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# Does High-Quality Financial Reporting Mitigate the Negative Impact of Global Financial Crises on Firm Performance? Evidence from the United Kingdom

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## I. Introduction and Research Motivation

The global financial crisis that began in 2008 significantly shook investor confidence worldwide and raised serious concerns about the stability of the financial system. The crisis originated in the collapse of the subprime mortgage market in the United States and subsequently evolved into a much more dangerous phenomenon, causing many corporate casualties in the United States and Europe. The literature concerning the causes of the crisis has attempted to clarify the role played by accounting; more specifically, there has been heated debate regarding whether fair-value measurement substantially accelerated the market meltdown. Critics have alleged that fair values are less transparent and increase information asymmetry—that after fair-value accounting was performed to recognize many unrealized losses for financial assets and liabilities in an attempt to avoid a vicious cycle of falling prices, fair-value accounting in fact triggered this cycle, or at least amplified and exacerbated its severity (see Liao et al., 2010, Liao et al., 2013; Liao et al 2014). However, Madras Gartenberg and Serafeim (2009) found inconsistencies in this idea, showing that fair valuation depressed equity values during the financial crisis. Laux and Leuz (2010) found little evidence that downward spirals or asset "fire sales" in certain markets were the result of fair-value accounting. Barth and Landsman (2010) concluded that fair-value accounting played little or no role in the 2008 recession.

The debate highlights the importance of accounting in the stability of economic systems and in maintaining investor confidence, both of which were notably absent during the crisis. The nature of the debate motivated us to consider more generally the role of financial reporting in the crisis. Fair valuation is only one part of financial reporting. Moreover, fair valuation is not likely to be a serious issue for non-financial institutions (Madras Gartenberg & Serafeim, 2009). Therefore, in the current paper, we decided to focus our attention on the quality of financial reporting as a whole to determine its effect on the quality of information. We argue that high-quality financial reporting will provide timely, relevant, and transparent information that could help minimize uncertainty. Conversely, we argue that low-quality financial reporting is associated with ambiguous, misleading, or unreliable information, which is likely to increase information asymmetry and market illiquidity. Because market participants are likely to face great uncertainty and risk, they may pay closer attention to the credibility of information in making a decision during a financial crisis. Hence, we would expect to see a positive relationship between the quality of financial reporting and liquidity of the equity market. In our context, this would mean that firms with higher-quality financial reporting would have been less adversely affected by the 2008 meltdown, all other factors being equal.

Our research design relied on prior studies (Barth et al., 2008; Jones et al., 2008; H. Chen et al., 2010), and we used earnings quality as a valid proxy for financial reporting quality (Leuz et al., 2003; Biddle et al., 2009; F. Chen et al., 2010). Our proxy for information asymmetry was the bid-ask spread, which is also frequently used in this line of study (Mohd, 2005; Leuz & Verrecchia, 2000; Bhat & Jayaraman, 2009). We chose the United Kingdom as our research setting, because, after the United States, the United Kingdom was

hit most severely by the global economic recession.

The findings were generally consistent with our predictions. We found that the bid-ask spread widened during the financial crisis, suggesting that liquidity of the share market decreased. However, we also found evidence that liquidity increased with financial reporting quality during the period of financial distress. That is, firms with higher-quality financial reporting suffered a relatively less significant negative effect of the crisis on their liquidity. Financial reporting played a mitigating role, not only for large firms but for small and medium-sized firms as well. Finally, we particularly concerned ourselves with whether our prediction would hold for financial firms, because they were the most seriously impacted. Our results offer unambiguous evidence that a transparent accounting system can also help financial institutions to be more stable during an economic downturn. Our findings regarding the relationship between financial reporting quality and bid-ask spread were robust when we controlled for endogeneity and other confounding factors.

This paper makes several contributions to the literature. First, our evidence corroborates the findings from a glowing body of research on the relationship between accounting and auditing and the global financial crisis (e.g., Liao et al 2010, 2013, 2014; Aldamen et al, 2012). Second, there is limited evidence regarding the overall financial reporting system on the crisis. Our research fills this gap by exploring and explicitly showing the links between information asymmetry and the quality of financial reporting. Third, the vast majority of extant studies in this area focus on U.S. firms, whereas there is a lack of analysis of the European experience on the association between accounting and the financial crisis. Because the institutional and economic factors are likely to be different between the two regions, the associative pattern is likely to differ as well. Therefore, our study should expand our knowledge on this issue. Fourth, Lang and Maffett (2011) found that firms in a global sample with greater transparency experienced less liquidity volatility and fewer extreme illiquidity events during the financial crisis. However, there is a concern that, since their study was conducted in an international setting, the observed differences in liquidity at the firm level may not have been caused by differences in accounting quality; instead, they might have been a result of institutional differences on the national level. To address this issue, we chose a national setting for our study, which has the following advantages: (1) firms in our sample used the same accounting standards; (2) this approach reduced the difficulty in controlling for many national institutional differences that potentially affect financial reporting characteristics, such as legal protection for investors, disclosure requirements, and ownership concentration; and (3) it is well documented that different countries experienced very different impacts of the financial crisis on their stock market, which could not be easily resolved in an international setting. Thus, we believe our results will complement evidence reported by earlier studies.

In sum, our robust empirical results suggest that a sound financial reporting system mitigates investor concerns about information uncertainty and increases investor confidence, improving market liquidity, and thus will play a positive role in a financial crisis. The results are consistent with the notion that a stable financial reporting system is

an important part of our overall economic fabric. In this sense, our project provides new data for the international accounting literature, and important policy implications should follow to improve regulatory arrangements with respect to financial reporting quality, such as reducing ambiguous accounting methods and enhancing auditor independence, to mention two examples. Our findings will help build a framework for capital market regulators and other government agencies, on the basis of which a financial crisis risk management strategy—whether national or international—including accounting and corporate governance, can be developed with the hope that future liquidity crises of a similar nature could be avoided.

