rate[7] (ETSIG)

An unusual decrease in the effective tax rate, which is not triggered by a statutory tax rate change, is generally considered to be transitory by analysts. Therefore, such decreases are considered to be bad news.

Order Backlog (OBSIG)

A relative (to sales) decrease in order backlog indicates a decrease in the demand for the firm's products and may also suggest that yet unrealized sales were recorded in the current period (opportunistic earnings management). Accordingly, such decreases are considered to be bad news by analysts.

Labour Force (LABORSIG)

A significant labour force reduction from corporate restructuring is considered to be good news by financial analysts. As in the cases of other fundamental signals, this variable is defined to yield an expected negative coefficient sign.

LIFO Earnings (INVMSIG)

In the period of inflation, LIFO earnings are regarded as more sustainable or closer to 'economic earnings' than FIFO earnings, because LIFO cost-of-sales are a closer proxy to current (replacement) costs than the FIFO cost-of-sales[8]. Accordingly,

[5] LT indicate, "Analysts generally attach a unique interpretation to a fundamental signal (e.g., a disproportionate increase in inventory conveys bad news). This, of course, is not always the appropriate interpretation. For example, a disproportionate (to sales) inventory increase might sometimes provide a positive signal about managers' expectation of sales increases. Nevertheless, initially, in the noncontextual part of this study, we follow a parsimonious approach of examining the extent to which a single interpretation of a fundamental (i.e., the one used by analysts) is valid for a large cross-section of firms".

[6] Since a detailed description of these fundamental signals is given in LT, we only give a brief explanation for the signals in this section to indicate why any increase in a signal results in bad or good news.

[7] LT (p. 196) demonstrate that the annual change in earnings, $\Delta E_t = \Delta E_t - E_{t-1}$, can be decomposed into two components: (a) the change in pretax earnings (ΔPTE_t), at last year's effective tax (T_{t-1}) level – $\Delta PTE_t(1 - T_{t-1})$, and (b) the effect of the tax rate change on current pretax earnings - $PTE_t(T_{t-1} - T_t)$:

$$\Delta E_t = \Delta PTE_t(1 - T_{t-1}) + PTE_t(T_{t-1} - T_t) \qquad (1)$$

In expression (1) $PTE_t(T_{t-1} - T_t)$, which indicates the part of the net earnings change due to the effective tax rate change, is the measure of the tax signal (after deflation by beginning stock price).

[8] In Canada, the LIFO inventory method is no longer permitted under ASPE (Accounting Standards for Private Enterprises) and IFRS (International Financial Reporting Standards). However, it is permitted under U.S. GAAP, and allowed for tax purposes in the States if a company also uses the method for financial reporting purposes (Kieso et al., 2016).

analysts consider the use of the LIFO inventory method to be good news. To capture the effect of this signal, we use a dummy variable (INVMSIG) = 0 for LIFO, and 1 for FIFO or other inventory methods. Therefore, this signal variable is defined to yield an expected negative coefficient sign.

Audit Qualification (AUOPSIG)

A qualified, disclaimed, or adverse opinion is obviously considered to be bad news. To capture the effect of this signal, we adopt a dummy variable (AUOPSIG) = 0 for Unqualified Opinion and 1 for Other Opinions. Accordingly, this signal variable is defined to yield an expected negative coefficient sign.

3. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

Prior research aimed at determining the value of corporate securities through a careful examination of key value-drivers, such as earnings, risk, growth, and competitive position. Lev and Thiagarajan identified a set of financial variables (fundamentals) that analysts claimed to be helpful in the valuation of corporate securities and examined these claims by evaluating the incremental value-relevance of these fundamentals over earnings. Their findings support the incremental value-relevance of most of the identified fundamentals; in fact, the fundamentals add approximately 60%, on average, to the explanatory power of earnings with respect to excess returns for their sample period from 1974 to 1988.

Contemporary accounting literature frequently debates whether the financial data is less value relevant in an era that is characterized by IT. Amir and Lev (1996) examined the independent cellular companies and found that such nonfinancial variables, such as total population in the licensed area (a growth proxy) and market penetration (an operating performance proxy), explained stock prices better than earnings and cash flows from operations. Trueman, Wong, and Zhang (2000) did not detect a significant positive association between net income and market prices for internet firms. They provided insights into the manner in which (relatively sparse) accounting information, along with measures of internet usage, are employed by the market in the valuation of internet firms. Their findings are consistent with some investor claims stating that financial statement information is of very limited use in the valuation of internet stocks. In a similar vein, Kwon and Yin (2015) documented that earnings persistence is lower in high-tech firms than in non-high-tech firms.

Lev and Zarowin (1999) investigated the usefulness of financial information for investors in comparison to the total information in the marketplace and documented that the usefulness of the reported earnings, cash flows, and book (equity) values have been deteriorating over the past 20 years[9]. They claimed that the innovative activities of business enterprises, mostly in the form of investments in intangible assets, such as R&D, IT, brands, and human resources, constantly alter a firm's products, operations, economic conditions, and market values. More specifically, they note that the large investments that generally drive change, such as restructuring costs and R&D expenditures, are immediately expensed, while the benefits of change are recorded later and are not matched with the previously expensed investments. Accordingly, the primary accounting measurement process of periodically matching costs with revenues is seriously distorted, adversely affecting the informativeness of financial information.

Twenty-five years after the introduction of the World Wide Web that effectively initiated the Information Age; every business organization has to focus on how to cope with rapid IT change in this globalized economy. Fang, Benamati, and Lederer (2011) suggested that culture affects the coping with such change in China and the United States, and multinational corporations deal with rapid IT change differently, in different divisions and cultures, regardless of whether it's China, The United States, Europe, or elsewhere. In addition, Hedman and Sarker (2015) observed that one important factor for explaining the high number of failures in corporate M&A is IS related issues, specifically, the lack of effective IS integration.

Therefore, these rapid IT changes and the creation of more intangibles assets in this digital era can cause the value-relevance of both earnings and analyst signals to deteriorate over time. Our first hypothesis, in its alternate form, is:

H1: The value relevance of both earnings and analysts' signals (other financial information) has decreased over time.

Since financial accounting information has the characteristics of the public good, suppliers of such information do not always get compensated for the information they produce (Scott, 2015). Scott (2015) further notes that the suppliers of financial accounting information will, therefore, under-produce such information, relative to the first-best amount of information production. As a result, information asymmetry in the forms of adverse selection and moral hazard is greater than is socially desirable. This market failure justifies the regulation of financial disclosure. Since regulation has a cost, too much regulation imposes a greater cost on society than the benefits of lower information asymmetry.

Romano (2005), the FEI (2005), and Solomon and Brian-Low (2004) claimed that the SOX was hastily put together in response to several corporate scandals and that it imposes substantial costs on firms without producing equivalent benefits[10]. In relation to this, Zhang (2007) investigated the economic consequences of SOX by examining market reactions to related legislative events. Zhang found that U.S. firms experienced a statistically significant, negative cumulative abnormal return around key SOX events. Zhang attributes her results to significant net costs imposed on firms by the SOX. In addition, Engel, Hayes, and Wang (2007) documented that there is a statistically significant increase in the

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[9] By contrast, Collins, Maydew, and Weiss (CMW, 1997) and Francis and Schipper (FS, 1999) document that while the incremental value-relevance of earnings has declined, it has been replaced by increasing value-relevance of the net book value of the firm's assets per the balance sheet. However, Chang (1998) and Brown, Lo, and Lys (1999) raise concerns about the use of adjusted R^2 as a measure of value-relevance. Correcting for heteroscedasticity in Chang (1998) or scale effects in Brown, Lo, and Lys (1999) reverses the conclusions of CMW and FS on value relevance over time. Indeed, value relevance of financial information, as measured by the regression adjusted R^2, has decreased over the last four decades. In this study, we use White t-statistics based on heteroscedasticity-consistent standard errors whenever the heteroscedasticity problem (i.e., errors are not homoscedastic) arises in the regression analyses.

