Finance Research Letters 6 (2009) 152–158

Contents lists available at ScienceDirect

Finance Research Letters

journal homepage: www.elsevier.com/locate/frl

Do firms' earnings management practices affect their equity liquidity?

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ARTICLE INFO

Article history:
Received 12 November 2008
Accepted 26 March 2009
Available online 5 April 2009

JEL classification:
G01
G10
G30
M40

Keywords:
Equity liquidity
Adverse selection costs
Earnings management

ABSTRACT

This study investigates the relationship between earnings management and equity liquidity, positing that as incentives arise for the manipulation of firm performance through earnings management (due partly to conflicts of interest between firm insiders and outsiders), greater earnings management may signal higher adverse selection costs. If earnings manipulation reveals aggressive accounting practices, liquidity providers tend to widen bid-ask spreads to protect themselves. The empirical results indicate that companies with higher earnings management suffer lower equity liquidity.

1. Introduction

Under accrual-based accounting standards, income and expenses are reported as they occur, as opposed to cash-based standards, under which income and expenses are reported as they are received or paid. It permits discretion in the financial statements to allow better expression of firm performance; however, accruals require certain assumptions and estimations. The use of such discretion to intentionally manage reported results is termed 'earnings management' (hereafter EM). EM is recognized

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doi:10.1016/j.frl.2009.03.003

to relate to certain factors that can reduce the quality of audited financial reports, such as auditor independence, audit and non-audit service fees, and client importance (Frankel et al., 2002; Myers et al., 2003). These findings suggest that audited financial reports are not guaranteed to be free of EM.

Managers may conduct aggressive EM for their private benefit in numerous circumstances; for example, Bartov and Mohanram (2004) note that managers tend to engage in EM to inflate earnings during periods leading up to a large exercise of stock options. Examining the differences in EM from a cross-county perspective, Leuz et al. (2003) argue that many of the differences result from attempts by insiders to protect their private control benefits.

This study investigates the influence of EM on equity liquidity, positing that firms with higher EM incur higher liquidity costs. Aggressive EM indicates lower accounting information quality (Dechow and Dichev, 2002), which may lead to a larger proportion of informed traders dealing in the equity of the firm, along with a corresponding decline in the willingness of uninformed liquidity traders to trade in such equities. Since the evidence demonstrates that managers may conduct aggressive EM for private benefit, liquidity traders recognize the involvement of adverse selection costs in EM, with such costs having been clearly demonstrated by the corporate accounting scandals.

Although sophisticated market makers can, to some degree, sense the EM performed by managers and estimate discretionary accruals based on financial information, they nevertheless remain uncertain about how much private information the insiders have and how much the earnings are manipulated. Firms with aggressive EM will incur higher information asymmetry, thereby increasing the probability of trading against informed traders. Uninformed liquidity providers will therefore incur relatively higher costs, and as a result will offer wider bid-ask spreads to obtain some price protection.

During periods of corporate financial reporting crises, managerial agency costs are particularly severe for firms with high discretionary accruals, as are information asymmetry costs.[1] The Sarbanes-Oxley (SOX) Act mandates corporate boards, executives and auditors to adopt specific measures to increase corporate accountability. The Act is designed to enhance the accuracy of corporate disclosure and reduce the likelihood of financial reporting misstatements. This study aims to investigate the relationship between EM and equity liquidity during the recent period of accounting scandals and the period following the Act enacted. The empirical results suggest that aggressive EM increases information asymmetry and decreases liquidity, and the effects of EM on equity liquidity might appear to be more severe after the enactment of the SOX Act.

2. Data source and variable definition

This study identifies an initial sample of non-financial firms included in the Russell 3000 index. For any given industry, the cross-sectional estimation of the measures of EM requires that the number of firms must exceed six and that the necessary data on COMPUSTAT be available to estimate the financial variables. The trading characteristic variables are obtained from CRSP. Similar to Huang and Stoll (1996), this study selects stocks with an average price greater than $1 and four or more average daily trades. The two sub-sample periods run from October to December of 2001 and 2002, periods corresponding to the Enron crisis period and the enactment of the SOX Act. This work obtains intraday data from the TAQ database[2] and deletes all trades and quotes out of time sequence. Following the data screening method in Chung (2006), this study omits irregular quotes where: (i) either the bid or the ask price is zero or less; (ii) either the bid or the ask depth is zero or less; and (iii) either the price or volume is zero or less.