The remainder of the article proceeds as follows. Section II provides a literature review and develops our hypothesis. Section III discusses the research methodology. Section IV presents the results. Section V concludes the article.

## II. Literature Review and Hypothesis Development

*Information asymmetry, investor decision-making, and market liquidity*

The association between financial information and information asymmetry is a key issue in understanding the role of accounting in the financial crisis. Previous studies have shown that information asymmetry arises as a result of separation of ownership and control, and managers of a company may have private inside information that is not available to outside investors. However, managers are not allowed to trade their company's shares on inside information, so their knowledge should not directly affect liquidity. On the other hand, outside investors are not equally informed. Some investors, such as institutional shareholders who have a close relationship with managers, may have access to or share some private information with the managers, meaning that they might have a comparative advantage in processing the accuracy of accounting estimates. These investors are informed investors. In contrast, uninformed investors have difficulty in evaluating the quality of and risks associated with the reported assets and liabilities of a given firm. This information asymmetry leads to an adverse selection problem, in which informed investors exploit their informational advantage at the expense of uninformed investors (Glosten & Milgrom, 1985). Consequently, market participants facing an adverse selection problem will seek price protection to increase the bid-ask spread as a means of protecting themselves against expected losses from trading with more informed investors. This argument suggests that information asymmetry increases the bid-ask spread, thereby reducing market liquidity.

*Determinants of financial reporting quality*

There is a general consensus that the purpose of financial reporting, particularly earnings information, is to narrow information asymmetry and market uncertainty for external users and investors. However, the quality of financial reporting is not constant. Extant literature shows that the quality of financial reporting depends on the following country-level factors: the underlying legal system (La Porta et al., 1998); whether the economy is market-oriented or bank-oriented (Durnev & Kim, 2005); the accounting standards adopted (Barth et al., 2008; Tang et al., 2010); and the level of law enforcement (Hope, 2003). At the firm level, quality of financial reporting is associated with characteristics of the firm, such as size,

auditor type, overseas listings, recent increases in capital or debt, and complexity (Morris & Gray, 2007).

It is also widely accepted that management has incentives to manage earnings, which would result in higher earnings opacity and increase information risk. Such incentives include improving market performance, boosting share price, increasing analyst following, and others (Barth et al., 1999; Schrand & Walther, 2000). If the market price is expected to react to unexpected earnings (Ball & Brown, 1968) and rational managers believe that investors are unable to detect opportunistic behaviour (Bernard & Thomas, 1990, 1989; Abarbanell & Bernard, 1992; Ball & Bartov, 1996; Sloan, 1996), then managers will take advantage of the inherent subjectivity in accounting assumptions and standards to achieve personal benefit by engaging in earnings management (Ahmed et al., 1999; Holthausen & Verrecchia, 1990; Healy & Palepu, 1993). Apart from capital market considerations, there may be direct economic consequences of earnings measures, for example, regulatory and political costs, debt covenants, and CEO compensation (Aboody & Kasznik, 2000; Aboody et al., 2004; Watts & Zimmerman, 1990). Dechow et al (2010) concluded that management discretion, distortions of disclosure, estimation errors, and manipulation of the size of reported gains or losses all reduce the quality of financial reporting.

In addition, previous literature has emphasized that earnings management often focuses on the discretionary (rather than the usual) component of accruals. Discretionary accruals are subject to arbitrary interpretation of flexible accounting standards by self-interested managers and consequently are believed to be obscure and biased about the underlying income and financial position of a firm (e.g., Chen et al., 2010). Since discretionary inputs are less precise and involve more risk, information asymmetry between informed and uninformed investors would be more severe with earnings assessed on the basis of discretionary accruals.

*Market perception of accounting information quality*

Prior literature has shown that high-quality financial disclosure and earnings figures reduce information asymmetry and increase investor confidence (Francis et al., 2004, 2005; Lambert et al., 2007) and has documented a positive association between the quality of accounting information and capital market performance (Kim & Verrecchia, 1994; Lang and Maffett, 2011). For example, Welker (1995) found that analysts' ratings of firms' disclosures are significantly and negatively associated with the bid-ask spread. Leuz and Verrecchia (2000) showed that firms committing themselves to the International Accounting Standards or the U.S. Generally Accepted Accounting Principles (a proxy for increased levels of disclosure) experienced a lower bid-ask spread than firms that used the German Generally Accepted Accounting Principles. Brown and Hillegeist (2007) also documented an inverse relationship between the spread-based measure of information asymmetry and disclosure quality, which reduces the likelihood that informed traders will discover and trade on private information. Other studies that examined the cost of capital found that disclosure not only reduced the estimation risks of future cash flows, but it also helped constrain agency problems (Lambert

et al., 2007). Consistent with this argument, Francis et al. (2004, 2005) found that the cost of capital is negatively correlated with seven earnings attributes, especially accrual quality.

