**Real Activities Manipulation and Firm Valuation**

**Abstract**

In this paper, we study the link between real earnings management and firm value. Consistent with prior studies, we expect the ability of a firm to generate future cash flows to be significantly impaired by its use of real activities manipulations. Using a cross-section of companies from the Standard & Poor's Compustat database from 1990 to 2013, we find that firms with higher real earnings management are associated with lower industry-adjusted Tobin's Q and firm-specific misvaluation measure. Our results are consistent under several regression techniques addressing potential endogeneity issues and alternative proxies for real earnings management after controlling for known factors to affect firm market values.

JEL Classification: G14; G32

Keywords: Earnings Management; Real Activities Manipulation; Real Earnings Management; Mispricing

**Introduction**

Prior studies suggest that firms with overvalued equity engage in a variety of actions to sustain the overvaluation; among which is earnings manipulations (see Jensen 2005). However, the ways in which these firms manage earnings have received relatively little attention in the academic literature. Therefore, such a study is timely to establish the extent to which companies with overvalued equity manipulate earnings. We examine these and related issues in the paper.

Dechow, Sloan and Sweeney (1996) study the consequences of earnings manipulation in a sample of firms subject to accounting enforcement actions by the Securities and Exchange Commission (SEC). Consistent with Feroz, Park and Pastena (1991), they find a significant drop in the manipulating firms' stock prices at the announcement of the earnings manipulation. Marciukaityte and Varma (2008) find that firms that restate their earnings downwards (consistent with prior years' earnings management) are associated with abnormally lower returns surrounding the restatement announcements and exhibit unusually high valuations in the previous years.

Many firms admit to prior earnings manipulation by restating earnings downward, although we can identify certain companies that manipulate earnings but never have to restate earnings subsequently. These firms operate under the radar and do not necessarily encounter the same negative reactions from investors as companies that are found liable for earnings management do. Studies based on samples of earnings-decreasing restatements or enforcement actions by the SEC tend to favor the inclusion of the most prominent cases of earnings manipulation (Dechow et al. 1996) and, consequently, overlook other undetected manipulators. In this paper, we examine an enlarged dataset, which includes firms that do not restate earnings but are nonetheless engaged in earnings management.

Earnings restatements could be due to several earnings management techniques, but not all of them inhibit a firm's operations and performance in a similar manner. Earnings management techniques generally fall into two categories, accruals-based (AM) and real activities manipulation (RM); although their effects on business operations tend to differ. AM hardly affects a firm’s operations and its effects are reversed over time. Under this method of earnings management, managers try to inflate reported earnings figures by merely changing accounting methods. For instance, a change in the depreciation method or inventory valuation method can provide an artificial boost to reported earnings.

Conversely, the effects on business operations of RM are more significant. They can take various forms including – but not limited to – overproduction and high inventory costs (which are then subtracted from the current year’s costs and are carried forward), and reductions in discretionary expenditures like research and development (R&D) and selling, general and administrative (SG&A) expenses. Investing less in R&D will adversely affect the firm’s competitive position in its industry. Real activities manipulations tend to lead to abnormally high levels of production costs and low levels of discretionary expenses. When compared to accruals management, they more severely impede a firm's ability to generate future cash flows (Cohen, Dey and Lys 2008b; Cohen and Zarowin 2010; Graham, Harvey and Rajgopal 2005; Roychowdhury 2006; Zang 2012).

Besides, changes in the regulatory environment are forcing managers to trade between the two methods. Following the Sarbanes-Oxley Act (SOX) of 2002, managers favor real activities manipulations over discretionary accruals since they are construed as business decisions and are harder to challenge (Cohen et al. 2008b). Francis, Hasan and Li (2016) find that, post-SOX, a firm’s deviation in real operations from industry norms has greater predictive power for crash risk in stock prices than discretionary accruals has. Zang (2012) argues that managers tend to trade-off between the two methods based on their relative costs and benefits. Managers favor real activities manipulations during the year by altering operations, finances, and investments. They adjust accruals at year-end based on the outcomes of real activities manipulations used during the year. Thus, the two methods are not perfect substitutes, and the findings based on accruals management cannot be generalized to real activities manipulations.

