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Peer Performance and Earnings Management

Abstract

This paper studies how peer performance affects firms' earnings management decisions. Using peer firms' idiosyncratic returns as an exogenous peer performance measure and the instrumental variable approach, we find that higher peer performance leads to higher discretionary accruals. This effect is salient for both industry leaders and followers and is robust to alternative discretionary accrual measures and alternative peer definitions. We examine two mechanisms through which peer performance affects firms' earnings management. We find that analysts revise their earnings forecasts according to peer performance and that when peer performance is higher, firms are less likely to meet or beat analyst consensus without managing earnings. This evidence suggests a capital market pressure mechanism. In addition, the effect of peer performance is more pronounced in firms using relative performance evaluation, suggesting a compensation pressure mechanism. In sum, our evidence suggests that managers report opportunistically to match peer performance.

JEL Classification: G10, M41

Keywords: *Peer performance, Earnings management, Capital market pressure, Relative performance evaluation*

1. Introduction

Firm performance is subject to common market or industry shocks. Theories therefore suggest that investors should consider peer performance when evaluating managers' talent or efforts (Holmstrom 1982). Accordingly, some market participants adopt relative performance evaluation to control for common shocks and to discipline managers. For example, investors often apply relative valuation techniques and form their valuations by choosing comparative multiples (Bhojraj and Lee 2002). Financial analysts, as both information intermediaries and external monitors, commonly refer to industry peers when forecasting a firm's future earnings and setting the target price.[1] Many boards use peer firms' performance as a benchmark to determine managerial compensation (e.g., Aggarwal and Samwick 1999; Gong, Li and Shin 2011) or tenure (Jenter and Kanaan 2015). Given the importance of peer performance in both external monitoring and internal governance, a natural but important question is whether or not managers will engage in opportunistic behavior in response to peer performance. In this study, we provide empirical evidence on this question by examining firms' earnings management decisions.

Analysts may set high expectations for a firm if its peers are performing well. Failing to meet these expectations can hurt the firm's reputation, convey unfavorable information about future prospects and increase investors' perceived risk of the firm (Degeorge, Patel and Zeckhauser 1999; Graham, Harvey and Rajgopal 2005). Meanwhile, peers' stock performance can have a direct impact on managerial incentives through the compensation contract.[2] To avoid pay reduction or potential reputation loss, executives would try to match peers' stock performance by strategically disclosing favorable earnings information. That is

[1] For example, De Franco, Hope and Larocque (2015) find that more than 90% of the peer firms chosen by the analysts are from the same industry in their hand-collected dataset.

[2] For instance, in the DEF 14A issued in 2007 of Collective Brand Inc. (CIK: 0001060232), the company stated that "…The Compensation Comparison Group is also used to calculate the amount payable [to the manager] under the long-term portion of the Company's Incentive Compensation Plan, under which the Company's *stock performance* is compared to the Compensation Comparison Group…" (emphasis added).

why we argue that managers have strong motivation to manage their firm's earnings according to peer performance.

Although our arguments also apply to peer firms' accounting performance such as their profits, we focus on peer firms' stock performance instead for three reasons. First, firms learn about their peers' accounting performance via earnings announcements. Because firms in the same industry usually make their earnings announcements at around the same time of the quarter (Hilary and Shen 2013), they simply would not be able to manage earnings quickly enough in response to each other's accounting performance. In contrast, peers' returns which contain information about future earnings (e.g. Kothari and Sloan, 1992) are publicly available throughout the entire fiscal period. In addition, since peers' performance is measured during the fiscal quarter by construction and firms usually engage in accruals management after the fiscal quarter end (Zang 2012), the measure of peer stock performance is unlikely to be affected by the firm's future earnings management. Therefore the concern of reverse causality is mitigated.

Second, peer firms' accounting performance may be the result of earnings management, leading to an alternative explanation involving earnings management contagion (Chui, Teoh, Tian 2013). Using a peer performance measure based on stock return information allows us to rule out this alternative explanation. Third, it is difficult to control for the endogeneity problem using peer accounting performance. For example, it is very difficult to remove the common industry components from peer accounting performance and these common components affect both peer accounting performance and the firm's earnings management decisions. Thus failing to remove the common components leads to a serious omitted variable problem. In contrast, as we will elaborate below, using peer stock performance allows us to better address the endogeneity problem.

The key endogeneity concern in examining our research question is the omitted variable problem. Prior studies typically define peers as firms in the same industry (Leary and Robert 2014). As firms in the same industry operate in a similar environment, experience common shocks, and compete in comparable markets, there are possible omitted factors driving both peer performance and firms' earnings management decisions.[3]

In this study, to overcome the endogeneity concerns, we follow Leary and Roberts (2014) and use idiosyncratic equity returns instead of raw returns as our measure of stock performance.[4] In particular, peer firms' performance (*Pshock*) is measured as the mean idiosyncratic equity returns of a firm's industry peers during the fiscal quarter. In our main empirical test, we examine the influence of *Pshock* on firms' earnings management decisions. We expect that firms would manage their earnings to match peer performance. We measure earnings management using performance-matched discretionary accruals. Consistent with our expectation, we find that a firm's discretionary accruals are positively and significantly correlated with the mean idiosyncratic equity returns of its industry peers. The results hold after controlling for the contemporaneous idiosyncratic equity returns of the firm itself (*Ishock*), the characteristics of the firm and of its peers, and industry and year fixed effects. In the robustness check, we find consistent results if we control for the last quarter effect or using alternative definitions of industry peers. Our results also hold for both industry leaders and followers and for both early and late announcement firms.

Although our measure of peer performance is unlikely to suffer from reverse causality and omitted variable problems, it may contain errors related to the measurement of a firm's

[3] It is possible that a firm's earnings manipulation can affect the investment decisions of its peers (Beatty, Liao and Yu 2013) and in turn their performance. However, as we argued before, the window during which we measure peer stock performance is before the firm's accruals management decisions, and so reverse causality is not a major concern of our research design.

[4] Leary and Roberts (2014) show that peer idiosyncratic returns serve as an accurate measure of exogenous performance. We elaborate on this point in Section 4.

earnings management.[5] In order to address this problem, we employ the instrumental variable approach and use lagged equity shock from peer firms' major customers *(Cshock)* as an exogenous instrument. *Cshock* is the average idiosyncratic returns of major customers of peer firms during the fiscal quarter. To be included in firm *i*'s *Cshock*, a customer must satisfy the following three criteria: (1) the customer must be in a different industry, (2) the customer must not be a major client of firm *i*, and (3) the customer must be a major client of at least one other firm in the same industry as firm *i*. As shown by Cohen and Frazzini (2008), the shocks to customers can predict the equity returns of supplier firms, but cannot predict the returns of other firms in the same supplier industry that are not directly related to the customers. Therefore, *Cshock* can serve as a valid instrument of peer performance (*Pshock*) because it is associated with peer performance but not with firm *i*'s performance directly (Leary and Roberts 2014). We further lag *Cshock* for one quarter to avoid any contemporaneous association among industries along a supply chain. We find that higher *Cshock* or instrumented *Pshock* leads to higher discretionary accruals of the firm. We do not find significant results in a placebo test using return shocks from randomly selected firms in the customers' industries that are not customers of any firm in firm *i*'s industry. Taken together, the above evidence is consistent with a causal relation between peer performance and firms' earnings management decisions.

Recently the literature has raised concerns about the noise in constructing discretionary accruals (Ball et al. 2013; Owens et al. 2017). For example, Owens et al. (2017) find that both idiosyncratic and industry shocks affect the magnitude (i.e., *unsigned*) of the estimated discretionary accruals. Moreover, firms' idiosyncratic shocks affect their estimated *signed* discretionary accruals as well. Because discretionary accruals are our key measure of earnings management, it is crucial to ensure that our results are not driven by measurement

[5] For example, measurement errors may arise from the imperfect estimation of the market and industry components in peers' returns.

errors in estimating discretionary accruals. First, following the advice in Owens et al. (2017), we control for firms' contemporaneous idiosyncratic equity returns in estimating discretionary accruals. Our results do not change. Second, we use quintile rank instead of the raw value of discretionary accruals as our dependent variable to minimize the measurement errors in estimating discretionary accruals. Our conclusions remain unchanged. Third, peer idiosyncratic shocks, by definition, should not be directly correlated with firms' fundamentals. Therefore, the *sign* of the estimated discretionary accruals should be unbiased after controlling for firms' own idiosyncratic shocks. We then conduct a robustness test by examining whether or not peer idiosyncratic returns affect the *sign* of firms' discretionary accruals using a Probit model. The evidence shows that peer performance is significantly and positively associated with the probability of observing positive discretionary accruals in the firms. Taken together, our inferences are unlikely biased by the measurement errors in estimating discretionary accruals.