To measure equity liquidity, this study first uses the variable averaged percentage spread (*PSP*) for each security from October to December of 2001 or 2002. PSP_i is calculated as:

$$PSP_i = \text{mean of } \frac{a_{it} - b_{it}}{(a_{it} + b_{it})/2} \tag{1}$$

[1] Cohen et al. (2008) suggest that EM increased significantly during the period prior to the enactment of the SOX Act. Jain et al. (2008) also find that the reported financial scandals have led to a higher adverse selection component for spreads, and a decline in investor confidence.

[2] TAQ database contains intraday data of every trades and quotes for all securities listed on the NYSE and AMEX, as well as Nasdaq National Market System and SmallCap issues.

where a_{it} and b_{it} denote the intraday ask and bid prices at time t for security i.

Since liquidity is a multifaceted concept, and since turnover has been widely used as a proxy for liquidity in previous studies (Brockman et al., 2008), this study also uses turnover as an additional measure of liquidity. This work defines *TURNOVER* as the log value of the average daily trading volume divided by total shares outstanding. Since firms with aggressive EM incur higher asymmetric information costs, decreasing the trading intention of uninformed investors, this study expects that *TURNOVER* will be deduced. Furthermore, since firms with higher turnover are actively followed by outside capital markets, such firms may be less able to hide EM behavior, thus reducing the level of discretionary accruals. This study thus expects a simultaneous and negative relationship between *EM* and *TURNOVER*.

Compared with other EM methods based on altering firm operations, such as selling assets and reducing spending on advertising and research and development, the manipulation of accounting accruals is expected to be easier and hence this instrument is prioritized over others (Peasnell et al., 2005). This study adopts the modified Jones model (Jones, 1991) to measure discretionary accruals. This approach estimates normal accruals as a function of revenue changes and discretionary accruals as the remaining portion of accruals. As noted by Dechow et al. (1995), the modified Jones model is extremely powerful in detecting sales-based manipulations. The parameters of the following cross-sectional OLS regression model are estimated:[3]

$$\frac{Accruals_{i,t}}{TA_{i,t-1}} = \omega_0 \frac{1}{TA_{i,t-1}} + \omega_1 \frac{\Delta SALES_{i,t}}{TA_{i,t-1}} + \varepsilon_{i,t} \tag{2}$$

where $Accruals_{i,t}$ denotes the current accruals for firm i in year t, measured as the change in non-cash current assets minus the change in non-debt current liabilities and depreciation expenses; $\Delta SALES_{i,t}$ represents the change in sales for firm i in year t; and $TA_{i,t-1}$ is the book value of total assets for firm i from the previous year. The regression equation is deflated by $TA_{i,t-1}$ to reduce heteroskedasticity, and the regression coefficient is estimated for each industry. Following Dechow et al. (1995), the non-discretionary accruals (*NDA*) for each sample firm are estimated as:

$$NDA_{i,t} = \hat{\omega}_0 \frac{1}{TA_{i,t-1}} + \hat{\omega}_1 \frac{(\Delta SALES_{i,t} - \Delta TR_{i,t})}{TA_{i,t-1}} \tag{3}$$

where $\hat{\omega}_0$ and $\hat{\omega}_1$ denote OLS estimates for the regression parameters in Eq. (2) and $\Delta TR_{i,t}$ represents the change in trade receivables, subtracted from $\Delta SALES_{i,t}$ to allow for the possibility of credit sales management by the company. The results of the paper are robust to omitting this adjustment, ΔTR. The discretionary accrual (*DA*) is then the remaining portion of the accruals:

$$DA_{i,t} = \frac{Accruals_{i,t}}{TA_{i,t-1}} - NDA_{i,t} \tag{4}$$

Accruals reverse over time, managing earnings upward and downward are hypothesized to be EM. Following Leuz et al. (2003), the hypothesis of this study does not rely on the direction of the discretionary accruals, but rather on the magnitude; thus, the measure of earnings management (*EM*) is based on the absolute value of *DA*.