To assess the true effect of earnings manipulation on firm value, we consider real activities manipulations (RM) instead of discretionary accruals (AM) for the following reasons. First, there are several studies already published on the effects of accruals management on firm value, in particular Chi and Gupta (2009), which we review in the following section. Second, accruals management is subject to diverse interpretations including inference of a firm's business strength. Unlike real activities manipulations, high accruals are not always symptomatic of earnings management. Growing businesses tend to accrue many expenses while they use scarce cash to finance growth. Once they reach their potential, they repay the accrued expenses.

Along these lines, Subramanyam (1996) documents a positive relationship between abnormal accruals and stock returns as high accrual signals that the business prospects and growth potential are strong. Demski (1998) argues that high accruals signal managers’ expertise and greater future returns. While Louis and Robinson (2005) claim that a higher level of accruals before a stock split is a sign of managerial optimism, which is further reinforced by the stock split, Xu and Lacina (2009) suggest that lower-accrual firms tend to experience lower future returns as opposed to higher accrual firms since they are perceived as less risky businesses. Kim and Qi (2010) find that firms with high accruals are more sensitive to macroeconomic shocks than firms with low accruals are.

Third, the ever-tightening of regulations, particularly following the passage of Sarbanes-Oxley Act of 2002 (SOX), makes it harder to achieve accruals management (Ewert and Wagenhofer 2005). Cohen et al. (2008b) find a significant decline in accrual-based earnings management following the passage of SOX and a significant increase in real earnings management post-SOX. Fourth, Gunny (2010) cites a number of reasons as to why managers may want to engage in RM versus using accruals management. She explains how SEC scrutiny and class-action litigations dissuade managers from engaging in accruals management, which is easily recognized as an earnings manipulation technique. Firms cannot engage in accruals manipulation over the long term and past actions constrain managers' ability to manage accruals (Barton and Simko 2002). Similar to Zang (2012), Gunny (2010) argues that decisions on accruals management are taken at year-end and many managers would rather engage in activities to inflate earnings during the year. AM involves accounting choices that are subject to auditors' scrutiny while the deliberate business decisions taken to alter operations as a way to inflate short-term earnings under RM are not subject to the same scrutiny. A survey of practitioners by Graham et al. (2005) attests to the common practice of managers to engage in RM as long as it is within GAAP and helps to deliver earnings on paper. We examine the effects of real activities manipulations on share value.

Our paper contributes to the literature on earnings management. By considering all the firms from the COMPUSTAT database, we limit the risk of excluding companies that were managing earnings but were omitted from the samples of prior studies, which tend to be event- or context-specific, i.e. based on enforcement actions by regulators and/or earnings restatements and/or meeting analyst forecasts, among others. Our study design differs from prior ones in that, instead of relying on an event, it tracks the performance of the firms over time. Thus, we provide both a cross-section and time dimensions on the impact of RM on firm value. In that context, it would be noteworthy to see if a manipulating company that has survived the whole sample period (which extends over 23 years) can consistently mislead investors and continues to be associated with overvalued shares. Such designs are important since they tend to yield different results. For instance, Bhattacharya, Daouk and Welker (2003) analyze financial statements from 34 countries for the period 1984-1998 to construct a panel dataset and derive a time-series measure of earnings opacity per country. They find that an increase in overall earnings opacity in a country is linked to an increase in the cost of equity.

One significant feature of the related studies that we review in the following section and some of the aforementioned ones is that they analyze earnings management in a given context or in anticipation of an event (e.g., to meet earnings forecasts, issue shares (Nagata and Hachiya 2007), stock swap transactions, exercise stock-based options, IPO lockup (Liao, Huang and Liu 2015) etc.). As such, McNichols (2001) argues that researchers aim to identify contexts where the incentives to manage earnings are of interest. Our approach is to examine the link between earnings management and firm valuation regardless of the context. We minimize the likelihood of omitting managers who manipulate earnings but were excluded from prior samples, i.e. managers who manage earnings routinely without contemplating an event of the type covered above.