We next perform analyses to provide direct evidence on the mechanisms through which peer performance affects firms' earnings management. In particular, we examine two channels: capital market pressure and compensation pressure. Regarding the capital market pressure channel, we find that analysts revise their earnings forecasts upward when peer performance is high suggesting a high expectation arising from strong peer performance. As a result, although the actual probability of meeting or beating analyst consensus is uncorrelated with peer performance, firms with higher peer performance are less likely to meet or beat analyst consensus after removing the impact of discretionary accruals. This evidence lends support to the capital market pressure mechanism that firms manage earnings to meet investors' high expectations when peers are performing well. In order to provide evidence of the compensation pressure channel, we manually collect relative performance evaluation (RPE) information following Gong, Li and Shin (2011). Our evidence shows that the effect of peer performance on firms' earnings management is more pronounced in those firms with explicit RPE in their compensation contract design.

Finally, we explore whether or not peer performance is correlated with firms' real expenditure. Prior studies suggest that managers can manipulate their earnings by taking real actions such as cutting discretionary expenses (e.g. Roychowdhury 2006; Zang 2012). Therefore, managers may try to match peer performance by cutting discretionary expenses in addition to accruals management. We find that firms incur less (more) R&D expenses when peer performance is higher (lower).[6] This evidence is consistent with the real earnings management literature and suggests that firms also conduct real transactions to increase short-term earnings in response to peer performance. In addition, our discretionary accrual results remain the same after controlling for the contemporaneous real expenditure.

Using meeting or beating analyst forecasts as a performance measure, Bratten et al. (2016) have recently examined whether or not the discretionary performance of followers is positively correlated with the leader's reported performance. Our study provides distinct evidence incremental to Bratten et al. (2016) in four aspects. First, the idiosyncratic stock performance of peers cannot be easily manipulated by the firm's managers and thus our study is able to establish a causal relationship between peer performance and firms' earnings with a valid instrument. In contrast, whether the firm meets or beats analyst forecasts is partly subject to management discretion and could be a result of earnings management (Degeorge et al. 1999). It is possible that peers' previous performance such as idiosyncratic returns drives both the leader's behavior (to meet or beat forecasts) and the followers reported performance.[7] It is also possible that the followers simply mimic the leader's earnings

[6] Leary and Roberts (2014) find that *Pshock* is unrelated to firms' long-term investment such as PPE, while we find that *Pshock* is negatively correlated with *R&D* expenses. Because cutting capitalized investment such as PPE does not affect short-term performance, whereas cutting *R&D* expenses can boost short-term profit, the overall finding is consistent with an explanation involving real earnings management.

[7] Our evidence indeed suggests that industry leaders engage in earnings management in response to peers' performance as well.

management behavior (Chui, Teoh, Tian 2013). Thus, the correlation between the leader's performance and the followers' earnings management might not be causal.

Second, we provide direct evidence on the two mechanisms through which peer performance affects firms' earning management: capital market pressure and compensation pressure. Third, our evidence suggests that analyst revisions serve as an important mechanism driving peer pressure. When we remove discretionary accruals from actual earnings, peer performance is negatively correlated with firms' ability to meet or beat revised analyst forecasts. This evidence suggests that firms would likely fail to beat or even meet the analysts' revised high expectation without earnings management. Fourth, our research design allows us to provide evidence on whether or not peer performance affects firms' real expenditure.

This study contributes to the corporate governance literature by providing evidence on the unintended consequence of using RPE as governance mechanisms. Theoretically, using RPE can absorb common shocks and efficiently align the interests of managers and shareholders (e.g. Holmstrom 1982). However, RPE is not widely used in practice (e.g. Bannister and Newman 2003; Gong et al. 2011). A recent theory suggests that RPE is seldom used because managers may engage in greater earnings manipulation when this governance mechanism is in place (Infuehr 2017). Our study provides support to this theory. By showing that managers have stronger incentives to manipulate earnings when RPE is used by external monitors (e.g. analysts) or as an internal governance mechanism (e.g. compensation contract), we provide insights on the consequences for disclosure and other costs of adopting RPE.

This study also adds to the earnings management literature by examining a new earnings management incentive (see Dechow, Ge and Schrand 2010 for a review). Previous studies have mostly focused on the learning effect where firms observe their peers' behavior and learn (Chiu, Teoh and Tian 2013; Kedia, Koh and Rajgopal 2015). By documenting the relationship between peer performance and firms' earnings management behavior, this study provides additional insight on the huge influence peers and their performance can have on financial reporting quality.

The rest of the paper is organized as follows. Section 2 discusses related literature and the hypothesis. Section 3 presents our sample and summary statistics. Variable construction and research design are described in Section 4. Section 5 presents our empirical evidence and Section 6 concludes the paper.

2. Related Literature and Hypothesis Development

2.1. Peer Firms and Corporate Policy

Peers influence a firm's corporate policies through various channels such as competition and learning. For example, industry competition affects a firm's corporate product strategy through product pricing (Bertrand 1883), product quantity (Cournot 1838) and other non-price product features (Stigler 1968). Recent findings show that when competition is intense, firms are reluctant to make dividend payment and tend to hold cash to increase their financial flexibility (Hoberg, Phillip and Probhala 2014). In addition to the competition effect, firms can obtain incremental information from the choices made by peers. When their information acquisition costs are high or when peers' signals are noisy, firms will simply choose to mimic their peers' corporate decisions (e.g. Banerjee 1992). The survey conducted by Graham and Harvey (2001) indicates that many CFOs take note of peer firms' financing decisions when making their own financing decisions. Leary and Roberts (2014) provide archival evidence suggesting that a firm's capital structure is significantly influenced by that of its peers.

Peers also play an important role in shaping disclosure and reporting policies. Prior literature suggests that competition threat significantly increases the proprietary costs of disclosure and leads to less frequent and lower quality of disclosure (Ali, Klasa and Yeung

2014; Li 2010). Kedia, Koh and Rajgopal (2015) find that firms learn the costs of breaking rules by observing what happens to those peers that misreport. If the costs are low, firms will likely engage in misreporting themselves in the near future. However, there is little empirical evidence on the causal impact of peer performance on firms' reporting choice. Different from most existing literature which relies on a lead-lag relationship in studying the impact of peers (e.g. Kedia, Koh and Rajgopal 2015), our study investigates the role of peer performance in corporate reporting policy by using an exogenous peer performance measure and the instrumental variable approach.

2.2. Peer Performance and Earnings Management

Management may manipulate their reported earnings to mislead investors and thus to influence the outcomes of their contracts (Healy and Wahlen 1999). Regulators and investors are concerned about earnings management because of its valuation and contracting impacts.[8] This concern has become salient after a series of accounting scandals in the early 2000s (Yu 2008). Therefore it is important to understand the different incentives driving earnings management.

Existing literature documents the important role that peer performance plays in a firm's valuation and CEO compensation. For example, if investors use relative valuation techniques, a firm's share price may be discounted if it underperforms its industry peers. Analysts use peer performance as the benchmark when setting earnings forecasts and the target price for a firm (De Franco, Hope and Larocque 2015). Managers' compensation contract is also sometimes set based on relative performance (e.g. Aggarwal and Samwick 1999; Gong, Li and Shin 2011) and they are more likely to be dismissed if they fail to generate performance that is superior or at least comparable to that of their peers (Jenter and Kanaan 2014).

[8] For example, SEC Chairman Levitt expressed concerns regarding "big bath" in his speech entitled "The numbers Game" on September 28, 1998.

Earnings management is costly as it leads to a lower disclosure quality and a higher cost of equity (Botosan 1997). In addition, past earnings manipulation can become a constraint and result in a higher cost for future earnings management (Barton and Simko 2002).[9] However, the literature suggests that managers often manage earnings opportunistically given enough motivation.[10] We argue that peer performance provides a strong incentive for managers to manipulate earnings. When peers are outperforming them, managers are motivated to inflate their own performance to meet or exceed market expectations or to achieve the benchmark set in the compensation contract. When peers are trailing them, considering that there may be a cap on their compensation and that the business environment is always uncertain (Healy 1985), managers may decide to smooth the income and defer certain profits to the future. Therefore, managers are likely to manage earnings downward when peer performance is poor. These arguments motivate our hypothesis 1 (H1):

H1: Managers will manipulate earnings in response to the performance of peer firms.

Next, we propose two economic mechanisms through which peer performance motivates managers to engage in earnings management: capital market pressure and compensation pressure.

Peer performance can affect firms' earnings management decisions through pressure in the capital market. Investors and analysts use peer performance as a benchmark when setting their expectations for a firm's performance (De Franco, Hope and Larocque 2015). When peers are outperforming the firm, investors and analysts are likely to revise their earnings forecasts upward for the firm, leading to increased pressure on the firm. Because of the negative consequences associated with disappointing the market (e.g. Bartov, Givoly, Hayn

[9] In our sample, we find that the discretionary accruals due to peer performance reverse after a year.
[10] See Beyer, Guttman and Marinovic (2014) and Fields, Lys and Vincent (2001) for reviews of the relevant literature.

2002; Graham, Harvey, Rajgopal 2005), managers of the firm are motivated to manipulate earnings to meet or beat the expectations. These arguments lead to our hypothesis 2a (H2a):

H2a: Managers will manipulate earnings in response to the performance of peer firms because of capital market pressure.