[10] Leuz (2007) reports that there is concern that the U.S. capital market is losing its leading position and competitiveness and that the regulatory burden of SOX is a driving force behind this development.

number of firms undertaking going-private transactions in the post-SOX period as compared to the pre-SOX period, and thus stated that SOX compliance costs are more burdensome for smaller and less liquid firms.

Dimitrov, Palia, and Tang (2015) examined the impact of the Dodd-Frank on corporate bond ratings issued by credit rating agencies (CRAs)[11]. They found that following the Dodd-Frank, CRAs issued lower ratings, more false warnings, and less informative downgrades[12]. These lower ratings can result in higher borrowing cost and cost of capital for affected firms. In addition, more false warnings that are disclosed in the financial statements of affected corporations will also lead to higher costs of their debts, because inaccurate information affects their disclosure quality. Sengupta (1998) documented that his sample firms show a negative correlation between interest cost and their disclosure quality.

Healy, Hutton, and Palepu (1999) demonstrated that firms with improved disclosure quality were associated with a significantly increased share price in the year following the disclosure-quality rating increase, compared to other firms in their same industry. Therefore, our second hypothesis, in its alternate form, is:

H2: There is a negative correlation between the SOX or Dodd-Frank regulations and firm-specific returns.

Cohen et al. (2008), Lobo and Zhou (2006), Li et al. (2006), and Carter et al. (2009) demonstrated that the reforms associated with the 2002s SOX have considerably altered the financial reporting environment in which managers operate, and documented an increase in accounting conservatism, a decrease in financial flexibility in financial reporting, and an ensuing decrease in opportunistic earnings management after the implementation of the SOX. In case of the Dodd-Frank, Section 748 includes complicated provisions to protect and subsidize "whistle-blowers" who report misconduct to the SEC (Coffee, 2012), which may reduce opportunistic earnings management on the part of corporate executives. Accordingly, this paper's third hypothesis, in its alternate form, is:

H3: The levels of opportunistic earnings management reflected in some fundamental signals decreased after regulation.

4. RESEARCH DESIGN AND SAMPLE SELECTION

4.1. Empirical models

Following Lev and Thiagarajan, we have also adopted two cross-sectional regressions to examine empirically the incremental value-relevance over earnings for the 12 fundamental signals[13]:

$$R_i = a + b_0 \Delta E_i + u_i \tag{2}$$

$$R_i = a + b_0 \Delta PTE_i + \sum b_j S_{ji} + v_i \tag{3}$$

Expression (2) is used as a benchmark against which expression (3) is evaluated. The effects of the SOX or the Dodd-Frank regulations on the value-relevance of fundamental signals are assessed using expression (4).

$$R_{it} = a + b_0 YDUM + c_0 \Delta PTE_i + c_1 \Delta PTE_i * YDUM + \sum\left(c_j S_{ji} + c_{j+1} S_j * YDUM\right) + \gamma_i \tag{4}$$

Where, i = 1, 2,… n, number of firms; R_i= either AMKTRET (annual market model excess return) or ANNMAR (annual market adjusted excess return), as described in Panel A of Table 2.

12 months excess stock return of firm i, where the return cumulation starts with the fourth month after the beginning of the fiscal year. The excess return is determined by subtracting the "market model" expected return from the realized return, as in the case of AMKTRET and the "CRSP Value-Weighted Index" as in the case of *ANNMAR*[14]; ΔE_i = the annual change in EPS (primary, excluding extraordinary items), deflated due to the beginning-of-year share price; ΔPTE_i = the annual change in pretax earnings times one minus last year's effective tax rate. This is the first component on the right side of expression (1); the second component is the tax signal. The sum of these two components is ΔE_i; S_{ji}= fundamental signals outlined in Panel A of Table 2 (j = 1,…, 12); and *YDUM* = a dummy year that takes 1 in the post-period and 0 in the pre-period.

4.2. Dependent variables

<u>*Annual Market-Model Excess Return (AMKTRET)*</u>

AMKTRET is the annual compounded market-model excess returns and is calculated as:

$$AMKTRET_t = \prod_{\tau=1}^{12}(MMRET_\tau + 1) - 1 \tag{5}$$

Where, *MMRET* = monthly market-model excess return; τ ranges from month 4 (τ = 1) of the current fiscal year to month 3 (τ = 12) of the next fiscal year. The "market model" α and β coefficients, used to derive the expected returns, were estimated using a value-weighted index from 36 monthly returns, ending with the sixth month of the preceding fiscal year. The minimum number of returns used for these firms was 26. The resulting monthly excess returns were compounded to obtain the AMKTRET for each fiscal year.

[11] Both of the following changes take effect immediately with the passage of Dodd-Frank on July 2010: first, Dodd-Frank increases the legal penalties for issuing inaccurate ratings by lessening the pleading standards for private actions against CRAs under Rule 10b-5 of the Securities and Exchange Act of 1934. Second, the law makes it easier for the SEC to impose sactions on CRAs and to bring claims against CRAs for material misstatements and fraud Dimitrov et al., 2015). The remaining provisions either have not been finalized as of the writing of the above paper or have been implemented very recently. In our paper, the post-Dodd-Frank period (2011-2013) is likely capture these effects in firm-specific returns.

[12] Coffee (2011) and Dimitrov et al. (2015) observe that the most significant provisions within Dodd-Frank are those that increase CRAs' liability for issuing erroneous ratings. The Securities and Exchange Commission (SEC) had effectively exempted CRAs from Section 11 of the Securities Act of 1933 in which an "expert (e.g., CRA)" whose opinion is cited in a registration statement used in connection with a public offering can be held liable for any stock price decline, unless it can prove that it was not negligent because the burden of proof is on the expert. Dissatisfied with the CRAs' performance, however, Congress ended this exemption in the Dodd-Frank Act of 2010.

[13] For the purpose of comparison, we use the same variables, except YDUM in expression (4), as the ones adopted by Lev and Thiagarajan (1993) in initial empirical tests.

[14] Lev and Thiagarajan use AMKTRET to gauge firm-specific loss (bad news) or gain (good news), whereas Ball et al. (2000) and Leone et al. (2006) use ANNMAR. These measures effectively control for changes in discount rates. In this paper, the term "firms' excess returns" and the term "firm-specific returns" are interchangeably used. When there is a significant industry effect, the two terms are different from each other.

Annual Market-Adjusted Return (ANNMAR)

ANNMAR is the annual compounded market-adjusted returns and is calculated as:

$$ANNMAR_t = \prod_{\tau=1}^{12}(MRET_\tau + 1) - 1 \quad (6)$$

Where, *MRET* = monthly CRSP raw return – value-weighted market index; τ ranges from month 4 (τ = 1) of the current fiscal year to month 3 (τ = 12) of the next fiscal year.