Our sample comprises 9,987 firms from 1990-2013 from the Standard & Poor's Compustat database. We measure mispricing in the shares of these firms using firstly an adjusted Tobin's Q measure following Marciukaityte and Varma (2008) and secondly Rhodes-Kropf, Robinson, and Viswanathan's (2005) measure of firm-specific price-to-book ratio. Following Roychowdhury (2006) and Zang (2012), we use abnormal production costs and abnormal discretionary expenditure to proxy for real activities manipulation. In the univariate test, we find that low-valuation firms are associated with abnormally high production costs and abnormally low discretionary expenditure. Similarly, total real earnings management is greater in low-valuation firms compared to highly valued ones. In multiple regressions, we find that the coefficients of each of the real earnings management variables are negative and highly significant. We find that both industry-adjusted Tobin's Q and firm-specific price-to-book misvaluation measure are inversely and significantly related to firms’ level of real activities manipulation. Our findings are broadly consistent with Bhojraj, Hribar, Picconi and McInnis (2009) as well as Kothari, Mizik and Roychowdhury (2016). Bhojraj et al. (2009) find that the long-run stock performance of firms that manage to beat analysts’ forecasts with low-quality earnings are weak. Insiders at these companies tend to sell their shares shortly afterward, which the authors argue is consistent with managers understanding the myopic nature of their actions. Kothari et al. (2016) find that the long-run performance of seasoned equity offerings (SEOs) is inversely related to the propensity for real activities manipulations at the time of the SEOs. Our paper provides additional evidence on the pervasive effects of real activities manipulations in the absence of such corporate events, i.e. SEO and/or meeting analyst forecasts.

The rest of the paper proceeds as follows. We review the literature and formulate our hypotheses in the Section II. We present our data and describe our methodology in Section III. We present and discuss our findings in Section IV and conclude the paper in the final section.

**II. Literature Review and Hypothesis Development**

Studies based on accruals management lead the literature on earnings management and share values, which we review next. For instance, Chi and Gupta (2009) and Houmes and Skantz (2010) use discretionary accruals as proxies for earnings management and document that overvaluation is related to subsequent income-increasing earnings management. However, the firms’ future stock return and operating performances are disappointing. Chi and Gupta’s (2009) findings are in line with those of Jensen (2005) and Marciukaityte and Varma (2008) in that overvaluation of equity pressures managers to manipulate earnings; however, subsequent earnings restatements cause investors to penalize these firms. Next, Chaney and Lewis (1995) develop a valuation model under asymmetric information (i.e. managers and investors are asymmetrically informed) in which compensation-maximizing, high-value managers manipulate earnings. Their model predicts that high-value firms tend to smooth income and adopt income-increasing accounting treatments.

Rangan (1998) finds that investors temporarily overvalue seasoned equity offerings (SEOs) and are subsequently disappointed by “predictable” declines in earnings caused by earnings management. DuCharme, Malatesta and Sefcik (2001) find that abnormal accruals prior to initial public offerings (IPOs) succeed in deceiving investors and lead to high initial firm value. However, abnormal accruals during the offer year adversely impact the firm’s subsequent stock returns. Teoh, Welch and Wong (1998) find that issuers with unusually high accruals in the IPO year experience poor stock return performance in the three years thereafter.

Louis (2004) examines the effect of earnings management on share prices in stock-financed mergers and acquisitions (M&As). He finds that acquiring firms overstate their earnings in the quarter preceding a stock swap announcement; however, he also finds a post-merger reversal of the stock price effects of the pre-merger earnings management. Jory, Farooqi and Ngo (2017) find that bidders engage in real activities manipulations prior to mergers and acquisitions (M&As). The findings suggest that earnings manipulations work for a specific event (for instance, an upcoming share issue or exercise of share options by managers or equity-financed M&A, etc.) but do not work in the long run. Thus, over a long period of time, earnings manipulation should be inversely related to firm value. Consistent with this argument, Bao and Bao (2004) find that the market does not reward all kinds of earnings smoothers (income smoothing is a form of earnings management) but only those that are of high quality, i.e. real versus artificial smoothing.

In this paper, we argue that investors highly value businesses that manage earnings less and, as a result, these companies would display higher valuation metrics, i.e. Tobin's Q and market-to-book ratios. Our theoretical rationale is based on the following: Assume there are equal companies. The total amount of wealth invested in all the companies is . Thus, each company is valued at , which is the equilibrium value. Suppose that companies engage in earnings manipulation. Consistent with Dechow et al. (1996) and Marciukaityte and Varma (2008), the investors will penalize the manipulating firms upon the “announcement” of alleged earnings manipulation. The value of the manipulating companies will decrease, and the total wealth will now be concentrated amongst the firms that did not manipulate earnings. At the extreme, the value of each of the offending firms will fall to zero while the value of the non-manipulating firms will increase to . Note that the non-manipulating firms are now overvalued, i.e. at instead of . Thus, they will exhibit higher (or abnormal) Tobin's Q and market-to-book ratios. The above leads to the following testable hypotheses:

*H1*: Firms with higher valuations will be associated with lower earnings management.