Many firms adopt RPE in executive compensation contracts (Aggarwal and Samwick 1999; Gong, Li and Shin 2011). When that happens, firms are compared with their peers in terms of accounting performance or stock return performance. A higher performance of peer firms can have a negative impact on managers' compensation. Therefore, managers would have stronger incentives to engage in earnings management to match peer performance when their compensation contracts are based on RPE. These arguments motivate our hypothesis 2b (H2b):

H2b: Managers will manipulate earnings to a greater extent in response to the performance of peer firms when their compensation contract is based on RPE.

3. Data and Summary Statistics

We obtain financial data from COMPUSTAT, stock return data from CRSP and analyst coverage data from I/B/E/S. Our sample covers the period from 1989 to 2013. We discard firms in financial (SIC code 6000-6999) and regulated utility industries (SIC code 4900-4999). Furthermore, we require that firms have at least 36 months of return information so that we can estimate their idiosyncratic returns. We require at least 15 firms in a three-digit

SIC industry to estimate discretionary accruals. Finally, we exclude penny stocks (with price less than one dollar) and require that data be available for all control variables.[11]

Panel A of Table 1 presents summary statistics for the whole sample, which consists of 138,299 firm-quarter observations from 6,863 unique firms. Following Leary and Roberts (2014), we define industry peers as all other firms operating in the same three-digit SIC industry. All continuous variables are winsorized at the 1st and 99th percentiles. We present discretionary accruals (*DA*) as a percentage of lagged assets to make the numbers more visible.[12] The mean and median of discretionary accruals (*DA*) are very close to zero (approximately 0.1% and 0.3%, respectively). The descriptive statistics of our firm characteristics and peer characteristics are also consistent with prior studies such as Leary and Roberts (2014) and Yu (2008).

[Insert Table 1 about here]

4. Variable Construction and Research Design

4.1. Construction of Key Variables

4.1.1. Construction of Peer Performance

Firms in the same industry share similar characteristics in their operation and face common technology shocks in their product market. Investors, economists and analysts often see other firms in the same industry as peer groups when analyzing a firm. Following Leary and Roberts (2014), we use peer equity shock (*Pshock*), which is the mean idiosyncratic equity returns of a firm's three-digit SIC industry peers, as a proxy for peer performance.[13] Idiosyncratic returns do not capture much common variation by construction and mainly

[11] In later sections, we use data collected from companies' DEF 14A filings. Details are provided in Section 5.
[12] We describe the construction of discretionary accruals in detail in Section 4.1.2.
[13] We report results using alternative industry classifications in Section 5 and find consistent results.

represent firm-specific performance (Leary and Roberts 2014).[14] In addition, the idiosyncratic returns are cross-sectionally and time-serially uncorrelated and are largely uncorrelated with firm characteristics such as profitability, size, and the market-to-book ratio, which are documented in prior literature as being able to explain earnings management.[15] These features make *Pshock* a good peer performance measure that is less vulnerable to endogeneity concerns. To estimate a firm's idiosyncratic equity returns (*Ishock*), we start with the following model to decompose the returns:

$$Ret_{i,t} - R_{f,t} = \beta_0 + \beta^{market}\left(R_{m,t} - R_{f,t}\right) + \beta^{industry}\left(R_{industry,t} - R_{f,t}\right) + \varepsilon_{i,j,t} \quad (1)$$

where i indicates the firm and t indicates the month; $Ret_{i,t}$ is firm i's monthly raw return; $R_{m,t}$ and $R_{f,t}$ are the market return and risk-free rate in the corresponding month, respectively; and $R_{industry,t}$ is the value-weighted three-digit SIC industry return excluding firm i's own return. We adopt a rolling window using observations in the 60 months before the fiscal quarter end to estimate Eq. (1) for each firm. We require at least 36 months of historical return data in each regression. Using the coefficients estimated from the past 60 months, we derive firm i's idiosyncratic equity returns (*Ishock*) in quarter q as follows:

$$Ishock_{i,q} = Ret_{i,q} - R_{f,q} - \hat{\beta}_0 - \hat{\beta}^{market}\left(R_{m,q} - R_{f,q}\right) - \hat{\beta}^{industry}\left(R_{industry,q} - R_{f,q}\right) \quad (2)$$

where $Ret_{i,q}$, $R_{m,q}$, $R_{industry,q}$ and $R_{f,q}$ are firm i's quarterly equity return, market return, industry return and risk-free rate, respectively, and all of the returns are cumulated within each fiscal quarter. After obtaining *Ishock*, we define firm i's *Pshock* as the average *Ishock* of all other firms in the same three-digit SIC industry during firm i's fiscal quarter.

Table 2 presents a summary of the construction of *Pshock*. We run Eq. (1) for each firm for a rolling window of the past 60 months. For each rolling regression, the mean number of monthly observations is 58 and the adjusted R-squared is 22%, both of which are very similar

[14] The endogeneity concern is the main reason for using idiosyncratic returns instead of raw stock returns to construct peer performance, although we find consistent results using raw returns.
[15] The results are documented by Leary and Roberts (2014), and we confirm these findings in our sample.

to those reported by Leary and Roberts (2014).[16] In our sample, *Ishock* has a mean of 0.3% and *Pshock* a mean of 0.8%, both of which are also close to zero by construction.

[Insert Table 2 about here]

4.1.2. Measurement of Earnings Management

We use performance-controlled discretionary accruals as the measure of earnings management. Accruals are more likely to be manipulated than operating cash flow because managerial judgment and estimation are involved. In order to differentiate manipulation from fundamentals, researchers further decompose accruals into two parts: nondiscretionary accruals (*NDA*) and discretionary accruals (*DA*). Discretionary accruals are widely used in the literature as a measure of earnings management (e.g. Teoh, Welch, and Wong 1998; Erickson and Wang 1999; Yu 2008). Following prior literature, we estimate discretionary accruals (*DA*) using the modified Jones model controlling for lagged performance (Jones 1991; Dechow, Sloan and Sweeney 1995; Kothari, Leone, and Wasley 2005). In particular, consistent with our definition of peer group, we use firms' quarterly data and run the following OLS model within the three-digit SIC industry each year to estimate the coefficients:

$$\frac{TA_{i,q}}{A_{i,q-1}} = \alpha_1 \frac{1}{A_{i,q-1}} + \alpha_2 \frac{\Delta REV_{i,q}}{A_{i,q-1}} + \alpha_3 \frac{PPE_{i,q}}{A_{i,q-1}} + \alpha_4 ROA_{i,q-4} + \epsilon_{i,q} \quad (3)$$

where *i* indicates the firm and *q* indicates the quarter; $TA_{i,q}$ is the total accruals measured as income before extraordinary items minus operating cash flow in quarter *q*; $\Delta REV_{i,q}$ is the change in sales from quarter *q-1* to quarter *q*; $PPE_{i,q}$ is the gross value of a firm's property, plant and equipment at the end of quarter *q*; and $ROA_{i,q-4}$ is income before extraordinary items scaled by total assets in quarter *q-4*. All of the variables used in the regression except

[16] Leary and Roberts (2014) report an average of 59 observations in each rolling regression and an average adjusted R^2 of 22.8%.

$ROA_{i,q-4}$ are scaled by total assets in quarter *q-1* ($A_{i,q-1}$). We require at least 15 observations in each industry-year cross-sectional regression. We then use the estimated coefficients $\hat{\alpha}_1$, $\hat{\alpha}_2$, $\hat{\alpha}_3$ and $\hat{\alpha}_4$ in year *y-1* to calculate nondiscretionary accruals (*NDA*) in the quarters of year *y* as follows:

$$NDA_{i,q} = \hat{\alpha}_1 \frac{1}{A_{i,q-1}} + \hat{\alpha}_2 \left(\frac{\Delta REV_{i,q}}{A_{i,q-1}} - \frac{\Delta AR_{i,q}}{A_{i,q-1}} \right) + \hat{\alpha}_3 \frac{PPE_{i,q}}{A_{i,q-1}} + \hat{\alpha}_4 ROA_{i,q-4}$$ [17]

where $\Delta AR_{i,q}$ is the change in trading receivables from quarter *q-1* to quarter *q*. Thus, we derive discretionary accruals (*DA*) as follows:

$$DA_{i,q} = \frac{TA_{i,q}}{A_{i,q-1}} - NDA_{i,q-1}.$$

We use coefficients estimated in year *y-1* instead of year *y* to calculate *DA* for two reasons. First, we need industry peers' information to estimate the coefficients. However, as our hypothesis suggests, the contemporaneous performance of industry peers can directly affect a firm's discretionary accruals. Therefore, using the coefficients estimated for year *y* might bias our results. Second, using coefficients estimated for year *y-1* allows us to capture the time-series variations in discretionary accruals for the entire industry, i.e. the sum of the discretionary accruals of a specific industry can vary across time. This is critical because time-series variations within an industry account for an important part of the peer impact (Leary and Roberts 2014).