3. Methodology

As noted in prior studies (Stoll, 1978, 2000; Van Ness et al., 2002), cross-sectional variations in spreads can be explained by economic variables, such as price, volume, volatility, firm size and stock exchange. To examine the influence of EM on bid-ask spreads, this study investigates the following regression model, controlling for the significant determinants of the spreads:

$$PSP_i = \alpha_0 + \alpha_1 EM_i + \alpha_2 SDRET_i + \alpha_3 LNTV_i + \alpha_4 LNCLP_i + \alpha_5 LNTR_i + \alpha_6 LNMV_i + \alpha_7 DEXCH_i + \varepsilon_i \tag{5}$$

[3] The average adjusted R^2 for all industries in Eq. (2) is 36.53% for 2001, and 34.15% for 2002.

where *PSP* denotes the average of percentage spread for equity *i* during the given period; *EM* represents the measure of EM; *SDRET* is the standard deviation of daily stock returns for the sample period; *LNTV* denotes the natural log of the average daily trading dollar volume for the sample period; *LNCLP* represents the natural log of the average closing stock price for the sample period; *LNTR* denotes the natural log of the average daily total number of trades for the sample period; *LNMV* is the natural log of the market value of the firm at the end of the sample period; and *DEXCH* represents the dummy variable, which equals 1 if the company is listed on the NASDAQ, and otherwise equals 0.

For timely disclosure of financial information, firms must announce interim financial reports and any unscheduled material events or corporate changes deemed important to investors during the accounting year. The sample periods of our investigation are the last quarters of 2001 and 2002 and close to the end of the two fiscal years. By this stage of the accounting year, much accounting information has already been released by firms and interpreted by market participants. Furthermore, to some extent, EM is an overall accounting arrangement, and time is required for the adjustment of discretionary accruals. If managers manipulate earnings, the effects of such manipulation will eventually be reversed at the same amount during subsequent periods. Firms with higher EM during the previous periods may still have relatively higher EM in the near future. Accordingly, although market makers do not have explicit financial reports of firms during the sample period, they can use interim financial information to conclude the degree of EM.

When information asymmetry is high, shareholders lack sufficient resources to monitor manager actions; thus, EM might occur. Richardson (2000) shows that information asymmetry costs (bid-ask spreads) positively affect firm EM behavior; that is, EM is endogenous, and an instrumental variable estimation procedure can help produce consistent estimates. Simultaneity may exist between EM and firm equity liquidity. This study thus adopts a simultaneous equation model, estimating Eq. (5) by three stage least squared (3SLS).[4] This study selects firm characteristics with potential to affect *EM* level as the instrument variables. Following prior studies (Dechow et al., 1996; Richardson, 2000; Lee et al., 2006), the instrumental variables are firm leverage (*LEV*), quarterly operating cash flow volatility (*CFVAR*), firm size (*LTA*), market-to-book ratio (*MB*), return on assets (*ROA*), and revenue growth (*GROWTH*).

4. Empirical results

The 3SLS regression results of Eq. (5) are listed in Table 1. The final sample in pre-SOX period comprised of a total of 999 firms in 44 industries. Among the sample firms, 537 corporations are listed on the NASDAQ and 457 (5) corporations are listed on the NYSE (AMEX). A positive relationship between *EM* and *PSP* exists for both pre- and post-SOX Act. The empirical results indicate that when firms increase discretionary accruals by 1% of total assets, market makers will widen the percentage spread by 2.4 (7.6) basis points, reaching 5.1% (17.7%) of average percentage spreads in the pre- (post-) SOX Act period.[5] The significantly positive coefficients of *DEXCH* indicate a difference in the *PSP* between the two market structures, as demonstrated by Van Ness et al. (2002). The regression results for *EM* are presented in Panel B showing that *EM* is positively related to *PSP* at below the 0.01 level. Generally, this study finds that the spreads amongst companies with higher *EM* are wider after controlling for cross-sectional differences. Table 1 also presents the results of the effects of *EM* on the *TURNOVER*. The coefficient of *EM* is significantly positive at the 0.01 level in pre-SOX period, indicating that firms with high *EM* will have reduced stock trading turnover; however, the effect is insignificant in the post-SOX period.

The empirical results support the argument that aggressive EM signals managerial intention to obtain private benefits, and the rational response of liquidity providers is to widen the bid-ask spreads to afford themselves some measure of price-protection, possibly reducing stock liquidity.

[4] One shortcoming of simultaneous equation is that market makers do not seem to have full accounting reports for the current year. For robustness, this study also verifies that our empirical results hold if the *EM* for the previous year is used in the estimation of Eq. (5) by two stage least squares regression model (2SLS), and gets similar conclusions.

[5] The average *EM* is approximately 6.72% of total assets, ranging between 61.53% and 0.01%, and the standard deviation is 5.71%. The average *PSP* are 47 and 43 basis points in the pre- and post-SOX Act period, respectively.