The resulting monthly excess returns were compounded to obtain the ANNMAR for each fiscal year.

4.3. The Fama-MacBeth regression model

We also estimate the regression equation (7) using the Fama-MacBeth (1973) procedure, which has the advantage of controlling for cross-sectional correlation in the residuals by assuming independence through time[15]. The presence of a positive, cross-sectional correlation in the residuals in the pooled regression would understate standard errors and overstate the t-statistics. Reported coefficients, adjusted R^2s, and a number of observations will be the means of the 15 annual regressions from 1999–2013. In addition, the standard errors will be the time-series standard deviations of the coefficients divided by the square root of 15. The t-statistics will be computed accordingly, as follows:

$$t(Y_j) = Y_j / (\frac{s(Y_j)}{\sqrt{n}}) \quad (7)$$

Where, Y_j = the mean coefficient of 15 annual cross-sectional regressions from 1999 through 2013 for variable j; $s(Y_j)$ = the time-series standard deviations of the 15 coefficients divided by the square root of 15; and n = the number of years tested.

4.4. Sample selection

The financial data is collected from the COMPUSTAT and CRSP monthly databases, and Table 1 describes the sample selection process. Financial and utilities firms are excluded as Cheng and Warfield (2005) and Burgstahler and Eames (2003) found that managers of these regulated industries have different motivations to manage earnings[16]. The same firms annually are used in this study for the sample period of 1999–2013, to examine the differential effects of regulations on the value-relevance of those twelve fundamental signals in the pre-regulation versus the post-regulation period[17]. This sample selection process has resulted in the final sample of 9,360 firm-years (624 firms x 15 years).

Panel A of Table 2 defines the variables used in the regression analyses, and Panel B of Table 2 shows the descriptive statistics in terms of each variable's mean, median, and standard deviation[18]. All the values of the dependent variables (AMKTRET and ANNMAR), except the median value (-0.076) of AMKTRET, are positive, and all earnings variables (ΔPTE, $\Delta EPSP$, and $\Delta EPSE$) are positive during the sample period. On average, INVSIG, RNDSIG, and OBSIG increased, whereas ARSIG, CESIG, GMSIG, XSGASIG, PDRSIG, ETSIG, and LABORSIG decreased during the sample period of 1999–2013. In addition, FIFO and the other inventory methods turned out to be the preferred methods of inventory costing, and more unqualified opinions were issued by external auditors during the sample period.

5. REGRESSION RESULTS

In Table 3, we empirically examine the incremental value-relevance over earnings of the 12 fundamental signals using yearly regressions, over the sample period of 1999–2013 and report regression results based on expressions (2) and (3) in Section 4. As in Lev and Thiagarajan, all but one of the yearly coefficients of the Gross Margin and S&A Expenses are negative. However, only 10(14) and 8(14) of the yearly coefficients of INVSIG and OBSIG, respectively, were negative during the 1999–2013 (the 1974–1988 period in Lev and Thiagarajan) sample period. Significance levels are based on one-tailed tests where there is a prediction of the coefficient's sign and based on two-tailed tests otherwise, similar to the treatment of significance levels in Lev and Thiagarajan and Leone et al. (2006). There is evidence of the incremental value-relevance of the earnings, and the 12 fundamental signals (adjusted R^2) over just earnings (benchmark-adjusted R2) in 11 years, including 1999–2001, 2003, 2005–2007, 2009, 2011–2013, whereas, in Lev and Thiagarajan, the evidence of the incremental value-relevance is shown in 11 years of 1975, 1977–1982, 1984–1985, 1987–1988. Based on the data in Table 3, Figure 1 graphically presents the values of the adjusted R^2 and the benchmark-adjusted R^2, over the sample period of 1999–2013, in both AMKTRET and ANNMAR as dependent variables of the yearly regressions.

White (1980) offered a general test for model misspecifications based on the null hypothesis that the errors are both homoscedastic and independent of regressors and that the linear specifications of the model is correct. Whenever there are violations of assumptions (equal to or less than the 10% significance level), in the results of regression tests in Tables 3–9, with respect to homoscedastic errors, independence between the errors and regressors, and the linear specifications of the model, White's heteroscedasticity-consistent t-statistics are used in determining the levels of significance. We also examine a possible multicollinearity problem using the variance inflation factor (VIF). Multicollinearity can be considered high and problematic when it exceeds 10 (Kutner et al., 2004; Judge et al., 1988). In the results of the regression tests in Tables 3–6, there are no signs of serious multicollinearity when variance inflation factors measure less than five (benchmark point). However, in the results of the

[15] Leone et al. (2006), among others, used the Fama-MacBeth procedure in their empirical analyses. Theil (1971, p. 160) discusses a theoretical aspect of correlated residuals (disturbances) in a panel data regression.

[16] Lev and Thiagarajan also exclude electrical utilities and finance companies from their sample.

[17] Lev and Thiagarajan (1993, p. 199) use all firms having data for all 12 fundamental signals, not the same firms each year, for their sample period of 1974-88 (roughly 140-180 firms per year). The effect of regulation is not a primary focus in their paper.

[18] As in prior research, we also delete the extreme 1% of each fundamental signal variable.

regression tests in Table 7–9, the only variable, YDUM, is a little higher than 5, and all other variables have less than 5 VIFs[19].

Table 4 shows empirical results based on pooled regressions and the Fama-MacBeth annual regressions. As in Leone et al. (2006), we estimate separate annual regressions following Fama and MacBeth (1973) to avoid standard errors due to cross-sectional dependence. Reported coefficients and adjusted R2 are the means of 15 annual cross-sectional regressions from 1999 to 2013. The standard errors are based on the time-series standard deviations of the coefficients divided by the square root of fifteen. The t-statistic of each coefficient is calculated by dividing the mean value of the coefficient by the standard error.

As expected, from the seminal work of Ball and Brown (1968), all coefficients of changes in pre-tax earnings (ΔPTE) are positively, significantly associated with the excess (firm-specific) returns in both the pooled and Fama-MacBeth regressions, under both dependent variables (AMKTRET and ANNMAR)[20]. Specifically, the coefficients are 0.116 (0.211) and 0.184 (0.181), both of which are significant at the 1%, or higher level, in the pooled and Fama-MacBeth regressions, respectively, in the case of AMKTRET (ANNMAR). In addition, the following fundamental signals are significant at least at the 10% level under the dependent variable of AMKTRET: INVSIG, ARSIG, CESIG, GMSIG, XSGASIG, OBSIG, LABORSIG, INVMSIG, and AUOPSIG (INVSIG, ARSIG, CESIG, GMSIG, and XSGASIG) in the pooled (Fama-MacBeth) regression. By comparison, the variables are INVSIG, ARSIG, CESIG, GMSIG, XSGASIG, and OBSIG in the "Across-Years Means" approach of LV[21]. In the case of ANNMAR, the fewer number of fundamental signals are significant at the level of 10% or higher, including INVSIG, CESIG, GMSIG, XSGASIG, OBSIG, LABORSIG, INVMSIG, and AUOPSIG (INVSIG, GMSIG, and XSGASIG) in the pooled (Fama-MacBeth) regression.