4.2. Research Design

We use the following empirical model to test our hypotheses:

$$DA_{i,t} = \beta_0 + \beta_1 Pshock_{-i,j,t} + \beta_2 Ishock_{i,j,t} + \beta_3 Controls + \mu + \nu + \varepsilon_{i,t} \quad (4)$$

[17] Following Dechow et al. (1995) and Kothari et al. (2005), we include change in revenue without adjusting trading receivables in estimating $\hat{\alpha}_1$, $\hat{\alpha}_2$, $\hat{\alpha}_3$ and $\hat{\alpha}_4$, but adjust the impact of change in trading receivables in calculating *NDA*.

where *DA* and *Pshock* are discretionary accruals and peer performance respectively as defined in Section 3.1. The correlation between any one of our measures of earnings management and peer performance is unlikely to suffer from reverse causality and omitted variable concerns for two reasons. First, a firm's subsequent earnings management behavior cannot go back and affect the previous equity returns of peer firms. Therefore the results are not driven by reverse causality. Second, as we have removed the common market and industry components when constructing *Pshock*, it is unlikely that omitted variables exist to drive both peer idiosyncratic returns and firms' earnings management. However, the estimation may contain noise and the common components may not be completely removed. In addition, Owens et al. (2017) suggest that controlling for firms' idiosyncratic shock can largely remove the noise in the measurement of discretionary accruals. Therefore, we further control for a firm's own idiosyncratic returns (*Ishock*) in all regressions. In addition, we include industry (μ) and year (v) fixed effects to further control for the omitted variable problem.

In addition to *Ishock*, and industry and year fixed effects, we also control for firm-level characteristics and peer characteristics in our regressions. Following prior literature (e.g. Yu 2008), we control for *MTB*, *Size*, *ROA*, *Asset Growth Rate*, *Cash Flow Volatility*, *Institutional Holding*, *Coverage* and *Leverage*. *MTB* is the market value of equity plus the book value of debt divided by the book value of assets. Previous studies suggest that growth firms are more likely to inflate their earnings (e.g. Lee, Li and Yue 2006). Therefore, we expect the coefficient of *MTB* to be positive.

Size is calculated as the log value of total assets. Large firms usually attract more public attention and face greater scrutiny leading to a high litigation risk (e.g. Khan and Watts 2009). Therefore, *ceteris paribus*, large firms are unlikely to over-report their earnings and so we expect the coefficient of *Size* to be negative.

Firms that performed well in the past may choose to smooth their earnings by engaging in negative earnings management and then reversing it in the future. Therefore, we expect *ROA* to be positively correlated with the discretionary accruals in the current quarter.

Asset Growth Rate is estimated from the change in total assets divided by lagged total assets. Because *Asset Growth Rate* also captures the growth aspects of the firm, we expect its coefficient to be positive for the same reasons that the coefficient of *MTB* is.

Cash Flow Volatility is measured by the standard deviation of a firm's cash flow throughout the whole sample period. Investors cannot easily detect earnings management when the earnings are riddled with noise (Rogers and Stocken 2005). Therefore, firms are likely to overstate earnings when *Cash Flow Volatility* is high and we expect the coefficient of *Cash Flow Volatility* to be positive.

Institutional Holding is the percentage of common shares owned by institutional investors. *Coverage* is the log value of one plus the number of analysts following a given firm. Both institutional ownership and analyst coverage are regarded as corporate governance mechanisms which can reduce the absolute value of discretionary accruals (e.g. Rajgopal, Venkatachalam and Jiambalvo 1999; Yu 2008). However, there are studies suggesting that financial analysts and at least some institutional investors may focus on short-term performance and thus induce managerial myopia (e.g. Bushee 1998; He and Tian 2013). Therefore, the coefficients of *Institutional Holding* and *Coverage* could be positive or negative.

Leverage is total debt divided by total assets. Khan and Watts (2009) argue that leveraged firms face more scrutiny and are more conservative in financial reporting. Therefore, we expect the coefficient of *Leverage* to be negative.

All firm characteristics are measured at the end of *q-1*. Following Leary and Roberts (2014), we take the average for firms within a three-digit SIC industry excluding the firm itself to construct and control for peer characteristics in our regressions. However, we are unable to predict the coefficients of these peer characteristics.

5. Empirical Results

5.1. Baseline Results for H1

The results of testing Hypothesis 1 (*H1*) are presented in Table 3. We cluster the standard errors at the firm level. In the first column, we only include *Pshock* and industry and year fixed effects. The estimated coefficient of *Pshock* is 1.551 with a t-statistic of 8.81, indicating a positive and significant relationship between peer equity returns and a firm's discretionary accruals.

In the second column, we include *Ishock* and all firm-level and peer-level characteristics in our regression. The coefficient of *Pshock* is 1.281 and remains statistically significant (t-stat is 7.30). The coefficients and related t-statistics of *Pshock* do not vary much between the first and the second column. This result is consistent with existing evidence (Leary and Roberts 2014) that there is little correlation between idiosyncratic equity returns and firm and peer characteristics.[18]

Using the coefficient in the second column, we find that a one-standard-deviation increase in peer performance (*Pshock*) causes a firm's discretionary accruals to increase by 0.12% of total assets. This 0.12% change corresponds to 2.4% of the standard deviation of *DA* or represents on average a $4.04 million change in income before extraordinary items,[19] suggesting an economically significant effect. Because we have removed all common components in peer performance, the economic impact of peer performance estimated in Table 3 is solely based on the idiosyncratic performance which should be considered as a

[18] The average variance inflation factor (VIF) of this regression is 1.85 suggesting that multicollinearity is unlikely a serious concern.

[19] 0.093 * 1.281 / 5.017 = 0.024. The average total assets in our sample are $3,391.08 million. 0.093 * 1.281 * $3391.08 / 100 = $4.08.

lower bound on the peer performance effect. In sum, the results in Table 3 lend strong support to our Hypothesis 1 (*H1*).

[Insert Table 3 about here]

5.2. The Instrument Variable Approach

Although we have removed common shocks from peer performance by using peer idiosyncratic equity returns (*Pshock*), it is possible that the noise in the estimation process contains information which might affect a firm's earnings management decisions (Leary and Roberts 2014). For example, the βs in Eq. (1) can be time-varying. *Pshock* may capture industry dynamics when there is a systematic change in βs within the industry. In order to address this concern, we construct *Cshock*, which is the average idiosyncratic returns of the major customers of peer firms, as an instrumental variable of *Pshock*. The customer information is collected from firms' segment disclosure from 1989 to 2010.

We identify peers' major customers for inclusion in firm *i*'s *Cshock* based on three criteria: (1) the customer must be in a different industry from firm *i*'s industry, (2) the customer must not be a major client of firm *i*, and (3) the customer must be a major client of at least one other firm in the same industry as firm *i*. Cohen and Frazzini (2008) show that the shocks to customers are associated with the equity returns of supplier firms but not with those of other firms in the same supplier industry that are not directly related to the customers. Therefore, *Cshock* can serve as a valid instrument because it is associated with peer idiosyncratic equity returns (*Pshock*) but not with firm *i*'s performance directly (Leary and Roberts 2014). We further measure *Cshock* at quarter *q-1* (lagged one quarter) to avoid any contemporaneous association between supplier and customer industries that is not fully removed. As indicated by Leary and Roberts (2014), this approach excludes the most of similar firms in the peer group definition from a demand perspective. The noise in the construction of peer group could significantly reduce the power of our test.

We present instrumental variable results in Table 4. In column (1), we conduct a reduced-form analysis using *Cshock* instead of *Pshock* as our peer performance measure. The coefficient of *Cshock* is 0.305 with a t-statistic of 2.62, suggesting that a firm will engage in greater earnings management in response to a stronger performance from the major customers of peer firms. We implement two-stage least squares (2SLS) in columns (2) and (3). Column (2) presents the first-stage results. Consistent with Cohen and Frazzini (2008), *Cshock* is positively and significantly correlated with *Pshock*. The Cragg-Donald F statistic is 10.718 rejecting the null hypothesis that *Cshock* is a weak instrument. The second-stage results are reported in column (3) of Table 5. The instrumented *Pshock* remains positive and significant (t-stat is 2.42). Although the statistical power of the second-stage results has declined compared to the OLS results, peer performance still has a significant impact on firms' earnings management decisions.

To ensure that our results are indeed driven by customer-supplier relationships, we conduct a placebo test. In panel B, we replace each major customer of a peer of firm *i* with a randomly selected firm from the same customer industry that is not a customer or supplier of any firm in firm *i*'s industry, i.e., *pseudo customers*. We construct *Cshock_Pseudo* using return shocks of these *pseudo customers* and rerun the analysis in panel A. We repeat the process of random selection and rerun the regressions 100 times. In panel B of Table 4, we report the distribution of the coefficient estimates and the corresponding t-statistics from the reduced-form regression, the first-stage of IV regression and the second-stage of IV regression. The coefficient estimates are winsorized at the 1st and 99th percentiles to avoid outlier problems. We find that the placebo estimates from using *Cshock_Pseudo* are very small and insignificant compared to the estimates reported in panel A of Table 4 using

Cshock. Take the median for example. The reduced form coefficient of *Cshock_Pseudo* is -0.003 and the t-statistic is -0.225, while the coefficient of *Cshock* reported in panel A of Table 4 is 0.305 and the t-statistic is 2.62. Overall, the evidence supports our previous findings and is consistent with a causal impact of peer pressure on firms' earnings management decisions.