*H2*: Firms with lower valuations will be associated with higher earnings management.

While the objectives of accruals manipulations (AM) and real earnings management (RM) are similar, investors are likely to realize the adverse consequences of AM faster than RM, since the latter can be indistinguishable from day-to-day business decisions (Graham et al. 2005; Cohen and Zarowin 2010). In this way, there may be a lagged effect in investors’ reaction to firms engaging in RM that is potentially overlooked in studies on the short-term effects of earnings manipulations. Chi and Gupta (2009) argue that a convergence in the share price towards its underlying value following RM-induced overvaluation is inevitable as information about the firm’s fundamentals emerges over time. These arguments favor a long-term study like the current paper on the values of firms engaged in RM.

We argue that the market is driven to a large extent by informed traders and participants, including short-sellers, stock analysts, institutional investors, activist investors, fund managers and insiders, whose trades would price in the effects of RM. Koh (2003) finds that the monitoring performed by long-term-oriented institutional investors limits managerial discretion to manage earnings (similar to Sakaki, Jackson and Jory 2017; also see Lin and Manowan 2012). Bergstresser and Philippon (2006) provide examples of companies where inflated earnings coincided with significant option exercises (similar to Philbrick and Stephan 1993) and share sales. Insiders are likely to sell their shares prior to imminent bad earnings news (Milian 2016). Besides, Alhadab, Clacher and Keasy (2016) find that the regulatory environment impacts firms’ undertaking of RM. Thus, we hypothesize that, based on the actions of informed and insider trading as well as regulators, we should observe a decline in the market value of firms engaged in RM.

There is a vast body of literature which suggests that investors value firms that do not manipulate their financial statements, and our propositions are in line with these studies. Rountree, Weston and Allayannis (2008) find that investors penalize companies that exhibit substantial cash-flow volatility. Karpoff, Lee and Martin (2008) report that the penalties imposed by the market on firms targeted by SEC enforcement actions are significantly larger (over 7.5 times bigger) than the ones imposed by the legal system. Feroz et al. (1991) find that disclosures of accounting violations are associated with significantly negative stock returns as well as disclosures of SEC investigations. We expect to find that investors discount the value of firms that engage in real activities manipulations.

**III. Data and Methodology**

***Data***

The initial sample comprises firms covered in the Standard & Poor’s Compustat Fundamental Annual Database from 1990-2013. We exclude financial institutions (SIC 6000-6999) and utilities (SIC 4900-4999) since they tend to be highly regulated. We further eliminate firms that are not listed on the Compustat and The Center for Research in Security Prices (CRSP) databases, which we use to calculate measures of mispricing and real activities manipulation. There are 92,687 firm-year observations equivalent to 9,987 firms in the final sample. We report the sample distribution by year and industry in Table 1.

[INSERT TABLE 1 ABOUT HERE]

## *Measures of firm valuation*

Following Marciukaityte and Varma (2008), we employ adjusted Tobin’s Q as the first proxy for firm mispricing. Following Roll, Schwartz and Subrahmanyam (2009), we calculate Tobin’s Q as the sum of the market capitalization of the firm’s common equity, the liquidation value of its preferred stock, and the book value of its debt divided by the book value of the firm’s assets. Adjusted Tobin's Q is the difference between a firm’s Tobin's Q and the median Tobin’s Q for all other firms in the same Fama-French 48-sector classification. A positive adjusted Tobin’s Q suggests higher valuation of the firm relative to other firms in the same industry.