In sum, higher-quality financial reporting should allow investors to make more informed business decisions and should restrict opportunities for insiders to expropriate the wealth of outside investors and creditors. The empirical evidence suggests that information asymmetry is an inverse function of financial reporting quality. These studies also imply that there is a link between information quality and liquidity. Systematic risk is a covariation/sensitivity effect. A firm with higher systematic risk will perform relatively worse (better) during bad (good) macroeconomic conditions (Campbell et al., 1997). Market liquidity reflects the ability to trade large quantities of shares quickly, at a low cost, and without moving the price (Pastor & Stambaugh, 2003). A decline in liquidity is typically associated with an economic status in which there is investor outflow from the equity markets amidst high market volatility and risk aversion (e.g., Chordia et al., 2000; Brunnermeier & Pedersen, 2009). In addition, because of investors' aversion to risk, the demand for shares of firms with higher-quality information is subject to less fluctuation conditional on market liquidity. Decreased liquidity will affect the investor behaviour of different firms differently. Investors in companies associated with a high degree of uncertainty and adverse selection problems because of poor information quality are more likely to leave the market. In addition, market makers are less likely to provide liquidity because of concerns about adverse selection, resulting in a further reduction in investor demand for these shares. Thus, these firms perform worse when liquidity decreases. Conversely, when liquidity increases, there is an inflow of investors and market makers, which increases the demand and liquidity of the shares of the firms associated with greater uncertainty and adverse selection. Thus, the returns of firms with lower information quality (i.e., higher information risk) are more sensitive to changes in market liquidity. That is, information quality contributes to liquidity risk (Ng, 2011).

Moreover, from the signalling theory perspective (Spence, 1973, 2002), it can be argued that higher-quality accounting information provides a more accurate indication of underlying performance, and firms with higher operating performance are expected to have more incentives to provide earnings information of higher quality to show the true status of the firm and thereby avoid adverse selection. Consequently, this should narrow information asymmetry and reduce information risk and illiquidity, particularly during a period of financial distress. In contrast, poor performing firms do not want to make their financial results transparent, making it more difficult for investors to understand the true situation. In addition, previous studies suggest that business transaction costs include the cost to search, collect, and interpret relevant information (Williamson, 1981). Thus, a higher-quality earnings figure can help provide market participants with reliable information, so that the buyer and seller of shares of the firm can relatively easily reach an agreement about the true value of the firm, speeding the transaction. As a result, market liquidity can be enhanced.

*Financial reporting quality and market liquidity during the crisis*

We assert that high-quality financial reporting is even more important for investors during times of financial distress. Financial crises often occur suddenly, seriously disrupting capital markets (Mishkin, 1992) and resulting in substantial share price volatility and asset value meltdowns. In the context of a financial crisis, market uncertainty is greater than in a normal business environment and investor confidence is often significantly reduced, which consequently leads to increased demands for reliable information. On the other hand, management's incentives for wealth expropriation become stronger, because tough times make some insiders act more unethically, perhaps as a survival tactic (Johnson et al., 2000). As a result, earnings management would be more likely to be used to hide expropriation or poor performance caused by depressed economic conditions. Outside investors, therefore, become more sensitive than previously to firms' integrity regarding financial disclosures (Rajan and Zingales, 1998), and they are inevitably more aggressive in seeking price protection. Accordingly, the current global financial crisis provides a unique setting to empirically test the link between financial reporting quality and information asymmetry as measured by lower market illiquidity, or bid-ask spread. Based on the above arguments, we propose the following testable hypothesis:

> *Hypothesis: Higher-quality financial reporting mitigates the negative effect of a financial crisis on market liquidity, as measured by the bid-ask spread.*

## III. Research Design

### a. Empirical Model

According to the literature (e.g., Leuz et al., 2000; Christensen et al., 2011), we used the following model to determine the impact of a crisis on bid-ask spread (see Table 1):

$$\log(Spread_{it}) = \beta_0 + \beta_1 Crisis_{it} + \beta_2 AQ_{it} + \beta_3 Crisis_{it} * AQ_{it} + \beta_4 Turnover_{it-1} + \beta_5 Size_{it-1} + \beta_6 Volatility_{it-1} + IndFE + \varepsilon_{it}$$

We used the log value of the bid-ask spread, measured as the yearly median and mean quoted spread, as the dependent variable that increases (decreases) illiquidity (liquidity).[5] *Crisis* is an indicator variable that equals 1 for observations during the crisis period (2008–2009) and 0 for the non-crisis period (2005–2007). *AQ* is a financial reporting quality proxy (see next section for details of calculation of *AQ*). The interaction term, *Crisis*AQ,* captures the effect of financial reporting on market liquidity. If high-quality reporting mitigates the impact of the crisis, the coefficient is expected to be negative.

We used one market microstructure measure, the bid-ask spread, to measure information asymmetry. The bid-ask spread is a well-developed and often employed proxy in the accounting and finance literature (Krinsky & Lee, 1996; Leuz & Verrecchia, 2000; Roger, 2008; Bhat & Jayaraman, 2009; Ball et al., 2012). Muller et al. (2011, p. 1144) suggested that the bid-ask spread has good theoretical underpinnings and that the component attributable to information asymmetry can be isolated. When information asymmetry among equity investors is high, informed investors can exploit the information advantage at the expense of uninformed investors. Uninformed investors realize that they are faced with

[5] Our model implies that annual earnings information is associated with investors' daily trading activities (Ng, 2011; Dechow et al., 1996; Affleck-Graves et al., 2002).

an adverse selection problem and therefore seek to increase the bid-ask spread to protect themselves against expected losses from trading with more informed investors (Venkatesh & Chiang, 1986; Chae, 2005). In particular, the bid-ask spread is a better measure of information asymmetry among market participants that is especially useful as a dependent variable in a setting characterized by rapidly changing levels of market uncertainty, i.e., during financial crises (Liao et al., 2010, 2014).

We considered the following control variables with reference to prior literature. We included *turnover* to control for market makers' inventory holding costs and risk, and a negative coefficient is predicted (Muller et al., 2011). *Turnover* is the log value of yearly share median turnover (daily US$ trading volume divided by the market value at the end of each trading day). *Size* is the log value of equity, calculated as the stock price times the number of shares outstanding (in US$ million) at the end of the year. We controlled for firm size because large firms are likely to be scrutinised more closely and thus could be more transparent, such that bigger firms are expected to have lower market risk than smaller firms (Ng, 2011). *Volatility* is the log value of return volatility, which is the standard deviation of daily stock returns for the year.