[Insert Table 4 about here]

5.3. Economic Mechanisms

5.3.1. Capital market pressure

Peer performance can affect firms' earnings management through pressure in the capital market. Investors and analysts often use peer performance as a benchmark when forming expectations for a firm's performance (De Franco, Hope and Larocque 2015). To avoid disappointing the market (e.g. Bartov, Givoly, Hayn 2002; Graham, Harvey, Rajgopal 2005), managers of the firm are motivated to manipulate earnings.

We first use analyst forecast revisions to test whether or not analysts set their expectations based on peer performance. In particular, we estimate the following empirical model:

$$Revisions_{i,q} = \rho_0 + \rho_1 Pshock_{-i,j,t} + \rho_2 Ishock_{i,j,t} + \rho_3 Controls + \mu + v + \epsilon_{i,t} \quad (5)$$

where $Revisions_{i,q}$ is the last analyst forecast consensus minus the first analyst forecast consensus in quarter *q*, scaled by the share price at the beginning of quarter *q*; and all other variables are as defined before. We expect the coefficient of *Pshock* (ρ_1) to be positive if analysts revise their expectations for the firm according to peer performance. The results are reported in panel A of Table 5.

In the first column, we do not include any control variables and in the second column, we include all control variables as well as industry and year fixed effects. The number of observations is smaller than that in Table 3 because this time we are only including firm-quarter observations with at least two consensus analyst forecasts. Consistent with our expectation, the coefficients of *Pshock* are positive and significant in both columns (t-stats are 10.66 and 4.73, respectively). These results support our argument that analysts set their expectations for firms according to peer performance.

Next, we perform tests to examine whether or not managers engage in earnings manipulation to meet or beat analyst consensus reached based on peer performance. We present the results in panel B of Table 5. The first column of panel B of Table 5 reports the results of estimating the following empirical model:

$$Prob(Meet/Beat)_{i,q} = \theta_0 + \theta_1 Pshock_{-i,j,t} + \theta_2 Ishock_{i,j,t} + \theta_3 Controls + \mu + \nu + \epsilon_{i,t} \quad (6)$$

where $Meet/Beat_{i,q}$ is a dummy variable that takes the value of one if the reported actual earnings per share (*EPS*) are greater than or equal to the last analyst consensus, and zero otherwise. As shown in the first column of panel B of Table 5, *Pshock* is insignificantly correlated with $Meet/Beat_{i,q}$, suggesting that peer performance does not affect the actual probability of meeting or beating market expectations (z-stat is 0.31). This evidence is consistent with Bratten et al. (2016) who find results disappearing after considering analyst forecast revisions.

Next we estimate the impact of peer performance on the probability of meeting or beating market expectations without earnings management. We remove the impact of earnings management from the reported actual *EPS* by subtracting discretionary accruals from reported actual *EPS*. In particular,

$$EPS_{NoEM} = EPS - \frac{Discretionary\ Accrual}{Number\ of\ shares}$$

where EPS_{NoEM} is the *EPS* after removing the impact of earnings management. We substitute the number of shares in the equation with common shares used to calculate diluted *EPS* (*Dilute Shares*) If *Dilute Shares* is missing for the firm-quarter, we substitute the number of shares with common shares used to calculate basic *EPS* (*Basic Shares*) instead.[20] We construct $Meet/Beat\_NoEM_{i,q}$ as a dummy variable that takes the value of one if EPS_{NoEM} is greater than or equal to the last analyst consensus, and zero otherwise. Although firms whose peers are performing well tend to manage their earnings upward, it is not clear whether or not such earnings management behavior is critical in meeting or beating analyst consensus. If firms do not face capital market pressure in their earnings management decisions, the probability of meeting or beating analyst consensus would be uncorrelated with peer performance even after excluding the effect of discretionary accruals. In contrast, if firms respond to capital market pressure by engaging in earnings management, we expect that after removing discretionary accruals, the probability of meeting or beating analyst consensus would be lower for firms whose peers are outperforming them. Then we estimate Model (6) again by replacing $Meet/Beat_{i,q}$ with $Meet/Beat\_NoEM_{i,q}$ as the dependent variable. The results are reported in the second column of panel B of Table 5.

As shown in the second column of panel B of Table 5, the probability of meeting or beating analyst consensus without earnings management is negatively and significantly correlated with *Pshock* (the z-stat is -8.55). This finding suggests that without earnings manipulation, managers would likely fail to meet the high expectations that analysts have set in response to strong peer performance. Taken together, the evidence in Table 5 lends support to the capital market pressure mechanism through which peer performance affects firms' earnings management, consistent with *H2a*.

[20] Our results do not change qualitatively or quantitatively if we use *Basic Shares* for all firm-quarter observations.

[Insert Table 5 about here]

5.3.2. Compensation pressure

Firms that adopt RPE in executive compensation contracts (Aggarwal and Samwick 1999; Gong, Li and Shin 2011) are compared with their peers in terms of accounting performance or stock return performance. Therefore, managers would have stronger incentives to engage in earnings management to match peer performance when their compensation contracts are based on RPE.[21] In order to test this compensation pressure mechanism, we follow Gong, Li and Shin (2011) to manually collect RPE information from firms' reports of Compensation Discussion and Analysis (CD&A) in their proxy statements. We start with S&P 1500 firms in 2006 and read the CD&A reports for each firm in fiscal years 2006 and 2013.[22] We collect 4,430 firm-quarter observations for the test. We estimate the following empirical model:

$$DA_{i,q} = \delta_0 + \delta_1 Pshock_{-i,j,t} + \delta_2 RPE * Pshock_{-i,j,t} + \delta_3 RPE + \delta_4 Ishock_{i,j,t} + \delta_5 Controls + \mu + v + \epsilon_{i,t} \quad (7)$$

where *RPE* is a dummy variable that takes the value of one if a firm's executive compensation contracts are explicitly based on RPE in year t, and zero otherwise. We are interested in the coefficients of the interaction between *RPE* and *Pshock*. We expect that managers would engage more heavily in earnings manipulation according to peer performance when their compensation contracts are RPE based. The results are presented in Table 6. In the first column, we do not include control variables. Instead, we include all

[21] We use all *RPE* firms because of the limited availability of the information about peer composition. Less than 10% of firms explicitly disclose their peer firms. Firms using RPE-based compensation may not use industry peer average performance as their benchmark. However, such practice works against our hypothesis and can only make our results weaker.

[22] Fiscal year 2006 is the first year when it became mandatory to disclose RPE and fiscal year 2013 is the last year in our sample period. If the filings are not available for the firm in 2013, we use the last filing of the firm in our sample period instead. The method and details of coding RPE information is available in Appendix B of Gong, Li and Shin (2011).

control variables in column 2. Consistent with our expectation, the coefficients of the interaction are positive and significant in both columns (t-stats are 2.04 and 1.75, respectively),[23] indicating that firms engage in greater earnings management in response to the performance of peer firms when their compensation is decided through RPE. The results support *H2b*.

[Insert Table 6 about here]

5.4. Robustness Checks

In this section, we present several robustness checks for our main finding. The estimation of discretionary accruals is noisy. Ball (2013) claims that when using discretionary accruals to proxy for earnings management, there is an over-identification of earnings management firms (i.e., more earnings management firms are identified than there actually exist). Owens et al. (2017) provide evidence consistent with this argument. In order to minimize this concern, in panel A of Table 7, we report the regression results of using different ways of constructing discretionary accruals. First, we follow Owens et al. (2017) to control for firm idiosyncratic shock in estimating discretionary accruals. Owens et al. (2017) show that after controlling for firm idiosyncratic shock, the over-identification problem largely disappears when using signed discretionary accruals.[24] In particular, when estimating Equation (3), we further include contemporaneous firm idiosyncratic shock ($Ishock_{i,q}$) in the control variables and estimate discretionary accruals (*DA_shock*) with this modified model. We report the results of *DA_shock* in the first column of panel A of Table 7. The coefficient of *Pshock* is 1.209 with a t-stat of 6.75 which is similar to our main results both qualitatively

[23] The sums of the coefficients of *Pshock* and *RPE*Pshock* are positive and significant in both specifications (p-values are 0.022 and 0.094, respectively).
[24] The over-identification problem of earnings management is mostly severe when using absolute discretionary accruals (Owens et al. 2017). The problem is less of a concern in our study because we use signed discretionary accruals and we have already controlled for contemporaneous firm idiosyncratic shock in our main regressions.

and quantitatively. In the second column, we use *DA_rank* instead of *DA* as our dependent variable. *DA_rank* is the quintile rank of *DA* in each year-quarter. Using the quintile rank of *DA* instead of the raw value can also mitigate the noise in the estimation. The coefficient of *Pshock* remains positive and significant (t-stat is 2.14). In the third column of Table 7, we construct a dummy *DA_Positive* that takes the value of one if *DA*>0, and zero otherwise. Using a signed dummy can further alleviate the concern over measurement errors in *DA* because peer idiosyncratic shocks, by definition, should not affect the firms' fundamentals. We run a Probit regression and the coefficient of *Pshock* is 0.356 and remains statistically significant (z-stat is 8.80) suggesting that higher peer performance increases the probability that firms' discretionary accruals are positive.