A possible concern about the adjusted Tobin’s Q measure, based on the findings of Martin (1996) and Hertzel and Li (2010), is that it might capture other information about the firm such as growth opportunities and information asymmetries rather than misvaluation. Martin (1996) suggests that Tobin’s Q reflects firm growth potentials. Hertzel and Li (2010) decompose market-to-book ratios into two, i.e. misvaluation and growth option, and find that issuing firms are both overvalued and have greater growth opportunities relative to non-issuers. Thus, it is important to adjust the Tobin’s Q so that it only reflects misvaluation. Rhodes-Kropf et al. (2005) decompose the market-to-book ratio into two parts as follows:

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| *Market-to-Book = Market-to-Value × Value-to-Book* | (1) |

where Market-to-Value is the discrepancy between the share price and its true value and thus represents misvaluation. Conversely, Value-to-Book measures pure growth opportunities of the firm. Market-to-Value (misvaluation) is further decomposed into two components, i.e. firm-specific misvaluation and sector-wide misvaluation. Firm-specific misvaluation captures the idiosyncratic component of misevaluation, which is specific to the firm. Sector-wide misvaluation captures the fact that a firm in an overrated/underrated industry will share the industrywide misvaluation.

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| --- | --- |
| , | (2) |

where = firm-specific error;

= sector-wide error; and

= value-to-book.

|  |  |
| --- | --- |
| *Firm-Specific Error + Sector-Wide Error = Market-To-Value (Misevaluation).* | (3) |

Following Rhodes-Kropf et al. (2005), for each industry and year , we first estimate the firm intrinsic value from the following industry-level regressions:

. (4)

where *i* indexes firms, *j* indexes industries, and *t* indexes time. is the market value of equity, is book value of equity *plus* balance sheet of deferred taxes and investment tax credit *minus* the book value of preferred stock, is absolute value of net income, is an indicator function for negative net income observations, and is the ratio of total long-term debt to total assets. To reduce the impact of outliers, all variables are winsorized at the 1% level.

We are interested in the firm-specific mispricing error component (which is from equation (1)). To obtain the firm-specific mispricing error component for each firm, we take the difference between its actual value in year *t*  and its fitted value given by . The higher the firm-specific misvaluation component, the more mispriced the firm is.

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| . | (5) |

Descriptive statistics on the adjusted Tobin’s Q () and are provided in Panel A of Table 2. The mean and median values of are 0.331 and -0.046, respectively. The corresponding values of are 0.054 and 0.034, respectively.

[INSERT TABLE 2 ABOUT HERE]

## *Real activities manipulation*

Roychowdhury (2006) defines real activities manipulation as management decisions that deviate from normal business practices that are undertaken with the primary objective of meeting certain earnings thresholds. He finds evidence consistent with managers’ manipulating real activities to avoid reporting annual losses. Specifically, he finds evidence of managers using price discounts to temporarily increase sales, overproducing to report lower cost of goods sold, and reducing discretionary expenditures to improve reported margins. Consequently, real activities manipulation can reduce firm value because actions taken in the current period to increase earnings can have a negative effect on cash flows in future periods (Roychowdhury 2006).

Roychowdhury (2006) constructs three measures of real activities manipulation, including abnormal cash flows from operations, abnormal discretionary expenses, and abnormal production costs, which subsequent studies (i.e. Cohen, Dey and Lys, 2008a; Cohen and Zarowin 2010; Zang 2012) confirm are good proxies for real activities manipulation. However, Roychowdhury (2006) and Zang (2012) caution against the use of abnormal cash flow from operations since real activities manipulation impacts this measure in different ways and its effects are ambiguous.

Following Roychowdhury (2006) and Zang (2012), we use abnormal discretionary expenses and abnormal production cost to proxy for real activities manipulation. Managers can increase earnings by overproducing inventory to report lower costs of goods sold. With overproduction, managers can spread fixed overhead costs over a larger number of units, thus decreasing the reported cost of goods sold and increasing reported operating margins (Roychowdhury 2006; Cohen et al. 2008b; Cohen and Zarowin 2010). At the same time, managers can cut discretionary expenditure to increase reported earnings – for instance, by reducing research and development (R&D), advertising, and selling, general and administrative (SG&A) expenditures. As a result, real activities manipulation leads to abnormally high levels of production costs and low levels of discretionary expenditure.

Abnormal production costs and abnormal discretionary expenses are estimated as the difference between their actual and predicted values. To estimate the normal level of production costs, we run the following regression model:

, (6)

where is the sum of the cost of goods sold of firm in year *t* and the change in inventory from year *t-1* to *t*;is the total assets of firm *i* in year *t-1*; is the net sales of firm *i* in year *t*;and is the change in net sales of firm from year *t-1* to *t.* The abnormal level of production cost ( is measured as the residuals from equation (6), i.e. . The higher the residuals, the larger is the amount of abnormal production costs, and the greater is the increase in reported earnings through reduced cost of goods sold. Higher residual values would indicate a high degree of real activities manipulation at firm .