A direct comparison of adjusted R^2, a measure of value-relevance, between this study and Lev and Thiagarajan's is made in Table 5. Panel A (B) of Table 5 reveals strong evidence of the incremental value-relevance of the 12 fundamental signals in Lev and Thiagarajan's study (this study)[22]. The results of the direct comparison of adjusted R^2 (the benchmark-adjusted R^2) between Lev and Thiagarajan and this study are reported in Panels C (D) of Table 5. As expected, the mean and median values of adjusted R^2 for the period 1974–1988 (1999–2013) in Lev and Thiagarajan (this study) are respectively, 0.210 (0.085) and 0.180 (0.080), which are significant at the 1% level under both parametric and non-parametric tests. Accordingly, we conclude that the results of Panel C (D) of Table 5, along with the results of Tables 3 and 4 (the value-relevance of fewer number of fundamental signals in more recent years), support our first hypothesis that the value relevance of both earnings and analysts' signals (other financial information) have decreased over time.

The purpose of Table 6 is to show that the value-relevance of the 12 fundamental signals significantly changes from a pre-SOX (pre-Dodd-Frank) to a post-SOX (post-Dodd-Frank) period. To this end, we construct 3-year pre- and post-subperiods around each regulation. Panel A of Table 6 reveals significant incremental value-relevance of the 12 fundamental signals over earnings when AMKTRET is the dependent variable in the 3-year pooled regressions. However, when ANNMAR is used as the dependent variable in Panel B of Table 6, the incremental value-relevance of the 12 fundamental signals is demonstrated only in the post-SOX period (2003–2005) and the post-Dodd-Frank period (2011-2013).

One purpose of Table 7 is to examine the effect of the SOX on excess (firm-specific) returns of corporations. To this end, we use a dummy variable (YDUM) that takes 1 in the post period and 0 otherwise. The coefficients of YDUM in Table 7 are all negative and significant at the 1% level. Specifically, when AMKTRET (ANNMAR) is the dependent variable of the regressions, the coefficient of YDUM is -0.087 (-0.071).

Similar results appear in Table 8 where the effect of the Dodd-Frank on excess firm returns is assessed. The coefficient of YDUM under the dependent variable of AMKTRET (ANNMAR) is -0.094 (-0.099), which is significant at the 1% level.

In Table 9, we further investigate the effects of regulations on excess firm returns comparing a pre-SOX and Dodd-Frank subperiod (1999–2001) with a post-SOX and Dodd-Frank subperiod (2011–2013). As expected, the coefficients of the YDUM variable are -0.077 and -0.107 under AMKTRET and ANNMAR, respectively, which are statistically significant at the 1% level. We believe that the results of Tables 7–9 strongly support our second hypothesis that there is a negative correlation between the SOX or Dodd-Frank regulations and firm-specific returns.

Another purpose of Tables 7–9 is to examine whether the levels of opportunistic earnings management decreased after the SOX and Dodd-Frank regulations. Lev and Thiagarajan suggested two fundamental signals, ARSIG and OBSIG, as candidates for opportunistic earnings management (earnings manipulation). In both cases, they indicated that managers may engage in earnings manipulation by prematurely recording unrealized revenues as sales. Since prior research findings support lower levels of earnings manipulation, following the SOX and Dodd-Frank regulations (Section 3), we expect significant, positive coefficients for ARSIG and OBSIG after each regulation. Even more positively significant coefficients for these two signal variables are likely to be revealed in the post-SOX and Dodd-Frank period when compared to the pre-SOX period, due to the dual impact of the SOX and Dodd-Frank regulations. In fact, we find evidence of significant, positive coefficients for OBSIG*YDUM (0.115 at the 1% level) with the dependent variable of AMKTRET and ARSIG*YDUM (0.031 at the 10% level) and with the dependent variable of ANNMAR in Table 7, where the pre-SOX and post-SOX comparison is made. We also find evidence of significant, positive

[19] If the variance inflation factor of a predictor variable were 9 (√9 = 3), this means that the standard error for the coefficient of that predictor variable is 3 times as large as it would be if that predictor variable were uncorrelated with the other predictor variables.

[20] Ball and Brown (1968) started a tradition of empirical capital markets research in accounting that continues to this day and were the first to demonstrate convincing empirical evidence that there is a significant, positive correlation between the change in earnings (unexpected earnings) and excess returns (firm-specific returns).

[21] The "Across-Years Means" approach is similar to the "Fama-MacBeth" approach in that both take the mean value of coefficients of yearly regressions.

[22] Among others, Lev and Thiagarajan, Collins, Maydew, and Weiss (1997), Francis and Schipper (1999) use adjusted R^2 as a measure of value-relevance of financial information.

coefficients for ARSIG*YDUM (0.129 at the 1% level) with the dependent variable of AMKTRET and with the dependent variable of AMKTRET in Table 8, where the pre- and post-Dodd-Frank comparison is made. More importantly, and as expected from prior discussion, we find strong evidence of significant, positive coefficients for ARSIG*YDUM (0.055 at the 1% level) and OBSIG*YDUM (0.047 at the 5% level) with the dependent variable of AMKTRET and ARSIG*YDUM (0.037 at the 5% level), and OBSIG*YDUM (0.053 at the 5% level) with the dependent variable of ANNMAR in Table 9, where the pre- and post-SOX and Dodd-Frank comparisons are made. Therefore, we conclude that the levels of opportunistic earnings management reflected in ARSIG and OBSIG decreased after regulation.

6. SENSITIVITY TESTS AND ALTERNATIVE SPECIFICATIONS

6.1. Annual Raw Returns (ANNMRR) replaces Annual Market-Adjusted Returns (ANNMAR)

We replace ANNMAR with ANNMRR to see whether this garbled measure of firm-specific returns generates the same results. As expected, the dummy variable (YDUM) is no longer significant in the regression analyses. This is because ANNMAR includes the effects of general market conditions and, therefore, cannot reflect accurately firm-specific responses to firm-specific financial information or changes in regulations.

6.2. Extreme values

For all regression analyses in this study, we use several methods of truncation: deletions of observations outside mean ± 3 std, mean ± 4 std, and mean ± 5 std; deletion of extreme 1% of variable distributions; and deletion of extreme 2% of variable distributions. The results presented in Tables 3–9 are robust in terms of such alternative treatments.

7. CONCLUDING REMARKS

Using the financial analysts' fundamental signals, as identified in Lev and Thiagarajan, along with unexpected earnings data, we posit and document that the value-relevance of both earnings and other financial information contained in those signals have decreased, and the levels of earnings manipulation reflected in some fundamental signal variables have decreased after such financial regulations as the SOX and Dodd-Frank. These results are consistent with the views that financial statement information is of limited use in the valuation of firms in this digital era, and financial regulations have altered the financial reporting environment that results in a decrease in financial flexibility in financial reporting, and an ensuing decrease in opportunistic earnings management. In addition, we also demonstrate as predicted by prior research, such regulations negatively affect firm-specific returns of corporations, which supports the claim that significant net costs were imposed on firms by these financial regulations.

These findings are based on a set of the heteroscedasticity-corrected regressions, and the firm-year observations that exclude the 1% extreme values of the fundamental signals. The results of this article can be useful to financial-market regulatory agencies in understanding the effects of comprehensive financial regulations, such as the SOX and Dodd-Frank, on firm-specific returns (firm well-being), on the value-relevance of the analysts' fundamental signals and earnings, and for the financial analysts assessing the effectiveness of their fundamental signals in security valuation. It can also be useful for other stakeholders including investors, creditors, managers, academics, etc. in evaluating the role of financial analysts determining the values of corporate securities and the capacity of the afore-mentioned regulations in reducing earnings manipulation.