Because of mandatory audits, the earnings management behavior might be different in the fourth quarter. In order to control for the last quarter effect, we include a fourth quarter dummy as a control variable in the regressions. The dummy takes a value of one if it is the fourth quarter of the fiscal year, and zero otherwise. As shown in columns (4) to (7) of panel A, our results are qualitatively unchanged. In sum, our results are unlikely driven by the noise in discretionary accruals.

In the main analyses, our peer group is based on the three-digit SIC industry classification. In this section we use an alternative approach to define peer groups as a robustness check. Hoberg and Phillips (2010, 2016) propose industry classifications based on 10-K textual analyses. They argue that the text-based industry classifications can better identify peer firms in a similar product market. Following Hoberg and Phillips (2010, 2016), we use fixed industry classifications instead of three-digit SIC industries to form our peer group and construct our peer performance measure (*Pshock*). Additionally, De Franco et al. (2015) find that the majority of peer firms are chosen from the same two-digit global industry classification (GIC) industries. Therefore, we also consider firms' performance in the same two-digit GIC industries as an alternative measure of peer performance. In panel B of Table 7, we report results based on 100, 300 and 500 fixed industry classifications (FICs)[25] and the two-digit GIC.[26] Although we have changed the breadth of the peer groups, the impact of peer performance on earnings management holds for different peer group classifications. In all columns, we include all control variables as we do in Table 3. In sum, our results are robust to alternative definitions of peers.

In panel C of Table 7 we examine whether or not the peer pressure exists for both leaders and followers. On the one hand, because of limited attention, market participants may not be able to distinguish one follower from another and may simply evaluate a follower's performance by the peer average. Therefore, managers of the followers would be motivated to manipulate their earnings according to peer performance. On the other hand, if leaders underperform their peers, then investors would start getting worried and may withdraw their investment.[27] Therefore, peer performance is also important to leaders and managers of the leaders would have the incentive to manipulate earnings according to peer performance. In the first two columns of panel C, we report results using *Size* to define industry leaders. Firms are classified as industry leaders if they are in the top quintile of *Size* in our sample. In columns (3) and (4) of panel C, firms are defined as industry leaders if they are in the top quintile of *Institutional Holding* in our sample. They are defined as industry leaders if they are in the top quintile of *Coverage* in our sample in the last two columns of panel C. Firms that are not industry leaders are classified as followers. As shown in panel C of Table 7, the coefficients of *Pshock* are positive and statistically significant for both leaders and followers

[25] The sample size is generally smaller than our main sample because the text-based industry classifications start from 1996. The FIC data are available at http://cwis.usc.edu/projects/industrydata/industryclass.htm.
[26] The sample size is larger because two-digit GIC industries contain more firms every year than three-digit SIC industries resulting in fewer observations lost in estimating *DA*.
[27] An example is Nokia. The company was once the leader in the mobile industry but eventually lost its advantage and hence its dominance.

regardless of how we define leaders. The evidence suggests that managers of both leaders and followers engage in earnings manipulation in response to peer performance.

In panel D of Table 7 we further examine whether or not the timing of earnings announcements matters for peer pressure. Bratten et al. (2016) suggest that firms that make their announcements earlier set a benchmark according to which firms that make their announcements later respond. Because we measure peer performance within the fiscal period, the timing of earnings announcements should not affect the relationship between peer performance and discretionary accruals in our context. We expect both types of firms to be affected by peer performance. The first two columns of panel D of Table 7 report the regression results for those firms that are among the first three in the industry to make their announcements for the quarter as well as all other firms. Consistent with our expectation, both types of firms respond to peer performance strongly by engaging in earnings management. In the next four columns, we further divide the two types of firms into big and small firms. Big (small) firms are those that are larger (smaller) than the industry average for the quarter. Again, our results suggest that even the firms that make their announcements earlier (i.e. the leaders) are significantly influenced by peer performance in their earnings management decisions.

[Insert Table 7 about here]

5.5. Peer Performance and Corporate Real Expenditure

In this section, we examine whether or not peer performance affects firms' real operation and investment. We focus on two types of expenditure: research and development (*R&D*) expenses and other selling, general and administrative expenses (i.e., SG&A expenses minus R&D expenses, *Other SG&A*).[28] A large part of SG&A and R&D expenses have long-lasting effects on firms' long-term performance (e.g. Eberhart, Maxwell and Siddique 2004; Eisfeldt and Papanikolaou 2013). Meanwhile, both also have an immediate impact on firms' short-term earnings because most of these expenses are not capitalized. Graham, Harvey and Rajgopal's (2005) survey finds that managers are willing to forego real projects in order to achieve short-term performance benchmarks. Because of the immediate impact on firms' short-term earnings, managers may also have incentives to cut SG&A or R&D expenses in response to peer performance. We scale SG&A and R&D expenses by total assets and use the same control variables as those in Eq. (4) to test the association between peer performance and firms' real expenditure. The results are reported in Table 8. The evidence in columns (1) and (2) shows that peer performance is negatively and significantly associated with firms' contemporaneous R&D expenses, but insignificantly associated with other SG&A expenses. The coefficients of *Pshock* are -0.001 and -0.353 (t-stats are -0.78 and -3.61) when the dependent variables are *Other SG&A* and *R&D*, respectively.[29] The result suggests that managers may cut their R&D expenses to match peer performance (e.g. Roychowdhury 2006; Zang 2012).

One potential concern is that cutting real expenditure can translate into higher-than-normal accruals, leading to biased inference in our results. In order to mitigate this concern, we repeat our analyses in Table 3 by adding contemporaneous other SG&A and R&D expenses as control variables. As reported in column (3) of Table 8, our results remain the same.[30] In particular, the *Other SG&A* and *R&D* expenses are negatively correlated with

[28] The majority of firms include R&D expenses as part of SG&A. See the COMPUSTAT manual for a detailed explanation. However, as discussed in Li, Qiu, and Shen (2017) and Peters and Taylor (2017), there is no credible way of determining whether a firm's R&D expenses have been included in SG&A or cost of goods sold (COGS).

[29] We do not replace missing SG&A or R&D with zero because Koh and Reeb (2015) have shown that firms without R&D expenses could still engage in innovation. Our results remain qualitatively the same if we replace missing SG&A and R&D with zero.

[30] There are fewer observations than in Table 3 because of missing SG&A and R&D information. Our results do not change if we replace missing SG&A and R&D with zero.

discretionary accruals. These results are consistent with the substitution effect between cutting real expenditure and engaging in accruals management (Zang 2012). Overall, the evidence in Table 8 ensures that our inferences of earnings management are valid.

[Insert Table 8 about here]

6. Conclusion

This study examines the role of peer performance in a firm's earnings management behavior. Although theoretically intuitive, demonstrating its role is empirically challenging. Using a peer performance measure constructed from the idiosyncratic equity returns of peer firms and an instrumental variable based on the idiosyncratic equity returns of the major customers of peer firms, we alleviate the possible endogeneity concerns. We find that peers' idiosyncratic performance plays an important role in a firm's earnings management. In particular, we find that a firm's discretionary accruals are positively correlated with peer performance. Further analysis reveals two important mechanisms of peer performance: capital market pressure and compensation pressure. We also find that peer performance is negatively associated with firms' real expenditure such as R&D expenses. The evidence documented in this paper emphasizes the importance of peer performance in financial reporting and corporate governance.

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Table 1 Summary Statistics

This table reports summary statistics for the sample. *DA* is estimated from the performance-matched modified Jones model and presented as a percentage of lagged assets. *MTB* is the market value of assets divided by the book value of assets. *Size* is calculated as the log value of total assets. *ROA* is calculated as net income scaled by lagged assets. *Asset Growth Rate* is estimated from the change in assets divided by lagged assets. *Cash Flow Volatility* is measured by the standard deviation of a firm's cash flow throughout the whole sample period. *Leverage* is total debt divided by total assets. *Institutional Holding* is the percentage of common shares owned by institutional investors. *Coverage* is the log value of one plus the number of analysts following the firm. *Firm-level Controls* represent variables of the focal firm in quarter *q-1*. *Peer Controls* denote variables averaged for all of the firms within the same three-digit industry, excluding the focal firm. The whole sample consists of 138,299 firm-quarter observations from 1989 to 2013 and 6,863 unique firms.