Similarly, we estimate the normal level of discretionary expenditure using the following model:

, (7)

where represents the amount of discretionary expenditure (i.e. the sum of R&D, advertising, and SG&A expenditure) of firm in year *t*;is the total assets of firm in year *t-1*; and is the net sales of firm in year *t.* The abnormal level of discretionary expenditure (denoted as ) is measured as the estimated residuals from the regression (. Following Zang (2012)*,* we estimate equations (6) and (7) cross-sectionally for each industry-year with at least 15 observations, and use robust standard errors. Industry is defined following the Fama and French 48-sector industry classification.[[1]](#footnote-1) Positive values of and negative values of suggest high real activities manipulations. We further derive a composite score of real earnings management by adding the abnormal production cost with the abnormal discretionary expenditure. To do so, we multiply by -1, so that the interpretation of the sign is the same as (also see Zang 2012).

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| . | (8) |

In Panel A of Table 2, we provide descriptive statistics on the real earnings management variables. The sample mean (median) values of , and are -0.037, -0.037 and 0.000 (-0.043, -0.053 and 0.008), respectively. In Panel B, we present a correlation analysis between the real earnings management variables and the ones measuring firm values, i.e. and . The correlation coefficients are of the expected sign and statistically significant. Specifically, abnormally high production cost, low discretionary expenditure and high total real earnings management are associated with lower values of and . Thus, this constitutes first evidence that investors place low values on the firms that manage earnings through RM.

**IV. Empirical Results**

***Univariate comparisons***

In Table 3, we report the mean of contemporaneous and lagged measures of real activities manipulation (i.e. , and ) by quartiles of mispricing measures ( in Panel A and in Panel B). The analysis suggests that abnormal production cost is higher in Q1 compared to Q4, and abnormal discretionary expenditure is lower in Q1 than in Q4 using either or as proxies for firm values. Q1 represents low-valuation firms while Q4 represents high-valuation firms. Thus, low-valuation firms are associated with abnormally high production costs and abnormally low discretionary expenditures. Similarly, the composite measure of real activities manipulations is greater for Q1 firms compared to that for Q4 companies.

[INSERT TABLE 3 ABOUT HERE]

***Multiple Regressions***

We run a multiple regression of the firm valuation variables, i.e. Tobin’s Q and firm-specific price-to-book ratio, on the three variables measuring real activities manipulations – i.e. , and , alongside the following control variables that affect firm valuation – i.e. Total Assets, Return on Assets and Growth following Marciukaityte and Varma (2008). We also control for the firm's level of idiosyncratic risk. We control for year fixed effects and correct the standard errors for firm-clustering effect. We present our findings in Table 4.

Different from prior studies that use an event that leads investors to recognize that a firm has been managing earnings, ours do not rely on those events (nor do we exclude them). We regress the firm values on proxies of earnings management over time. Thus, our sample is not reliant on firms that are subject to SEC enforcement actions and companies that reinstate earnings downwards. We argue that, besides enforcement measures and earnings restatements, investors use other clues to value companies, and that the actions of informed and sophisticated traders will cause firm value to fall in line with their level of real activities manipulation.

Consider a firm that manipulates earnings to inflate its market value. Our sample period extends over 23 years. Assume that this company exists over the whole sample period. Based on studies that document a positive link between earnings manipulation and firm value, this firm will be overvalued over the 23-year period until it is forced to revise its earnings figure following some enforcement actions. Conversely, we argue that there exists a higher likelihood that the firm value over the sample period will reflect its true level of earnings manipulation. Specifically, businesses that manipulate earnings actively will be associated with lower Tobin's Q and firm-specific price-to-book ratios.

Indeed, the findings in Table 4 suggest that the value which the market places on firms is heavily influenced by the firms' levels of real activities manipulations. The coefficients of , and are of the correct sign and are highly significant. Both the univariate tests from Table 3 and the multiple regressions from Table 4 support the hypothesis that firm value is inversely related to earnings manipulation.