As we find limitations and opportunities for future research in most other empirical studies, this manuscript also has the following limitations and suggestions for further research: 1) Things have changed over the past 20 years since Lev and Thiagarajan (1993) focused on the 12 fundamental signals that analysts often use in security valuation. It might be worthwhile to provide some evidence, through some survey results, on whether these signals remain important; 2) Value-Relevance literature uses more than R-squared to assess value-relevance. It might be helpful to also explore other measures of value-relevance to help increase the robustness of the inferences.

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Appendix

Table 1. Sample selection

	Observations
Total number of firm-year observations from 1997-2014 with COMPUSTAT data	228,492
Less: financial and utilities firm-year observations and missing values for variables	(95,737)
used in the regressions	132,755
Less: loss of observations in computing variables that use past two-year average data and in	(101,285)
selecting the same firms across the period from 1999-2013	31,470
Less: loss of observations in computing annual market-adjusted returns (ANNMAR) from	(12,705)
CRSP data	18,765
Less: loss of observations in computing market-model based	
annual abnormal returns (AMKTRET) from CRSP data	(9,405)
Final sample (624 firms x 15 years)	9,360

Table 2. Variable definitions and descriptive statistics (Part 1)

Panel A. *Variable definitions based on Lev and Thiagarajan, 1993*	
AMKTRET	the "market model" α and β coefficients used to derive the expected returns were estimated using a value-weighted index from 36 monthly returns ending with the sixth month of the preceding fiscal year. The minimum number of returns used for these firms was 26. The resulting monthly excess returns were compounded to obtain the annual market return (*AMKTRET*) for each fiscal year;
ANNMAR	the difference between Monthly Raw Return and Monthly Market Return (the CRSP value-weighted index) is called the market-adjusted monthly return. These resulting market-adjusted excess returns were compounded to obtain the annual market-adjusted return (*ANNMAR*) for each fiscal year;
ANNMRR	Monthly Raw Returns were compounded to obtain the annual raw return (*ANNMRR*) for each fiscal year;
ΔPTE	the annual change in pretax earnings times one minus last year's effective tax rate;
$\Delta EPSP$	the annual change in EPS (primary, excluding extraordinary items), deflated by beginning-of-year share price, $(EPS_t - EPS_{t-1})/P_{t-1}$;
$\Delta EPSE$	the annual change in EPS (primary, excluding extraordinary items), deflated by the absolute value of beginning-of-year EPS, $(EPS_t - EPS_{t-1}) / \lvert EPS_{t-1} \rvert$
12 fundamental signals	
INVSIG (inventory signal)	ΔInventory (either INVT or INVFG) – ΔSales(Sale);
ARSIG (accounts receivable signal)	ΔAccounts Receivable (RECT) – ΔSales;
CESIG (capital expenditures signal)	ΔIndustry Capital Expenditures (CAPXV) – ΔFirm Capital Expenditures;
R&DSIG (research and development expenditures signal)	ΔIndustry R&D (XRD) – ΔFirm Capital Expenditures;
GMSIG (gross margin signal)	ΔSales – ΔGross Margin, where Gross Margin = Sales (Sale) – Cost of Goods Sold (COGS);
XSGASIG (sales and administrative expenses signal)	ΔS&A(XSGA) – ΔSales;
PDRSIG (provision for doubtful receivables signal)	ΔGross Receivables (RECT + RECD) – ΔDoubtful Receivables (RECD);
ETSIG (effective tax signal)	PTE_t $(T_{t-1} - T_t)$ where PTE_t = pretax earnings(PI) at t, deflated by beginning price, and T = effective tax rate = TXFED/(IB + TXFED + MII - XIDO - EIEA), where TXFED = Income Taxes –Federal, IB = Income before extraordinary Items, MII = Minority Interest, XIDO = Extraordinary Items & Discontinued Operations, EIEA = Equity in Earnings;
OBSIG (order backlog signal)	ΔSales – ΔOrder Backlog(OB);
LABORSIG (labour force signal)	$[Sales_{t-1} \div No.of\ Employees_{t-1} - Sales_t \div No.of\ Employees_t]/(Sales_{t-1} \div No.of\ Employees_{t-1})$, where *No. of Employees* = EMP;
INVMSIG (LIFO earnings)	0 for LIFO and 1 for FIFO or other inventory methods;
AUOPSIG (audit qualification)	1 for qualified and 0 for unqualified where AUOP = 1 for unqualified and 2 for qualified.

Table 2. Variable definitions and descriptive statistics (Part 2)

Panel B. *Descriptive statistics for 1999-2013*			
Variables	***Mean***	***Median***	***Std.Dev.***
Dependent variables			
AMKTRET	0.019	-0.076	0.662
ANNMAR	0.121	0.022	0.634
Earnings variables			
ΔPTE	4.433	0.360	130.983
$\Delta EPSP$	0.023	0.000	0.381
$\Delta EPSE$	0.201	0.090	8.629
Signal variables (S)			
INVSIG	0.017	-0.012	0.550
ARSIG	-0.030	-0.014	0.570
CESIG	-0.127	0.012	0.965
RNDSIG	0.152	0.043	2.111
GMSIG	-0.024	-0.001	0.629
XSGASIG	-0.040	-0.004	0.388
PDRSIG	-2.652	0.150	34.348
ETSIG	-0.149	0.000	9.509
OBSIG	0.670	0.999	1.222
LABORSIG	-0.123	-0.037	1.502
INVMSIG	0.755	1.000	0.430
AUOPSIG	0.376	0.000	0.484

Note: As in prior research, we also delete the extreme 1% of each fundamental signal because there are some extreme values of the fundamental signals, mainly due to small denominators in the percentage change computation.

Table 3. Value-relevance of fundamental signals yearly analysis (Part 1)
AMKTRET (dependent variable)