	Q1	Mean	Median	Q3	Std Dev.
DA	-1.817	0.100	0.268	2.337	5.017
Firm-level Controls					
MTB	1.121	1.936	1.479	2.177	1.404
Size	4.295	5.879	5.768	7.370	2.105
ROA	-0.002	0.002	0.011	0.024	0.051
Asset Growth Rate	-0.019	0.025	0.012	0.047	0.116
Cash Flow Volatility	0.022	0.066	0.037	0.067	0.097
Leverage	0.039	0.220	0.191	0.338	0.200
Institutional Holding	0.167	0.448	0.453	0.705	0.304
Coverage	0.693	1.346	1.386	2.197	1.034
Peer Controls					
MTB	1.403	1.928	1.754	2.286	0.734
Size	4.823	5.744	5.614	6.593	1.280
ROA	-0.010	-0.001	0.003	0.013	0.023
Asset Growth Rate	0.000	0.023	0.019	0.041	0.046
Cash Flow Volatility	0.036	0.068	0.055	0.089	0.046
Leverage	-0.004	0.010	0.005	0.021	0.028
Institutional Holding	0.142	0.223	0.204	0.287	0.113
Coverage	0.321	0.429	0.415	0.530	0.165

Table 2 Decomposition of Return and Construction of *Pshock*

This table reports summary statistics of return factor regression and of the constructed *Pshock* and *Ishock*. Return decomposition is estimated from the following model:

$$Ret_{i,t} = \beta_0 + \beta^{market}\left(R_{m,t} - R_{f,t}\right) + \beta^{industry}\left(R_{industry,t} - R_{f,t}\right) + \varepsilon_{i,j,t}$$

where $Ret_{i,t}$ is the monthly return for firm *i*; $R_{m,t}$ and $R_{f,t}$ are the market return and risk-free rate in the corresponding month, respectively; and $R_{industry,t}$ is the value-weighted three-digit SIC industry returns excluding firm *i* itself. We adopt a rolling window using observations in the 60 months before the fiscal quarter end to estimate the model for each firm. We require at least 36 months of historical return data in each regression. Using the estimated coefficients from the past 60 months, we derive firm *i*'s idiosyncratic equity returns (*Ishock*) in quarter *q* as follows:

$$Ishock_{i,q} = Ret_{i,q} - \hat{\beta}_0 - \hat{\beta}^{market}\left(R_{m,q} - R_{f,q}\right) - \hat{\beta}^{industry}\left(R_{industry,q} - R_{f,q}\right)$$

where $Ret_{i,q}$, $R_{m,q}$, $R_{industry,q}$ and $R_{f,q}$ are firm *i*'s return, market return, industry return and risk-free rate, respectively, for the quarter. All returns are cumulated for each fiscal quarter. Following Leary and Robers (2014), we define *Peer Shock* (*Pshock*) as the mean of *Ishock* of all other firms in the same three-digit SIC industry.

	Mean	Median	Std Dev.
$\alpha_{i,t}$	0.009	0.008	0.021
$\beta_{i,t}^{Market}$	0.643	0.597	0.990
$\beta_{i,t}^{Industry}$	0.442	0.376	0.707
Observations	58	60	6
Adjusted R^2	0.220	0.181	0.170
$Ret_{i,q}$	0.042	0.014	0.34
Ishock	0.008	-0.011	0.246
Pshock	0.007	-0.003	0.093

Table 3 Effect of Peer Performance on Earnings Management
This table reports the regressions of discretionary accruals (*DA*) on peer shock *(Pshock*) in column (1) and on *Pshock* and other control variables in column (2). All of the variables are defined in Table 1. All of the *Firm-level Controls* and *Peer Controls* are lagged one quarter relative to the dependent variable. The regressions are estimated using OLS with industry and year fixed effects. Standard errors are clustered by firm and t-statistics are reported in parentheses. ***, **, and * indicate significance levels below 1%, 5% and 10% respectively (two-tailed).

	Predicted Sign	(1) *DA*	(2) *DA*
Pshock	+	1.551***	1.281***
		(8.81)	(7.30)
Ishock	+		0.668***
			(9.01)
Firm-level Controls			
MTB	+		0.075***
			(4.41)
Size	-		-0.023*
			(-1.91)
ROA	+		1.501***
			(3.12)
Asset Growth Rate	+		0.300
			(1.51)
Cash Flow Volatility	+		0.177
			(0.77)
Leverage	-		-0.494***
			(-5.05)
Institutional Holding	?		0.025
			(0.37)
Coverage	?		-0.052**
			(-2.16)
Peer Controls			
MTB	?		0.055
			(1.57)
Size	?		-0.076**
			(-2.33)
ROA	?		-1.504*
			(-1.72)
Asset Growth Rate	?		-0.766*
			(-1.86)
Cash Flow Volatility	?		0.574
			(1.18)
Leverage	?		-0.004
			(-0.02)
Institutional Holding	?		0.212
			(1.28)
Coverage	?		0.053
			(0.86)

Constant	Yes	Yes
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Observations	138,299	138,299
Adj R^2	0.006	0.008

Table 4 Performance of Major Customers of Peers as Instrumental Variable

This table reports results based on an instrumental variable. In panel A, the performance of major customers of peers (*Cshock*) is used as an exogenous instrument of peer performance (*Pshock*). *Cshock* is the average idiosyncratic returns of major customers of peer groups. To be included in firm *i*'s *Cshock*, a major customer must satisfy the following three criteria: (1) the customer must be in a different industry, (2) the customer must not be a major customer of firm *i*, and (3) the customer must be a major customer of at least one other firm in the same industry as firm *i*. *Cshock* is measured at quarter *q-1*. Column (1) presents reduced-form regression results in which we use *Cshock* instead of *Pshock* in the regression. Column (2) reports the first-stage results of the two-stage least squares regressions, in which *Cshock* is used as an instrument of *Pshock*. Second-stage results are presented in column (3). In panel B, we rerun the tests in panel A by replacing *Cshock* with *Cshock_Pseudo*, which is the mean of return shocks from *pseudo customers*. *Pseudo customers* are randomly selected from the same industry but are not the customers or suppliers of any firm in firm *i*'s industry. We perform random selection and estimation 100 times and report the distribution of coefficients and t-statistics. All control variables are the same as those in Table 3 and are defined in Table 1. Standard errors are clustered by firm and t-statistics are reported in parentheses. ***, **, and * indicate significance levels below 1%, 5% and 10% respectively (two-tailed).

Panel A Customer performance (*Cshock*)

	(1) Reduced-form *DA*	(2) First-stage of IV *Pshock*	(3) Second-stage of IV *DA*
Cshock	0.305***	0.007***	
	(2.62)	(2.73)	
Instrumented Pshock			41.184**
			(2.42)
Ishock	Yes	Yes	Yes
Firm-level Controls	Yes	Yes	Yes
Peer Controls	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Observations	111,479	111,479	111,479
Adj R^2	0.011	0.131	0.009

Panel B Placebo tests

	Percentile					
	Mean	5th	25th	50th	75th	95th
(1) Reduced-form	-0.003	-0.093	-0.023	-0.003	0.019	0.113
	(-0.26)	(-2.35)	(-1.11)	(-0.23)	(0.85)	(1.84)
(2) First-stage of IV	0.002	-0.001	0.000	0.001	0.003	0.008
	(1.63)	(-3.52)	(-0.55)	(1.69)	(3.85)	(6.72)
(3) Second-stage of IV	50.010	5.050	25.250	50.500	74.750	94.950
	(-0.02)	(-1.83)	(-0.73)	(0.03)	(0.69)	(1.70)

Table 5 Capital Market Pressure

This table reports results for capital market pressure hypothesis (H2a). Panel A reports the regressions of analyst forecast revisions (*Revisions*) on peer shock *(Pshock*) in column (1) and on *Pshock* and other control variables in column (2). $Revisions_{i,q}$ is the last analyst forecast consensus minus the first analyst forecast consensus in quarter *q*, presented as a percentage of share price at the beginning of quarter *q*. All control variables are the same as those in Table 3 and are defined in Table 1. The first column of panel B reports the Probit regression of *Meet/Beat* on *Pshock* and other control variables. $Meet/Beat_{i,q}$ is a dummy variable that takes the value of one if the reported actual earnings per share (*EPS*) is greater than or equal to the last analyst consensus, and zero otherwise. The second column of panel B reports the Probit regression of *Meet/Beat_NoEM* on *Pshock* and other control variables. $Meet/Beat\_NoEM_{i,q}$ is a dummy variable that takes the value of one if EPS_{NoEM} is greater than or equal to the last analyst consensus, and zero otherwise. EPS_{NoEM} is the *EPS* after removing the impact of discretionary accruals from the reported actual *EPS*. All control variables are the same as those in Table 3 and are defined in Table 1. Standard errors are clustered by firm and t-statistics are reported in parentheses. ***, **, and * indicate significance levels below 1%, 5% and 10% respectively (two-tailed).