**b. Financial Reporting Quality Proxies**

*AQ* serves as a proxy for financial reporting quality, which equals the absolute value of discretionary accruals multiplied by −1. Discretionary accruals equal total accruals minus estimated normal accruals, and we used the following five widely adopted models to estimate discretionary accruals.[6] Note that *AQ* is actually a measure of earnings quality that decreases earnings management and thus increases financial reporting quality.

Decow et al. (2010) defined earnings quality as follows: Higher-quality earnings provide more information about the features of a firm's financial performance that are relevant to a specific decision made by a specific decision maker. They organized the earnings quality proxies into three broad categories—properties of earnings, investor responsiveness to earnings, and external indicators of earnings misstatements—and emphasized that they reached no conclusion about the single best measure of earnings quality. Researchers typically use the earnings response coefficient as a proxy for investor responsiveness; this measure is not suitable for our study, as the bid-ask spread also gauges investor responsiveness. External indicators, such as earnings restatements, are available for a limited number of firms. Therefore, it appears that the properties of earnings are the most appropriate proxy for earnings quality in our context. Properties of earnings include earnings persistence and accruals, earnings smoothness, asymmetric timeliness and timely loss recognition, and target beating. These proxies are used for earnings management, which is assumed to erode earnings quality. Accruals and abnormal accruals have the following features. In its favour, measurement of accruals attempts to isolate the managed or error component of accruals, and the use of these models has become the accepted

[6] Bartov et al. (2000) found that cross-sectional models were better than time-series models in detecting earnings managements.

methodology in accounting to capture discretion. However, tests of the determinants/consequences of earnings management are joint tests of the theory and the abnormal accrual metric as a proxy for earnings management. Correlated omitted variables associated with fundamentals, especially performance, are of concern, given the dependence of normal accruals on fundamentals and the endogeneity of the hypothesized determinants/consequences with the fundamentals (Decow et al., 2010). Despite these limitations, it appears that they influence other measures and are more suitable for our project. For instance, it is still not clear whether earnings smoothing would increase or decrease earnings quality. Because we have already considered the effect of loss as firm, timely loss recognition is unlikely to increase our test power.

We next discuss the specific models used in our study to measure earnings quality.

**(1) Jones Model**

Jones (1991) argued that normal accruals are determined by two fundamentals: change of revenue and fixed assets investment. Accruals not explained by fundamentals are discretionary and will add bias into earnings, which lowers the quality of earnings as a measure to reflect performance of the firm. Thus, the basic model (Jones, 1991; DeFond & Jiambalvo, 1994) is:

$$TA_{it} = \alpha_1(1/Assets_{it\text{-}1}) + \alpha_2 \Delta REV_{it} + \alpha_3 PPE_{it} + \varepsilon_{it}$$

*TA* is total accruals scaled by lagged total assets for firm *i* in year *t*, in which total accruals are calculated as the difference between income before extraordinary items and operating cash flows. *Assets* are the year-end assets for company *i* in year *t-1*. *ΔREV* is the change in sales from year *t-1* to year *t*. *PPE* is gross property, plant, and equipment. *TA*, *ΔREV*, and *PPE* are scaled by *Assets*.

We estimated coefficients of the model from cross-sectional industry regressions by two-digit SIC groups for the year. We required a minimum of 10 observations for each two-digit SIC group for the year. The discretionary accrual is the predicted residual of the model. We then multiplied –1 by the absolute value of the residual and referred to it as *AQ_JM*. The higher the *AQ_JM*, the higher the earnings quality/financial reporting quality.

**(2) Modified Jones Model**

The Jones model assumes that all credit sales are non-discretionary; however, Dechow et al. (1995) argued that change of accounting receivables is discretionary and should be deducted from change of sales to estimate normal accruals. Therefore, the modified Jones model (Dechow et al., 1995; DeFond & Subramanyam, 1998) is:

$$TA_{it} = \alpha_1(1/Assets_{it\text{-}1}) + \alpha_2(\Delta REV_{it} - \Delta AR_{it}) + \alpha_3 PPE_{it} + \varepsilon_{it}$$

*ΔAR* is the change in accounts receivable from year *t-1* to year *t*, deflated by total assets of year *t-1*. The definitions of other variables in the model are the same as for the Jones model. Similar to Model 1, discretionary accruals (*AQ_MJM*) are equal to the absolute value of the

predicted residuals of the model, multiplied by –1. The higher the *AQ_MJM*, the higher the quality of financial reporting.

**(3) Adapted Jones Model**

Dechow et al. (2003) contended that the modified Jones model assumes that all credit revenues are discretionary and thus induces a positive correlation between discretionary accruals and current sales growth. They proposed the following adapted Jones model, which includes only the unexpected portion of the change in accounts receivables:

$$TA_{it} = \alpha_1(1/Assets_{it\text{-}1}) + \alpha_2((1+k)\Delta REV_{it} - \Delta AR_{it}) + \alpha_3 PPE_{it} + \varepsilon_{it}$$

The coefficient *k* is estimated in each two-digit SIC group for the year by the following model, which captures the expected change in accounts receivable for a given change in sales:

$$\Delta AR_{it} = \alpha + k\Delta REV_{it} + \eta_{it}$$

The definitions of the variables in the two models are the same as in the modified Jones model. Then, similarly, the discretionary accrual (*AQ_AJM*) is the absolute value of the predicted residual of the model multiplied by –1.