Table 1
3SLS regression results of the simultaneous equation model.[a]

Panel A	October–December 2001				October–December 2002			
	PSP		*TURNOVER*		*PSP*		*TURNOVER*	
Intercept	0.010	(0.001)***	−0.534	(0.001)***	0.007	(0.001)***	−0.411	(0.001)***
EM	0.024	(0.001)***	−7.251	(0.001)***	0.076	(0.001)***	−1.908	(0.218)
SDRET	0.101	(0.001)***	8.721	(0.001)***	0.068	(0.001)***	4.187	(0.001)***
LNTV	−0.001	(0.059)*	0.829	(0.001)***	0.001	(0.923)	0.834	(0.001)***
LNCLP	−0.002	(0.001)***	−0.074	(0.019)**	−0.002	(0.001)***	0.049	(0.109)
LNTR	−0.003	(0.001)***	−0.157	(0.001)***	−0.003	(0.001)***	−0.081	(0.051)*
LNMV	0.001	(0.001)***	−0.561	(0.001)***	0.001	(0.001)***	−0.703	(0.001)***
DEXCH	0.005	(0.001)***	0.282	(0.001)***	0.005	(0.001)***	0.256	(0.001)***
Panel B[b]	*EM*		*EM*		*EM*		*EM*	
Intercept	−0.002	(0.840)	0.019	(0.015)**	0.024	(0.006)***	0.049	(0.001)***
PSP	2.203	(0.001)***			1.849	(0.001)***		
TURNOVER			−0.006	(0.001)***			−0.001	(0.621)
LEV	−0.029	(0.002)***	−0.027	(0.001)***	−0.019	(0.004)***	−0.011	(0.244)
CFVAR	0.002	(0.082)*	0.001	(0.948)	0.001	(0.503)	0.002	(0.051)*
LTA	0.008	(0.001)***	0.001	(0.001)***	0.003	(0.002)***	0.001	(0.708)
MB	0.003	(0.001)***	0.002	(0.001)***	0.003	(0.001)***	0.002	(0.001)***
ROA(%)	−0.001	(0.001)***	−0.001	(0.001)***	−0.001	(0.001)***	−0.001	(0.001)***
GROWTH	0.001	(0.999)	−0.007	(0.050)*	0.009	(0.018)**	0.002	(0.679)
System weighted R^2	0.573		0.630		0.535		0.715	
Number of observations	999		999		1059		1059	

[a] The dependent variable in the first equation is the average percentage spread (*PSP*) or the turnover (TURNOVER) for the sample period. The dependent variable in the second equation is the absolute value of the discretionary accruals (*EM*). *** indicates significance at the 1% level; ** indicates significance at the 5% level; and * indicates significance at the 10% level. Figures in parentheses are *p*-values.

[b] *LEV* is the debt to total asset ratio at the end of the sample period; *CFVAR* represents the standard deviation of quarterly operating cash flows over the 12 quarters before the sample periods and divided by the average quarterly operating cash flows over the period; *LTA* represents the natural log of total assets at the end of the sample periods; *MB* is the market to book ratio at the end of the sample periods; *ROA* is the return on assets for the given year; and *GROWTH* is the growth rate in net revenue.

To test whether the effect of EM on equity liquidity alters after the implementation of the SOX Act, Table 2 lists the 3SLS regression results for pooling the data of 2001 and 2002. Dummy variable $d1$ is equal to 1 for the post-SOX period data to control for the potential difference due to the 2002 sample. Two regression models are presented in Table 2. The first model assumes no structural change in the control variables, while the second one assumes that these variables have structural change for the post-SOX period. The empirical results show that the estimated coefficients for the '$EM \times d1$' variable are significantly positive for both *PSP* equation models, whilst the first model in the *TURNOVER* equation is significantly negative. The results provide some evidence that the effect of EM on equity trading costs and liquidity is greater in the post-SOX period. If firms engage in aggressive EM after the enactment of the Act, then executives are supposed to pursue greater personal benefits to compensate for increased costs associated with legal responsibility. Market makers thus face higher asymmetric information costs, and so widen the bid-ask spreads to afford themselves some measure of price protection.

This study also investigates the impact of EM on the asymmetric information component of the bid-ask spread, using the methods adopted by George et al. (1991) and Madhavan et al. (1997) as robustness tests. Since the results are similar to those obtained using the PSP approach, they are not reported here.