[INSERT TABLE 4 ABOUT HERE]

To account for certain time-invariant firm characteristics that we fail to control for in Table 4, we re-estimate the regression equation using a firm-fixed-effect specification and present our findings in Table 5. Our results stay the same, i.e. both Tobin's Q and firm-specific price-to-book ratios are inversely and significantly related to our measure of total real earnings management.

[INSERT TABLE 5 ABOUT HERE]

***Dynamic Generalized Method of Moments*** (***GMM) Regressions***

We must also account for the possibility that past valuations affect firms' current attitude towards manipulating earnings. To address the potential endogeneity between firm values and earnings manipulation, we estimate the regression equation using the Generalized Methods of Moments (GMM) estimator as explained in Arellano and Bond (1991), Arellano and Bover (1995), and Blundell and Bond (1998).

We include two lags of Tobin's Q in the regression equation. We then use lags of Tobin's Q and from and as instrument variables for at time . The model assumes that firm values (i.e. Tobin's Q) from and do not directly affect its current value at time but do so through the Tobin's Q at times and . Thus, the GMM model allows us to account for the impact of previous firm values and earnings management on the company's current level of earnings management. We present our findings in Table 6. The findings suggest that the value which the market places on firms is heavily influenced by the firms' levels of real activities manipulations. The coefficient of is thus negative and highly significant.

[INSERT TABLE 6 ABOUT HERE]

***Unexpected Real Activities Manipulation***

Zang (2012) argues that firms use more than one method of earnings management, i.e. real and accruals-based manipulations. Managers adjust the amount of accruals-based manipulations at year-end based on the realized outcomes of real activities manipulations made during the year. She further finds that some firms engage in unexpectedly high levels of real activities manipulations. Since our study is based on real activities manipulations, we use Zang’s measure of unexpected real activities manipulation as an additional measure of earnings management and test whether our findings stay the same with this new measure. The model to derive unexpected real activities manipulation (), which we denote as , is as follows:

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| --- | --- |
|  | (9) |

where is total real earnings management of firm *i* in year *t.* measures a firm’s market leader status in its industry at the beginning of the year and is measured as the ratio of company’s sales-to-total industry sales. We define industry using the three-digit SIC codes as in Harris (1998). is a modified version of Altman’s Z-score (Altman 1968, 2000) that proxies for a firm’s financial condition. Higher values of Z-score indicate a healthier financial condition and are calculated using the following equation:

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| --- | --- |
|  | (10) |

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Institutional ownership () is the number of institutional investors reported in the company’s form 13F. A high value of institutional ownership indicates high costs of real activities manipulation owing to the monitoring performed by institutional shareholders. TAX is the marginal tax rate of the firm as calculated by Graham (2000). is a proxy for auditor scrutiny and equals 1 if the auditor has been with the firm for a number of years in excess of the sample median, and 0 otherwise. is an indicator variable representing the years post-Sarbanes Oxley Act of 2002. Post-SOX, the accounts of firms are under more scrutiny. Net Operating Assets () is a dummy variable taking a value of 1 when the following ratio exceeds the industry median:

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| --- | --- |
|  | (11) |

refers to the firm’s operating cycle calculated as the days’ receivables *plus* the days’ inventory *less* the days’ payables. refers to the natural logarithm of the firm’s market capitalization; is the ratio of research and development expenditure-to-sales; is the ratio of total debt-to-total assets; is the market-to-book ratio, and is the firm’s return on assets. We present our findings in Table 7.

[INSERT TABLE 7 ABOUT HERE]

Real earnings management is positively related to market share, long-serving auditors, post-SOX, net operating assets and highly geared firms. On the contrary, we find a negative association between a firm’s market-to-book ratio and its measures of real earnings management. It suggests that the market places a higher value on firms that manage earnings less. In Table 8, we regress the firm’s adjusted Tobin’s Q and firm-specific price-to-book ratio on the unexpected real earnings management variable. We present our findings based on OLS regressions (Panel A), panel fixed-effect regressions in Panel B and the Generalized Methods of Moments (GMM) in Panel C. In all the panels, , which represents the unexpected component of total real earnings management, is inversely and significantly related to both and .