**(4) Modified Jones Model with Book-to-Market Ratio and Cash Flow from Operations**

Larcker and Richardson (2004) argued that the discretionary accruals estimated using the modified Jones model are correlated with growth in operating performance and contain measurement errors. Hence, they added the book-to-market ratio and cash flow from operations to the modified Jones model:

$$TA_{it} = \alpha_1(1/Assets_{it\text{-}1}) + \alpha_2(\Delta REV_{it} - \Delta AR_{it}) + \alpha_3 PPE_{it} + \alpha_4 BM_{it} + \alpha_5 CFO_{it} + \varepsilon_{it}$$

where *BM* is the book-to-market value of the common equity and *CFO* is the cash flow from operations in year *t* scaled by total assets in *t-1*. The definitions of other variables are the same as modified Jones model, and again, the discretionary accrual (*AQ_MBCFO*) is the absolute value of the predicted residual of the model multiplied by –1.

**(5) Modified Jones Model with Last-Year ROA**

To control for measurement errors in discretionary accruals caused by performance, Kothari et al. (2005) added ROA to the modified Jones model (see following for definition of ROA). The performance-matched Jones model (PJM) has since become a standard model to estimate normal accruals:

$$TA_{it} = \alpha_1(1/Assets_{it\text{-}1}) + \alpha_2(\Delta REV_{it} - \Delta AR_{it}) + \alpha_3 PPE_{it} + \alpha_4 ROA_{it-1} + \varepsilon_{it}$$

*ROA* is income before extraordinary items for firm *i* in year *t-1* over total assets in year *t-2*, and the discretionary accrual (*AQ_PJM*) is the absolute value of the predicted residual of the model multiplied by –1.

Table 1 Variable Definitions

| Variable | Definition |
|---|---|
| Liquidity | |
| Log(spread) | Log value of the yearly median quoted spread (defined as the difference between the bid price and ask price divided by the mid-point and measured at the end of each trading day). |
| Log(spread1) | Log value of the yearly mean quoted spread. |
| AQ (financial reporting quality) | |
| AQ_JM | The product of –1 and absolute value of discretionary accruals. Discretionary accruals are estimated using the cross-sectional Jones model, the cross-sectional modified Jones model, the cross-sectional adapted Jones model, the cross-sectional modified Jones model with book-to-market ratio and cash flow from operations, and the cross-sectional modified Jones model with the last-year ROA, respectively. We require a minimum of 10 observations for each two-digit SIC group for the year. |
| AQ_MJM | The product of –1 and absolute value of discretionary accruals. Discretionary accruals are estimated using cross-sectional modified Jones model. |
| AQ_AJM | The product of –1 and absolute value of discretionary accruals. Discretionary accruals are estimated using cross-sectional adapted Jones model. |
| AQ_MBCFO | The product of –1 and absolute value of discretionary accruals. Discretionary accruals are estimated using the cross-sectional modified Jones model with book-to-market ratio and cash flow from operations. |
| AQ_PJM | The product of –1 and absolute value of discretionary accruals. Discretionary accruals are estimated using the cross-sectional modified Jones model with the last-year ROA. |
| Crisis | Indicator variable equals 1 for observations in the crisis period (2008–2009) and 0 for observations in the non-crisis period (2005–2007). |
| Turnover | Log(share turnover). Share turnover is defined as daily US$ trading volume divided by the market value at the end of each trading day. |
| Size | Log(market value). Market value is defined as stock price times the number of shares outstanding (in US$ million). |
| Volatility | Log(return volatility). Return volatility is defined as the standard deviation of daily stock returns in a given year. |
| Loss | Indicator variable; equals one if net income is negative in a given year and zero otherwise. |
| PRICE | The ending trading price in a given year. |
| Industry FE | Industry fixed effects. There are 30 SIC2 industries in our sample. We generated 29 industry dummy variables. |

### c. Sample Selection, Descriptive Statistics, and Correlation Coefficients

*Sample Selection*

Bid-ask spread data, price-related data, and financial data were obtained from the Datastream database. Our sample period started in 2005 and ended in 2009. The European

Union and its member states formally adopted International Financial Reporting Standards IFRS for the preparation of financial statements on 1 January 2005. To prevent the shift in accounting standards from affecting determinations of earnings quality, we started sampling at 2005. We ended sampling in 2009 because most serious events of the current crisis took place in 2008 and 2009.

We started the selection process for the sample firms from all listed firms. In calculating discretionary accruals, we then excluded firms that did not have the required data and industries that had fewer than 10 firms. In line with previous analyses (Hail, 2011; Christensen et al., 2011), we excluded firms with a market value of equity of less than 1 million US dollars. The final sample was distributed across 30 industries and included 4271 firm-year observations. The numbers of observations for 2005 to 2009 are 624, 745, 877, 987, and 1038, respectively.

*Descriptive Statistics and Correlation Coefficients*

Table 2 (below) provides descriptive statistics of our sample firms. Panel A provides statistics for the whole sample, while Panel B divides it into two subsamples, a pre-crisis sample and a crisis sample. The log value of the yearly median spread was significantly larger in the crisis period (–3.194) than in the pre-crisis period (–3.571), which means that liquidity decreased in 2008 and 2009 (see also Figure 1). With respect to financial reporting quality, we did not find any significant changes in the five accounting quality proxies between the crisis period and the pre-crisis period; this indicates that the accounting quality during our sample period was stable. We also found, as expected, that share turnover and share prices were lower and return volatility was higher during the crisis period than in the pre-crisis period. In addition, 46.7% of the sample firms reported negative net income in the crisis period, which was significantly higher than during the pre-crisis period (34.2%), suggesting that the sample firms suffered from financial and operating difficulties in the crisis. We also calculated Pearson correlation coefficients, and the results (not tabulated) showed that illiquidity was positively and significantly correlated with *Crisis* but negatively correlated with *AQ* (financial reporting quality), as expected. However, we did not find any correlation between financial reporting quality proxies and the crisis.