5. Conclusions

This study posits that aggressive EM signals greater managerial agency costs and asymmetric information costs. As a result, liquidity providers incur relatively higher costs and thus offer higher bid-ask spreads and lower liquidity. The empirical results presented in this study support this hypothesis,

Table 2
3SLS regression results of the simultaneous equation model on EM and the percentage spread for the two sub-sample periods.[a]

Variables	Model 1				Model 2			
Panel A	*PSP*		*TURNOVER*		*PSP*		*TURNOVER*	
Intercept	0.008	(0.001)***	−0.338	(0.001)***	0.009	(0.001)***	−0.476	(0.001)***
EM	0.037	(0.001)***	−5.848	(0.001)***	0.027	(0.001)***	−7.996	(0.001)***
SDRET	0.085	(0.001)***	6.343	(0.001)***	0.108	(0.001)***	10.730	(0.001)***
LNTV	−0.001	(0.365)	0.826	(0.001)***	−0.001	(0.151)	0.894	(0.001)***
LNCLP	−0.002	(0.001)***	−0.017	(0.412)	−0.002	(0.001)***	−0.109	(0.001)***
LNTR	−0.003	(0.001)***	−0.117	(0.001)***	−0.003	(0.001)***	−0.205	(0.001)***
LNMV	0.001	(0.001)***	−0.628	(0.001)***	0.001	(0.001)***	−0.613	(0.001)***
DEXCH	0.005	(0.001)***	0.275	(0.001)***	0.005	(0.001)***	0.334	(0.001)***
EM × *d*1	0.012	(0.001)***	−0.801	(0.034)**	0.029	(0.071)*	7.416	(0.231)
SDRET × *d*1					−0.040	(0.009)***	−7.503	(0.001)***
LNTV × *d*1					0.001	(0.415)	−0.119	(0.043)**
LNCLP × *d*1					−0.001	(0.541)	0.190	(0.043)**
LNTR × *d*1					−0.001	(0.378)	0.188	(0.007)***
LNMV × *d*1					−0.001	(0.835)	−0.063	(0.042)**
DEXCH × *d*1					0.001	(0.939)	−0.110	(0.169)
Panel B	*EM*		*EM*		*EM*		*EM*	
Intercept	0.009	(0.219)	0.030	(0.001)***	0.010	(0.179)	0.038	(0.001)***
PSP	2.262	(0.001)***			1.962	(0.001)***		
TURNOVER			−0.006	(0.001)***			−0.002	(0.163)
LEV	−0.026	(0.001)***	−0.024	(0.002)***	−0.025	(0.001)***	−0.020	(0.026)**
CFVAR	0.001	(0.148)	0.001	(0.848)	0.001	(0.122)	0.001	(0.688)
LTA	0.006	(0.001)***	0.006	(0.001)***	0.006	(0.001)***	0.004	(0.001)***
MB	0.003	(0.001)***	0.003	(0.001)***	0.003	(0.001)***	0.002	(0.001)***
ROA(%)	−0.001	(0.001)***	−0.001	(0.001)***	−0.001	(0.001)***	−0.001	(0.001)***
GROWTH	−0.001	(0.965)	−0.008	(0.054)*	−0.001	(0.884)	−0.007	(0.110)
PSP × *d*1	−0.213	(0.566)			0.157	(0.732)		
TURNOVER × *d*1			0.001	(0.796)			−0.001	(0.914)
LEV × *d*1	0.004	(0.718)	0.006	(0.574)	0.002	(0.835)	0.003	(0.761)
CFVAR × *d*1	0.001	(0.964)	0.002	(0.058)*	−0.001	(0.981)	0.002	(0.018)**
LTA × *d*1	−0.001	(0.015)**	−0.002	(0.025)**	−0.002	(0.014)**	−0.002	(0.021)**
MB × *d*1	0.001	(0.181)	−0.001	(0.926)	0.001	(0.409)	0.001	(0.294)
ROA(%) × *d*1	0.001	(0.001)***	0.001	(0.001)***	0.001	(0.001)***	0.001	(0.001)***
GROWTH × *d*1	0.012	(0.061)*	0.007	(0.267)	0.011	(0.079)*	0.010	(0.169)
System weighted R^2	0.566		0.663		0.563		0.666	

[a] The dependent variable in the first equation is *PSP* or *TURNOVER*. The dependent variable in the second equation is the proxy of earnings management (*EM*). The number of observations is 2058. Figures in parentheses are *p*-values.

showing a positive (negative) simultaneous relationship between EM and equity trading costs (stock trading turnover). The evidence also indicates that there might be an increase in adverse selection costs of EM for the post-SOX period.

Acknowledgments

Financial support for this study was provided by the National Science Council of Taiwan. The authors wish to thank anonymous referees for helpful comments and suggestions.

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