$$R_{it} = a + b_0 \Delta PTE_i + \Sigma b_j S_{ji} + V_i$$

	1999	***2000***	***2001***	***2002***	***2003***	***2004***	***2005***	***2006***
Intercept	-0.083	-0.087**	-0.044	-0.002	-0.084**	-0.039	0.169**	-0.026
ΔPTE	0.591***	0.131***	0.236***	0.126**	0.044	0.001	0.245***	0.286**
INVSIG	-0.123***	-0.042	-0.050	-0.115*	-0.150**	-0.094***	-0.047	0.047
ARSIG	-0.008	0.103**	0.047	-0.067	-0.064	0.013	0.011	-0.048
CESIG	-0.131***	-0.183***	-0.016	-0.296***	0.017	-0.001	-0.127**	-0.088*
R&DSIG	-0.048*	-0.117***	0.208***	0.070*	-0.123*	0.045*	0.142***	-0.012
GMSIG	-0.201***	-0.051	-0.300***	-0.138*	-0.521***	0.011	-0.573***	-0.413***
XSGASIG	0.017	0.170***	-0.166***	-0.040	-0.139***	-0.013	-0.192***	-0.199***
PDRSIG	0.010	0.210	0.066	0.103	0.157	-0.041	-1.199***	0.092
ETSIG	-0.065	-0.110**	0.099	0.018	-0.076	-0.006	-0.080	-0.036
OBSIG	0.053	-0.088***	-0.132**	0.025	0.049*	0.007	0.129	-0.035
LABORSIG	0.387	-0.073**	-0.033	-0.088*	0.004	-0.167***	-0.201***	-0.039
INVMSIG	0.066***	0.101***	-0.062**	-0.081***	-0.023	-0.040**	-0.084***	-0.044*
AUOPSIG	-0.022	0.020	-0.006	0.004	-0.016	-0.008	0.035	0.046*
Adj R^2	0.098	0.197	0.101	0.041	0.057	0.037	0.147	0.066
Benchmark[a]	0.001	0.038	0.024	0.007	-0.001	0.078	0.010	0.018
Partial F	4.97***	7.04***	2.57***	1.33	2.15**	1.87**	5.61***	3.45***
White's Heteroskedasticity test								
Chi-square	99.11	109.40	122.38	88.66	88.74	88.48	122.22	96.97
(p-value)	(0.56)	(0.29)	(0.09)*	(0.82)	(0.84)	(0.85)	(0.10)*	(0.65)
F-Value	5.58***	11.19***	5.78***	2.74***	3.51***	2.64***	8.41***	3.91***
The highest	LABORSIG	LABORSIG	LABORSIG	XSGASIG	LABORSIG	XSGARSIG	OBSIG	LABORSIG
VIF	1.20	1.25	1.37	1.18	1.14	1.18	1.10	1.16

Table 3. Value-relevance of fundamental signals yearly analysis (Part 2)
AMKTRET (dependent variable)

$$R_{it} = a + b_0\Delta PTE_i + \Sigma b_j S_{ji} + V_i$$

	2007	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**
Intercept	0.032	-0.002	-0.030	-0.073***	0.035	-0.086	-0.038
ΔPTE	0.275***	0.051	0.506***	0.023	0.156*	-0.090	0.183**
INVSIG	-0.112**	0.053*	0.006	0.001	-0.046	0.048	-0.019
ARSIG	-0.141**	-0.058*	-0.201***	-0.222***	0.181***	0.007	-0.057*
CESIG	0.178***	-0.084**	0.056	0.006	-0.006	-0.027	0.052
R&DSIG	-0.021	0.042	-0.056	-0.063	0.053	-0.043	0.173**
GMSIG	-0.428***	-0.416***	-0.047	-0.288***	-0.535***	-0.412***	-0.229***
XSGASIG	-0.060	-0.127***	-0.027	-0.030	-0.135***	-0.366***	-0.168***
PDRSIG	0.058	-0.493**	0.587**	0.320*	0.019	0.009	0.110
ETSIG	0.112	0.016	-0.016	0.009	0.079	0.001	0.035
OBSIG	0.019	-0.011	-0.034	-0.045**	-0.041	0.120*	-0.006
LABORSIG	-0.067	-0.157***	-0.382***	-0.046	-0.194***	1.685*	0.061
INVMSIG	-0.065**	0.022	0.022	0.013	-0.005	-0.024	-0.031
AUOPSIG	0.052*	0.069***	0.028	-0.029*	-0.038	-0.050*	0.046*
Adj R^2	0.107	0.114	0.050	0.049	0.080	0.086	0.046
Benchmark[a]	0.028	0.013	-0.001	0.073	0.008	-0.001	0.017
Partial F	1.96**	1.25	4.33***	1.73*	4.23***	4.76***	2.44***
White's Heteroskedasticity test							
Chi-square	93.76	91.55	88.83	88.35	105.20	122.50	94.34
(p-value)	(0.73)	(0.76)	(0.84)	(0.86)	(0.42)	(0.09)*	(0.72)
F-Value	6.10***	6.59***	3.26***	3.20***	4.77***	5.07***	3.05***
The highest	PDRSIG	LABORSIG	LABORSIG	LABORSIG	XSGASIG	XSGASIG	GMSIG
VIF	1.25	1.24	1.49	1.44	1.29	1.61	1.24

*Note: All variables are defined in Panel A of Table 2. *, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively, on a one-tailed test for coefficients with sign predictions and on a two-tailed test for those without sign predictions. White's (1980) heteroskedasticity tests for violations of assumptions of homoskedastic errors, independence between the errors and regressors, and the linear specification of the model. Whenever any violation occurs, White t-statistics replace Student's t-statistics.*

Table 4. Value-relevance of fundamental signals (across-years over 1999-2013)

$$R_{it} = a + b_0\Delta PTE_i + \Sigma b_j S_{ji} + V_i$$

	AMKTRET		***ANNMAR***	
	Pooled	***Fama-MacBeth***	***Pooled***	***Fama-MacBeth***
Intercept	-0.038***	-0.028*	-0.039***	-0.025**
ΔPTE	0.116***	0.184***	0.211***	0.181***
INVSIG	-0.037***	-0.043**	-0.047***	-0.056***
ARSIG	-0.043***	-0.040*	0.008	-0.003
CESIG	-0.019*	-0.043*	0.019*	0.004
R&DSIG	0.013	0.017	-0.001	-0.057
GMSIG	-0.268***	-0.303***	-0.235***	-0.315***
XSGASIG	-0.089***	-0.121***	-0.052***	-0.093***
PDRSIG	-0.025	0.001	0.025	0.094
ETSIG	0.016	-0.002	-0.004	-0.013
OBSIG	-0.018*	0.001	-0.028**	-0.032
LABORSIG	-0.137***	0.046	-0.133**	-0.046
INVMSIG	-0.014**	-0.016	-0.010*	-0.016
AUOPSIG	0.020***	0.009	-0.018***	-0.007
Adj R^2	0.037	0.085	0.032	0.077
Benchmark[a]	0.004	0.020	0.021	0.037
Partial F	12.23***	2.83***	6.51***	1.38*
White's Heteroskedasticity test				
Chi-square	215.60		172.97	
(p-value)	(0.00)***		(0.00)***	
F-Value	26.62***		22.52***	
The highest	LABORSIG		LABORSIG	
VIF	1.12		1.12	

*Note: All variables are defined in Panel A of Table 2. *, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively, on a one-tailed test for coefficients with sign predictions and on a two-tailed test for those without sign predictions. White's (1980) heteroskedasticity tests for violations of assumptions of homoskedastic errors, independence between the errors and regressors, and the linear specification of the model. Whenever any violation occurs, White t-statistics replace Student's t-statistics.*

Table 5. The comparison of Adjusted R^2 between Lev and Thiagarajan (LT, 1993) and this study 15 years (1974-1988 vs. 1999-2013)

	Adjusted R^2			***Adjusted R^2 Benchmark***			***Wilcoxon Student***	
	Mean	***Median***	***STD***	***Mean***	***Median***	***STD***	***Z***	***t***
Panel A: LT	0.210	0.180	0.080	0.135	0.140	0.051	2.66***	3.10***
Panel B: this study	0.085	0.080	0.044	0.021	0.013	0.025	4.03***	4.89***
	LT			***This study***			***Wilcoxon Student***	
Panel C: Adjusted R^2	0.210	0.180	0.080	0.085	0.080	0.044	4.15***	5.32***
Panel D: Adjusted R^2 Benchmark	0.135	0.140	0.051	0.021	0.013	0.025	4.48***	7.84***

*Note: All variables are defined in Panel A of Table 2. *, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively, on a one-tailed test for coefficients with sign predictions and on a two-tailed test for those without sign predictions.*