Table 2 Descriptive Statistics

Panel A Descriptive Statistics for All Firms During 2005–2009

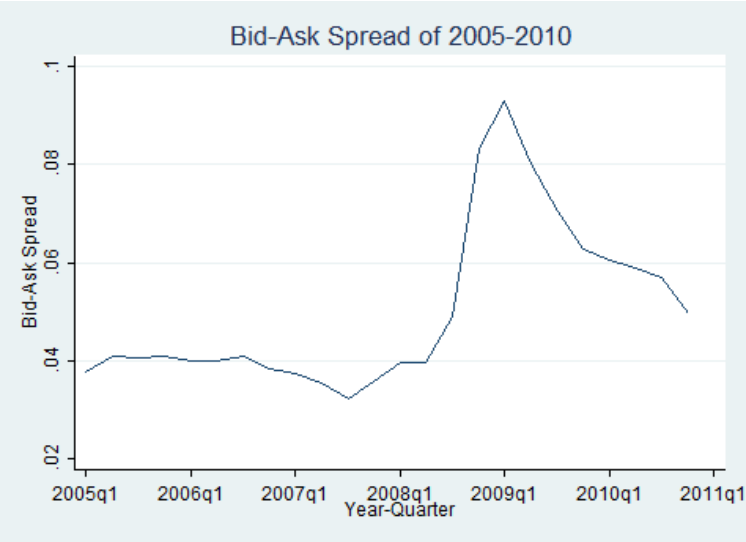
| Variable | N | Mean | Median | SD | Min | P5 | P95 | Max |
|---|---|---|---|---|---|---|---|---|
| Log(Spread) | 4271 | –3.393 | –3.147 | 1.577 | –7.044 | –6.426 | –1.153 | –0.405 |
| Log(Spread1) | 4271 | –3.242 | –3.036 | 1.51 | –6.733 | –6.17 | –1.06 | –0.047 |
| Crisis | 4271 | 0.474 | 0 | 0.499 | 0 | 0 | 1 | 1 |
| AQ_JM | 4271 | –0.098 | –0.059 | 0.118 | –0.622 | –0.349 | –0.005 | –0.001 |
| AQ_MJM | 4271 | –0.099 | –0.059 | 0.118 | –0.625 | –0.354 | –0.005 | –0.001 |
| AQ_AJM | 4271 | –0.098 | –0.059 | 0.119 | –0.639 | –0.358 | –0.005 | –0.001 |
| AQ_MBCFO | 4271 | –0.091 | –0.055 | 0.109 | –0.599 | –0.323 | –0.005 | –0.001 |
| AQ_PJM | 4271 | –0.096 | –0.059 | 0.113 | –0.604 | –0.342 | –0.005 | –0.001 |
| Turnover | 4271 | –7.084 | –7.272 | 1.26 | –9.746 | –8.993 | –4.919 | –4.483 |
| Size | 4271 | 4.719 | 4.428 | 2.152 | 0.536 | 1.557 | 8.646 | 10.571 |
| Volatility | 4271 | –3.679 | –3.709 | 0.521 | –4.819 | –4.51 | –2.779 | –2.407 |
| Loss | 4271 | 0.401 | 0 | 0.49 | 0 | 0 | 1 | 1 |
| PRICE | 4271 | 4.013 | 1.5 | 6.749 | 0.01 | 0.04 | 16.69 | 42.89 |

Panel B Descriptive Statistics for Pre-Crisis Period and Crisis Period

| | Crisis=0 (2005–2007) | | Crisis=1 (2008–2009) | |
|---|---|---|---|---|
| Variable | Mean | Median | Mean | Median |
| Log(Spread) | –3.571 | –3.351 | –3.194*** | –2.823*** |
| Log(Spread1) | –3.432 | –3.233 | –3.032*** | –2.711*** |
| AQ_JM | –0.1 | –0.06 | –0.096 | –0.058 |
| AQ_MJM | –0.1 | –0.06 | –0.097 | –0.058 |
| AQ_AJM | –0.1 | –0.06 | –0.096 | –0.058 |
| AQ_MBCFO | –0.092 | –0.057 | –0.09 | –0.054 |
| AQ_PJM | –0.097 | –0.059 | –0.094 | –0.059 |
| Turnover | –6.945 | –7.069 | –7.237*** | –7.482*** |
| Size | 4.707 | 4.397 | 4.733 | 4.469 |
| Volatility | –3.814 | –3.891 | –3.531*** | –3.545*** |
| Loss | 0.342 | 0 | 0.467*** | 0*** |
| PRICE | 5.047 | 2.325 | 2.867*** | 0.91*** |
| Observation | 2246 | 2246 | 2025 | 2025 |

**Log(spread)** is the log value of the yearly median quoted spread (defined as the difference between the bid and ask price divided by the mid–point and measured at the end of each trading day), and **log(spread1)** is the log value of the yearly mean quoted spread. Crisis is a dummy variable, which equals 1 if the observation is from 2008 and 2009 and is 0 otherwise. **AQ_JM, AQ_MJM, AQ_AJM, AQ_MBCFO,** and **AQ_PJM** are five proxies of earnings quality (defined as the product of –1 and the absolute value of discretionary accruals; discretionary accruals were estimated using the cross-sectional Jones model, the cross-sectional modified Jones model, the cross-sectional adapted Jones model, the cross-sectional modified Jones model with book-to-market ratio and cash flow from operations, and the cross-sectional modified Jones model with the last-year ROA). **Turnover** is the log value of last year's median share turnover, which is defined as daily US$ trading volume divided by the market value at the end of each trading day. **Size** is the log value of last year's median market value of equity, which is defined as stock price times the number of shares outstanding (in US$ million). **Volatility** is the log value of last year's median share volatility, which is defined as the standard deviation of daily stock returns in a given year. **Loss** is a dummy variable, which equals one if net income is negative in a given year and 0 otherwise. **PRICE** is the ending trading price in a given year. The *t*-test was used to test mean differences between the non-crisis sample and the crisis sample, and the Wilcoxon rank-sum test was used to test median differences. *** denotes significance at the 1% level (two-tailed).