Panel A Analyst Forecast Revisions

	(1) *Revisions*	(2) *Revisions*
Pshock	0.221***	0.094***
	(10.66)	(4.73)
Ishock		0.370***
		(30.77)
Firm-level Controls		
MTB		0.026***
		(15.56)
Size		0.011***
		(4.78)
ROA		0.689***
		(11.47)
Asset Growth Rate		0.034**
		(2.01)
Cash Flow Volatility		0.047*
		(1.65)
Leverage		-0.124***
		(-8.53)
Institutional Holding		0.049***
		(5.19)
Coverage		-0.008*
		(-1.85)
Peer Controls		
MTB		0.000
		(0.02)
Size		-0.012**
		(-2.51)
ROA		0.270***

		(2.62)
Asset Growth Rate		0.013
		(0.35)
Cash Flow Volatility		0.149**
		(2.07)
Leverage		-0.033
		(-1.14)
Institutional Holding		0.027
		(1.17)
Coverage		0.003
		(0.33)
Constant	Yes	Yes
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Observations	98,856	98,856
Adj R^2	0.030	0.069

Panel B Meeting or Beating Analyst Consensus

	(1) *Meet/Beat*	(2) *Meet/Beat_NoEM*
Pshock	0.016	-0.416***
	(0.31)	(-8.55)
Ishock	0.719***	-0.084***
	(32.66)	(-4.49)
Firm-level Controls		
MTB	0.054***	0.002
	(10.16)	(0.35)
Size	0.060***	-0.017***
	(9.84)	(-3.41)
ROA	1.907***	0.511***
	(15.75)	(4.70)
Asset Growth Rate	0.047	-0.114***
	(1.13)	(-2.72)
Cash Flow Volatility	0.582***	0.066
	(6.43)	(1.11)
Leverage	-0.164***	0.132***
	(-4.57)	(4.37)
Institutional Holding	0.264***	0.003
	(9.77)	(0.14)
Coverage	0.093***	0.034***
	(7.64)	(3.30)
Peer Controls		
MTB	-0.013	-0.001
	(-1.03)	(-0.07)
Size	-0.008	0.001
	(-0.59)	(0.05)
ROA	0.167	0.463*

	(0.57)	(1.75)
Asset Growth Rate	0.069	0.265**
	(0.65)	(2.34)
Cash Flow Volatility	0.046	-0.179
	(0.25)	(-1.09)
Leverage	0.017	0.008
	(0.20)	(0.12)
Institutional Holding	0.102	-0.187***
	(1.62)	(-3.48)
Coverage	-0.045*	0.030
	(-1.82)	(1.53)
Constant	Yes	Yes
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Observations	98,856	98,856
Adj R^2	0.062	0.011

Table 6 Compensation Pressure

This table presents results for compensation pressure hypothesis (H2b). Column (1) reports the regressions of discretionary accruals (*DA*) on peer shock *(Pshock*) and its interaction with *RPE*. Column (2) reports the regressions of discretionary accruals (*DA*) on *Pshock*, its interaction with *RPE*, and other control variables. *RPE* is a dummy variable that takes the value of one if the firm's executive compensation contracts are explicitly RPE based, and zero otherwise. All control variables are the same as those in Table 3 and are defined in Table 1. The regressions are estimated using OLS with industry and year fixed effects. Standard errors are clustered by firm and t-statistics are reported in parentheses. ***, **, and * indicate significance levels below 1%, 5% and 10% respectively (two-tailed).

	(1) *DA*	(2) *DA*
Pshock	-0.581	-0.862
	(-0.50)	(-0.75)
*Pshock * RPE*	3.244**	2.801*
	(2.04)	(1.76)
RPE	0.164	0.164
	(1.51)	(1.51)
Ishock	No	Yes
Firm-level Controls	No	Yes
Peer Controls	No	Yes
Constant	Yes	Yes
Year Fixed Effects	Yes	Yes
Industry Fixed Effects	Yes	Yes
Observations	4,430	4,430
Adj R^2	0.023	0.030

Table 7 Robustness Tests for the Effect of Peer Pressure on Earnings Management
This table reports the robustness tests for the effect of peer performance on earnings management. In panel A, *DA_rank* is the quintile rank of *DA* in each quarter. *DA_shock* is estimated following Owens et al. (2017) by controlling for firm idiosyncratic shock in (a/the?) performance-matched modified Jones model. *DA_Positive* is a dummy variable taking the value of one if *DA*>0, and zero otherwise. Panel B presents results based on alternative industry classifications. Following Hoberg and Phillips (2010, 2016), FIC 100, FIC 300 and FIC 500 are fixed 100, fixed 300 and fixed 500 industry classifications based on 10-K textual analysis, respectively. Panel C reports results for leaders and followers. Firms are classified as leaders if they are in the top quintile of *Size*, *Institutional Holding* or *Coverage* in our sample. Panel D reports results for firms that are among the first three in the industry to announce earnings for the quarter as well as for all other firms. Big firms are those that are larger than the industry average for the quarter. Small firms are those that are smaller than the industry average for the quarter. All firms that are not leaders are classified as followers. All control variables are the same as those in Table 3 and are defined in Table 1. Standard errors are clustered by firm and t-statistics (z-statistics) are reported in parentheses. ***, **, and * indicate significance levels below 1%, 5% and 10% respectively (two-tailed).

Panel A

	(1) *DA_shock*	(2) *DA_rank*	(3) *DA_Positive*	(4) *DA*	(5) *DA_shock*	(6) *DA_rank*	(7) *DA_Positive*
Pshock	1.209***	0.097**	0.356***	0.528***	0.462***	0.097**	0.174***
	(6.75)	(2.14)	(8.80)	(3.09)	(2.64)	(2.12)	(4.36)
Ishock	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Peer Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes
4th quarter dummy	No	No	No	Yes	Yes	Yes	Yes
Observations	137,155	138,299	138,299	138,299	137,155	138,299	138,299
Adjusted R^2 / Pseudo R^2	0.007	0.005	0.008	0.036	0.034	0.005	0.027

Panel B

	FIC 100	FIC 300	FIC 500	2-digit GIC
	DA	*DA*	*DA*	*DA*
Pshock	0.815***	0.822***	0.590***	2.177***
	(3.71)	(3.82)	(2.86)	(9.53)
Ishock	Yes	Yes	Yes	Yes
Firm-level Controls	Yes	Yes	Yes	Yes
Peer Controls	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes
Observations	98,043	89,963	84,651	158,808
Adj R^2	0.016	0.014	0.013	0.018

Panel C

	DA					
	Size		*Institutional Holding*		*Coverage*	
	Leaders	*Followers*	*Leaders*	*Followers*	*Leaders*	*Followers*
Pshock	1.882***	1.158***	1.239***	1.280***	1.854***	1.157***
	(6.54)	(5.66)	(3.80)	(6.39)	(6.76)	(5.60)
Ishock	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Peer Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	27,671	110,628	27,769	110,530	29,272	109,027
Adj R^2	0.019	0.008	0.019	0.008	0.014	0.009

Panel D

	DA					
	Announcement		*Earlier announcement*		*Later announcement*	
	Earlier	*Later*	*Big*	*Small*	*Big*	*Small*
Pshock	0.962***	1.351***	1.409***	0.239	1.757***	0.984***
	(2.97)	(6.61)	(3.98)	(0.41)	(7.37)	(3.04)
Ishock	Yes	Yes	Yes	Yes	Yes	Yes
Firm-level Controls	Yes	Yes	Yes	Yes	Yes	Yes
Peer Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	33,799	104,591	19,208	14,591	51,854	52,737
Adj R^2	0.012	0.010	0.018	0.008	0.017	0.008

Table 8 Peer Performance and Corporate Real Spending

This table reports results of the association between *Pshock* and contemporaneous corporate expenses. In column (1), the dependent variable is *Other SG&A* which is firm *i*'s SG&A expenses minus its R&D expenses as a percentage of total assets in quarter q. In column (2), the dependent variable is *R&D* which is firm *i*'s R&D expenses as a percentage of total assets in quarter q. Observations with missing *SG&A* or *R&D* expenses are removed from the regressions. All control variables are the same as those in Table 3 and are defined in Table 1. In column (3), we repeat the analyses in Table 3 with contemporaneous *Other SG&A* and *R&D* as additional control variables. Standard errors are clustered by firm and t-statistics are reported in parentheses. ***, **, and * indicate significance levels below 1%, 5% and 10% respectively (two-tailed).

	(1) *Other SG&A*	(2) *R&D*	(3) *DA*
Pshock	-0.001	-0.353***	0.932***
	(-0.78)	(-3.61)	(3.72)
Other SG&A			-6.591***
			(-7.33)
R&D			-23.106***
			(-13.42)
Ishock	Yes	Yes	Yes
Firm-level Controls	Yes	Yes	Yes
Peer Controls	Yes	Yes	Yes
Year Fixed Effects	Yes	Yes	Yes
Industry Fixed Effects	Yes	Yes	Yes
Observations	65,629	71,524	65,629
Adj R^2	0.450	0.420	0.027