Table 6. Value-relevance of fundamental signals over subperiods around SOX and Dodd-Frank regulations: Pooled regressions (Panel A)

$$R_{it} = a + b_0\Delta PTE_i + \Sigma b_j S_{ji} + V_i$$

R_{it} = *AMKTRET*	***Pre-SOX (1999-2001)***	***Post-SOX (2003-2005)***	***Pre-Dodd-Frank[23] (2007-2009)***	***Post-Dodd-Frank (2011-2013)***
Intercept	-0.053***	-0.011	-0.043**	-0.006
ΔPTE	0.264***	0.146***	0.332***	0.109**
INVSIG	-0.019	-0.063**	-0.024	-0.009
ARSIG	-0.047*	-0.025	-0.111***	0.054**
CESIG	-0.103***	-0.044*	0.033*	0.012
R&DSIG	0.007	0.048*	-0.021	0.122
GMSIG	-0.148***	-0.255**	-0.548***	-0.386***
XSGASIG	-0.126***	-0.087***	-0.066**	-0.207***
PDRSIG	0.034	0.019	0.044	0.017
ETSIG	-0.011	0.004	0.005	0.047
OBSIG	-0.071***	0.047*	-0.035	0.006
LABORSIG	0.040	-0.107***	-0.073*	0.061
INVMSIG	0.036***	-0.048***	0.004	-0.027*
AUOPSIG	0.038***	-0.017	0.003	-0.019
Adj R^2	0.067	0.058	0.054	0.051
Benchmark[a]	0.014	0.007	0.002	0.005
Partial F	6.04***	5.35***	6.22***	6.85***
White's Heteroskedasticity test				
Chi-square	114.96	141.83	113.16	124.91
(p-value)	(0.18)	(0.01)***	(0.23)	(0.08)*
F-Value	10.27***	8.99***	8.59***	8.03***
The highest	XSGASIG	LABORSIG	LABORSIG	XSGASIG
VIF	1.13	1.11	1.26	1.28

*Note: *, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively, on a one-tailed test for coefficients with sign predictions and on a two-tailed test for those without sign predictions. White's (1980) heteroskedasticity tests for violations of assumptions of homoskedastic errors, independence between the errors and regressors, and the linear specification of the model. Whenever any violation occurs, White t-statistics replace Student's t-statistics.*

Table 6. Value-relevance of fundamental signals over subperiods around SOX and Dodd-Frank regulations: Pooled regressions (Panel B)

$$R_{it} = a + b_0\Delta PTE_i + \Sigma b_j S_{ji} + V_i$$

R_{it} = *ANNMAR*	***Pre-SOX (1999-2001)***	***Post-SOX (2003-2005)***	***Pre-Dodd-Frank[24] (2007-2009)***	***Post-Dodd-Frank (2011-2013)***
Intercept	-0.060***	-0.023	-0.047**	0.001
ΔPTE	0.180***	0.134**	0.163*	0.224***
INVSIG	-0.045**	-0.092***	-0.047*	-0.053**
ARSIG	-0.007	0.022	0.034	0.032
CESIG	0.009	0.037	0.077***	-0.001
R&DSIG	-0.041**	0.076***	-0.004	-0.190
GMSIG	-0.077**	-0.419***	-0.295***	-0.440***
XSGASIG	-0.042**	-0.070**	-0.060**	-0.090**
PDRSIG	0.001	-0.128	-0.091	0.092**
ETSIG	-0.011	-0.019	0.013	0.021
OBSIG	-0.058***	-0.130***	-0.029	0.005
LABORSIG	-0.029	-0.093**	-0.012	0.057
INVMSIG	0.035***	0.003	-0.013	-0.022
AUOPSIG	-0.008	0.041**	-0.060***	-0.023
Adj R^2	0.027	0.058	0.021	0.061
Benchmark[a]	0.034	0.053	0.032	0.021
Partial F	3.04***	2.46***	3.06***	4.86***
White's Heteroskedasticity test				
Chi-square	117.44	142.84	125.26	138.66
(p-value)	(0.16)	(0.01)***	(0.06)*	(0.02)**
F-Value	4.49***	8.93***	3.71***	9.38***
The highest	XSGASIG	LABORSIG	LABORSIG	XSGASIG
VIF	1.13	1.11	1.26	1.32

*Note: All variables are defined in Panel A of Table 2. *, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively, on a one-tailed test for coefficients with sign predictions and on a two-tailed test for those without sign predictions. White's (1980) heteroskedasticity tests for violations of assumptions of homoskedastic errors, independence between the errors and regressors, and the linear specification of the model. Whenever any violation occurs, White t-statistics replace Student's t-statistics.*

[23] The Pre-Dodd-Frank period in this study completely overlaps with the global financial crisis period (GFC).
[24] The Pre-Dodd-Frank period in this study completely overlaps with the global financial crisis period (GFC).

Table 7. Pre-SOX and Post-Sox comparison (1999-2001 vs. 2003-2005)

$$R_{it} = a + b_0 YDUM + c_0 \Delta PTE_i + c_1 \Delta PTE_i * YDUM + \Sigma\left(c_j S_{ji} + c_{j+1} S_j * YDUM\right) + \gamma_i$$

	AMKTRET	***ANNMAR***
Intercept	-0.030**	-0.048***
YDUM	-0.087***	-0.071***
ΔPTE	0.253***	0.178***
$\Delta PTE * YDUM$	-0.131**	-0.102**
INVSIG	-0.065**	-0.043*
INVSIG*YDUM	0.028	-0.019
ARSIG	-0.068*	-0.015
ARSIG*YDUM	0.008	0.031*
CESIG	-0.092***	0.015
CESIG*YDUM	0.035*	0.016
R&DSIG	0.006	-0.047**
R&DSIG*YDUM	0.003	0.059***
GMSIG	-0.224***	-0.124**
GMSIG*YDUM	-0.061	-0.126**
XSGASIG	-0.115***	-0.040**
XSGASIG*YDUM	-0.007	-0.020
PDRSIG	-0.019	-0.037
PDRSIG*YDUM	-0.021	0.059
ETSIG	-0.035	0.018
ETSIG*YDUM	0.018	-0.031
OBSIG	-0.098***	-0.044*
OBSIG*YDUM	0.115***	-0.030
LABORSIG	0.028	-0.029
LABORSIG*YDUM	-0.031*	-0.077***
INVMSIG	0.039***	0.037***
INVMSIG*YDUM	-0.084***	-0.037**
AUOPSIG	0.056**	-0.005
AUOPSIG*YDUM	-0.060***	0.031*
Adj R^2	0.088	0.045
White's Heteroskedasticity test		
Chi-square	361.12	338.86
(p-value)	(0.00) ***	(0.00)***
F-Value	12.76***	6.62***
The highest	YDUM	YDUM
VIF	5.29	5.27

*Note: YDUM = a year dummy that takes 1 in the post period and 0 in the pre-period. All variables are defined in Panel A of Table 2. *, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively, on a one-tailed test for coefficients with sign predictions and on a two-tailed test for those without sign predictions. White's (1980) heteroskedasticity tests for violations of assumptions of homoskedastic errors, independence between the errors and regressors, and the linear specification of the model. Whenever any violation occurs, White t-statistics replace Student's t-statistics.*