Figure 1 Quarterly Liquidity in the United Kingdom, 2005–2010.




### d. The Role of Financial Reporting Quality in the Financial Crisis

Table 3 reports OLS coefficient estimates and (in parentheses) *t*-statistics based on robust standard errors that are heteroscedasticity-consistent and clustered by firm. We first used the discretionary accruals estimated by applying the performance-matched Jones model (Kothari et al., 2005) to proxy for financial reporting quality. Column (1) of Table 3 shows that the coefficient on *Crisis* is positively significant ($t = 4.80$ and $P < .01$), which suggests that the overall effect of the crisis was a drop in market liquidity, as expected. This means that, during the financial crisis, firms suffered from bad market conditions. However, we conjecture that the degree of market impact was conditional on the characteristics of each firm, particularly the quality of financial reporting, which is a key element associated with investor confidence. Thus, our primary interest is the interaction between the variables of crisis and financial reporting quality proxy (*Crisis*AQ_PJM*). If higher financial reporting quality helps firms, the coefficient of the interaction term will be negative. The coefficient was –0.605 and therefore significant ($t = –3.61$, $P < .01$), supporting our hypothesis that higher-quality financial reporting reduced the negative effect of the financial crisis on share liquidity. Note that the coefficient of *AQ* was insignificant, suggesting that bid-ask is not sensitive to accounting quality during ordinary business periods. However, in the context of economic meltdown and a crisis of investor confidence, high-quality financial information became important as a consequence of the unusually high degree of uncertainty and risk, which increased the sensitivity of market price to financial disclosure. The negative coefficient of *Crisis*AQ_PJM* is consistent with this interpretation. Our inferences held when we controlled for the known influence from a set of control variables, such as share turnover, firm value, return volatility, as well as industry fixed effects on market liquidity. Table 4 shows the results of our use of the Jones model, the modified Jones model, the adapted Jones model, and the Jones model with book-to-market ratio and cash flows from operations to estimate discretionary accruals multiplied by –1; the results were virtually the same as Table 3.

Table 3 The Role of Earnings Quality on Liquidity during the Financial Crisis

| | (1) | (2) |
|---|---|---|
| Liquidity | Log(spread) | Log(spread1) |
| Constant | –1.797*** | –1.461*** |
| | (–12.06) | (–9.71) |
| **AQ_PJM** | **0.148** | **0.086** |
| | **(1.14)** | **(0.64)** |
| **Crisis** | **0.122*** ** | **0.140*** ** |
| | **(4.80)** | **(5.25)** |
| **Crisis*AQ_PJM** | **–0.605*** ** | **–0.680*** ** |
| | **(–3.61)** | **(–3.99)** |
| Turnover | –0.330*** | –0.298*** |
| | (–23.42) | (–21.49) |
| Size | –0.518*** | –0.493*** |
| | (–60.28) | (–58.38) |
| Volatility | 0.395*** | 0.411*** |
| | (14.67) | (15.09) |
| Industry FE | Y | Y |
| *N* | 4271 | 4271 |
| $R^2$ | 0.867 | 0.853 |
| Adj. $R^2$ | 0.866 | 0.852 |

**Log(spread)** is log value of the yearly median quoted spread (defined as the difference between the bid and ask price divided by the mid-point and measured at the end of each trading day), and **Log(spread1)** is log value of the yearly mean quoted spread. **Crisis** is a dummy variable, which equals 1 if the observation is from 2008 and 2009 and is 0 otherwise. **AQ_PJM** is a proxy of earnings quality (defined as the product of –1 and the absolute value of discretionary accruals; discretionary accruals were estimated using the cross-sectional modified Jones model with the last-year ROA). **Turnover** is the log value of last year's median share turnover, which is defined as daily US$ trading volume divided by the market value at the end of each trading day. **Size** is the log value of last year's median market value of equity, which is defined as stock price times the number of shares outstanding (in US$ million). **Volatility** is the log value of last year's median share volatility, which is defined as the standard deviation of daily stock returns in a given year. The table reports OLS coefficient estimates and (in parentheses) *t*-statistics based on robust standard errors that are heteroscedasticity-consistent and clustered by firm. *** denotes significance at the 1% level (two-tailed).

Table 4 The Role of Earnings Quality on Liquidity during the Financial Crisis (Different EQ Proxies)