[INSERT TABLE 8 ABOUT HERE]

***Robustness Checks***

The approach used to calculate abnormal production cost (equation (6)) and abnormal discretionary expenditure (equation (7)) follows Roychowdhury (2006), Cohen et al. (2008), Cohen et al. (2010), Gunny et al. (2010) and Zang (2012). Nonetheless, the regression residuals from equations (6) and (7) suffer from model misspecification, error-in-variables, missing variables, and wrong dynamic specification, which undermine the reliability of the reported statistics.[[2]](#footnote-2) To address these issues, we perform robustness tests using industry-adjusted real earnings management (RM) variables as we explain next.

Industry-adjusted production cost is calculated as the difference between the production cost of firm *i* in year *t* and the median production cost of all the firms in the same industry (using the Fama-French 48-sector classification) in the same year. Similarly, industry-adjusted discretionary expenditure is calculated as the difference between the discretionary expenditure of firm *i* in year *t* and the median discretionary expenditure of all the firms in the same industry in the same year. These two industry-adjusted RM measures capture the deviation in costs between the firm and the typical firm in its industry. While they capture the abnormal costs of a firm, they do not however suffer from the limitations of the abnormal cost measures derived from the OLS regressions.

We perform the analyses using industry-adjusted production cost and industry-adjusted discretionary expenditure (in place of the measures from equations (6) and (7), respectively) and present our findings in Tables 9 and 10.

[INSERT TABLES 9 & 10 ABOUT HERE]

We report summary statistics of industry-adjusted production cost, industry-adjusted discretionary expenditure and industry-adjusted total real earnings management (in Panel A of Table 9). We present the correlation matrix between the industry-adjusted earnings management variables and the firm valuation variables (in Panel B of Table 9). Consistent with the results using abnormal production cost and abnormal discretionary expenditure, the results in Panel B indicate that firm valuation is inversely related with the industry-adjusted real earnings management variables, i.e. high RM variables are associated with lower firm values of and . In Panel C of Table 9, we perform OLS regressions of firm valuation (i.e. and in separate regressions) on the industry-adjusted RM measures. Consistent with the results reported in Table 4, the coefficients on industry-adjusted production cost (*ADJ. PRODCOST*), industry-adjusted discretionary expenditure (*ADJ. DISEXP*) and industry-adjusted total real earnings management (*ADJ. TOTRM*) are all negative and significant at the 1% level. Results based on panel fixed-effect regressions and GMM regressions shown in Table 10 indicate a negative and significant association between each of the two measures of firm valuation and the industry-adjusted total real earnings management variable.

**V. Conclusion**

In this paper, we study the relationship between real activities manipulation and the firm value. Following Roychowdhury (2006) and Zang (2012), we use abnormal production costs and abnormal discretionary expenditure to proxy for real activities manipulation. We measure firm under- or overpricing using firstly an adjusted Tobin's Q measure following Marciukaityte and Varma (2008) and secondly Rhodes-Kropf, Robinson and Viswanathan’s (2005) measure of firm-specific price-to-book ratio. Our sample comprises 92,687 firm-year observations equivalent to 9,987 firms from the COMPUSTAT database over the sample period 1990 to 2013. Many studies on earnings management rely on a dataset that is subject to an event (for instance, meeting analysts' forecasts or subject to SEC investigation or restating earnings or issuing equity or performing an M&A or exercising stock options, etc.); ours does not rely on these events. By analyzing the cross-section of COMPUSTAT firms over several years, we include not only the firms that were part of the prior studies but also companies that managed earnings but were left out of the samples of studies based on the aforesaid events. We argue that the actions of informed and sophisticated traders will cause the firms' value to fall in line with their level of real activities manipulation. Specifically, businesses that manipulate earnings actively will be associated with lower Tobin's Q and firm-specific price-to-book ratios. Our findings suggest that this is indeed the case. In univariate tests, we find that low-valuation firms are associated with abnormally high production costs and abnormally low discretionary expenditure. Similarly, total real earnings management is greater in low-valuation firms compared to highly valued ones. In multiple regressions, we find the coefficients of each of the real earnings management variables to be negative and highly significant. We conclude that both a firm's Tobin's Q and its price-to-book ratio are inversely and significantly related to its level of real activities manipulation. Our results are consistent with several regression techniques addressing potential endogeneity issues and alternative proxies for real earnings management after controlling for known factors to affect firm market values.

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1. http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data\_Library/det\_48\_ind\_port.html [↑](#footnote-ref-1)
2. This was kindly pointed out to us by a reviewer. [↑](#footnote-ref-2)