Table 8. Pre-Dodd-Frank and Post-Dodd-Frank comparison (2007-2009 vs. 2011-2013) (Part 1)

$$R_{it} = a + b_0 YDUM + c_0 \Delta PTE_i + c_1 \Delta PTE_i * YDUM + \Sigma\left(c_j S_{ji} + c_{j+1} S_j * YDUM\right) + \gamma_i$$

	AMKTRET	***ANNMAR***
Intercept	0.007	-0.016
YDUM	-0.094***	-0.099***
ΔPTE	0.306***	0.240***
$\Delta PTE * YDUM$	-0.057	0.076*
INVSIG	-0.032	-0.047
INVSIG*YDUM	0.010	-0.009
ARSIG	-0.186***	0.046
ARSIG*YDUM	0.129***	0.020
CESIG	0.022	0.081***
CESIG*YDUM	-0.001	-0.068**
R&DSIG	-0.019	-0.043**
R&DSIG*YDUM	0.116	-0.079
GMSIG	-0.642***	-0.331***
GMSIG*YDUM	0.143**	-0.009
XSGASIG	-0.075***	-0.055*
XSGASIG*YDUM	-0.053*	-0.008
PDRSIG	0.095	-0.022
PDRSIG*YDUM	-0.071	0.103
ETSIG	0.024	-0.001
ETSIG*YDUM	-0.018	0.006
OBSIG	-0.029	-0.035*
OBSIG*YDUM	0.021	0.039
LABORSIG	-0.089	-0.140
LABORSIG*YDUM	-0.734*	-0.178
INVMSIG	-0.010	-0.013
INVMSIG*YDUM	-0.009	0.003
AUOPSIG	0.010	-0.070***
AUOPSIG*YDUM	-0.015	0.015
Adj R^2	0.075	0.033

Table 8. Pre-Dodd-Frank and Post-Dodd-Frank comparison (2007-2009 vs. 2011-2013) (Part 2)

$$R_{it} = a + b_0 YDUM + c_0 \Delta PTE_i + c_1 \Delta PTE_i * YDUM + \Sigma\left(c_j S_{ji} + c_{j+1} S_j * YDUM\right) + \gamma_i$$

White's Heteroskedasticity test		
Chi-square	272.73	357.22
(p-value)	(0.03)**	(0.00)***
F-Value	10.89***	5.16***
The highest	YDUM	YDUM
VIF	7.22	7.28

*Note: YDUM = a year dummy that takes 1 in the post period and 0 in the pre-period. All variables are defined in Panel A of Table 2. *, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively, on a one-tailed test for coefficients with sign predictions and on a two-tailed test for those without sign predictions. White's (1980) heteroskedasticity tests for violations of assumptions of homoskedastic errors, independence between the errors and regressors, and the linear specification of the model. Whenever any violation occurs, White t-statistics replace Student's t-statistics.*

Table 9. Pre-SOX & Dodd-Frank and Post-SOX & Dodd-Frank comparison (1999-2001 vs. 2011-2013)

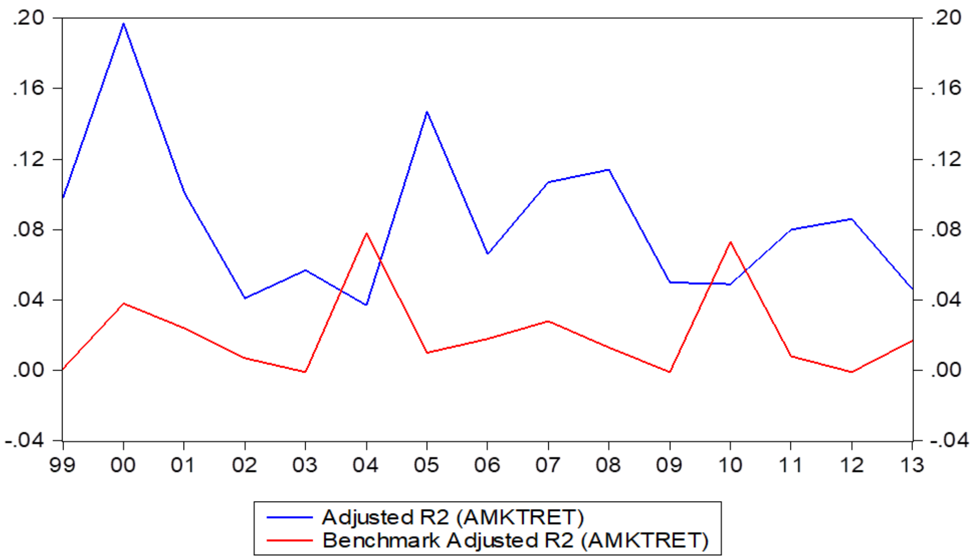
$$R_{it} = a + b_0 YDUM + c_0 \Delta PTE_i + c_1 \Delta PTE_i * YDUM + \Sigma\left(c_j S_{ji} + c_{j+1} S_j * YDUM\right) + \gamma_i$$

	AMKTRET	***ANNMAR***
Intercept	-0.029	-0.040***
YDUM	-0.077***	-0.107***
ΔPTE	0.290***	0.251***
$\Delta PTE * YDUM$	-0.241***	-0.140***
INVSIG	-0.064**	-0.044*
INVSIG*YDUM	0.027*	-0.002
ARSIG	-0.101***	-0.044*
ARSIG*YDUM	0.055***	0.037**
CESIG	-0.072***	0.012
CESIG*YDUM	0.057***	-0.004
R&DSIG	0.015	-0.034
R&DSIG*YDUM	0.046	-0.028
GMSIG	-0.161***	-0.100**
GMSIG*YDUM	-0.051	-0.075*
XSGASIG	-0.104***	-0.030*
XSGASIG*YDUM	-0.011	-0.004
PDRSIG	0.028	-0.016
PDRSIG*YDUM	-0.015	0.072**
ETSIG	0.035	-0.003
ETSIG*YDUM	-0.028	0.007
OBSIG	-0.066**	-0.060**
OBSIG*YDUM	0.047**	0.053**
LABORSIG	0.037	-0.067
LABORSIG*YDUM	-0.531**	-0.135
INVMSIG	0.031**	0.031**
INVMSIG*YDUM	-0.047**	-0.039**
AUOPSIG	0.040**	-0.002
AUOPSIG*YDUM	-0.032**	-0.005
Adj R^2	0.073	0.065
White's Heteroskedasticity test		
Chi-square	385.16	428.41
(p-value)	(0.00)***	(0.00)***
F-Value	10.55***	9.41***
The highest	YDUM	YDUM
VIF	5.51	5.49

*Note: YDUM = a year dummy that takes 1 in the post period and 0 in the pre-period. All variables are defined in Panel A of Table 2. *, **, *** indicate significance at the 10 percent, 5 percent, and 1 percent levels, respectively, on a one-tailed test for coefficients with sign predictions and on a two-tailed test for those without sign predictions. White's (1980) heteroskedasticity tests for violations of assumptions of homoskedastic errors, independence between the errors and regressors, and the linear specification of the model. Whenever any violation occurs, White t-statistics replace Student's t-statistics.*

Figure 1. Adjusted R^2 and Benchmark Adjusted R^2 from regression analyses (1999-2013)

Panel A: AMKTRET (dependent variable)



Panel B: ANNMAR (dependent variable)