| Liquidity | (1) Log(spread) | (2) Log(spread1) | (3) Log(spread) | (4) Log(spread1) | (5) Log(spread) | (6) Log(spread1) | (7) Log(spread) | (8) Log(spread1) |
|---|---|---|---|---|---|---|---|---|
| Constant | –1.826*** | –1.490*** | –1.821*** | –1.489*** | –1.822*** | –1.488*** | –1.861*** | –1.530*** |
| | (–12.20) | (–9.86) | (–12.20) | (–9.87) | (–12.17) | (–9.83) | (–12.36) | (–10.08) |
| **Crisis** | **0.126*** ** | **0.145*** ** | **0.125*** ** | **0.145*** ** | **0.126*** ** | **0.145*** ** | **0.136*** ** | **0.156*** ** |
| | **(4.92)** | **(5.38)** | **(4.88)** | **(5.37)** | **(4.91)** | **(5.36)** | **(5.44)** | **(5.88)** |
| **AQ_JM** | **0.052** | **–0.009** | | | | | | |
| | **(0.41)** | **(–0.06)** | | | | | | |
| **Crisis*AQ_JM** | **–0.564*** ** | **–0.621*** ** | | | | | | |
| | **(–3.42)** | **(–3.64)** | | | | | | |
| **AQ_MJM** | | | **0.069** | **–0.004** | | | | |
| | | | **(0.56)** | **(–0.03)** | | | | |
| **Crisis*AQ_MJM** | | | **–0.569*** ** | **–0.621*** ** | | | | |
| | | | **(–3.48)** | **(–3.68)** | | | | |
| **AQ_AJM** | | | | | **0.065** | **0.001** | | |
| | | | | | **(0.52)** | **(0.01)** | | |
| **Crisis*AQ_AJM** | | | | | **–0.559*** ** | **–0.618*** ** | | |
| | | | | | **(–3.42)** | **(–3.66)** | | |
| **AQ_MBCFO** | | | | | | | **–0.073** | **–0.149** |
| | | | | | | | **(–0.53)** | **(–1.01)** |
| **Crisis*AQ_MBCFO** | | | | | | | **–0.505*** ** | **–0.569*** ** |
| | | | | | | | **(–2.92)** | **(–3.16)** |
| Turnover | –0.331*** | –0.298*** | –0.331*** | –0.298*** | –0.331*** | –0.298*** | –0.331*** | –0.299*** |
| | (–23.48) | (–21.54) | (–23.48) | (–21.55) | (–23.47) | (–21.54) | (–23.52) | (–21.59) |
| Size | –0.517*** | –0.491*** | –0.517*** | –0.491*** | –0.517*** | –0.491*** | –0.516*** | –0.491*** |
| | (–60.05) | (–58.02) | (–60.06) | (–58.06) | (–59.99) | (–57.98) | (–60.17) | (–58.08) |
| Volatility | 0.393*** | 0.409*** | 0.393*** | 0.409*** | 0.393*** | 0.409*** | 0.389*** | 0.404*** |
| | (14.56) | (14.98) | (14.59) | (14.99) | (14.58) | (14.99) | (14.37) | (14.80) |
| Industry FE | F | F | F | F | F | F | F | F |
| *N* | 4271 | 4271 | 4271 | 4271 | 4271 | 4271 | 4271 | 4271 |
| $R^2$ | 0.867 | 0.853 | 0.867 | 0.853 | 0.867 | 0.853 | 0.867 | 0.853 |
| Adj. $R^2$ | 0.866 | 0.852 | 0.866 | 0.852 | 0.866 | 0.852 | 0.866 | 0.852 |

**Log(spread)** is the log value of the yearly median quoted spread (defined as the difference between the bid and ask price divided by the mid-point and measured at the end of each trading day), and log(spread1) is the log value of the yearly mean quoted spread. **Crisis** is a dummy variable, which equals 1 if the observation is from 2008 and 2009 and is 0 otherwise. **AQ_JM, AQ_MJM, AQ_AJM,** and **AQ_MBCFO** are four proxies of earnings quality (defined as the product of –1 and the absolute value of discretionary accruals; discretionary accruals were estimated using the cross-sectional Jones model, the cross-sectional modified Jones model, the cross-sectional adapted Jones model, and the cross-sectional modified Jones model with book-to-market ratio and cash flow from operations). **Turnover** is the log value of last year's median share turnover, which is defined as daily US$ trading volume divided by the market value at the end of each trading day. **Size** is the log value of last year's median market value of equity, which is defined as stock price times the number of shares outstanding (in US$ million). **Volatility** is the log value of last year's median share volatility, which is defined as the standard deviation of daily stock returns in a given year. The table reports OLS coefficient estimates and (in parentheses) *t*-statistics based on robust standard errors that are heteroscedasticity-consistent and clustered by firm. *** denotes significance at the 1% level (two-tailed).

Note that while we reached a similar conclusion as did Lang and Maffett (2011), who addressed this issue in an international setting, we focused exclusively on financial reporting quality, while Lang and Maffett additionally considered auditor quality. In addition, our research design enabled us to avoid many international/national institutional effects, such as degree of legal protection for outside investors, stringency of disclosure requirements, media penetration, ownership concentration, and adoption of different accounting standards (H. Chen et al., 2010). These factors are likely to vary across nations and are hard to control.

Because of these differences in research setting, methodology, and sample selection, the results are not directly comparable, although our evidence is generally consistent with theirs.

**e. Robustness Tests**

We conducted a number of robustness tests. First, we increased the threshold from 10 observations to 20 observations in each two-digit SIC-year grouping to calculate financial reporting quality indicators and rerun our tests; the results (not reported) were qualitatively the same. Second, we included an intercept in the discretionary accruals model as an additional control for heteroscedasticity (Kothari et al., 2005); the results (not tabulated) were virtually unchanged. Third, we reduced the sample size by excluding firms with less than US$1 million in total assets (instead of market value of equity), and again, the results remained qualitatively the same. In addition, some previous studies did not include the variable of leverage (e.g., Muller et al., 2011), which might be a factor associated with market risk (Ng, 2011). Therefore, we reran our model with leverage as an additional control, and the result (not reported) was qualitatively the same.

Fourth, our sample included both financial and non-financial institutions. Because financial firms were hit more severely by the crisis, it is possible that the positive relationship between reporting quality and liquidity may not apply to financial firms. This appears to be a valid concern and is worthy of further investigation, because these firms lost huge amounts of money for their investors; it can be argued, therefore, that it is very unlikely that their financial reporting would have maintained investor confidence. Therefore, we ran the tests separately on financial and non-financial firms using the same model specifications. We found virtually the same results (not tabulated) from the two subsamples, suggesting that, although financial sectors are inherently more sensitive to market volatility, high-quality financial reporting remained successful in mitigating the negative impact of the crisis, even for financial firms.

Fifth, there are some endogeneity concerns about our research design. That is, liquidity and financial reporting quality may be determined by some other omitted variables. For example, financially distressed firms (e.g., loss-making firms) may have more uncertainty about future return, which is inevitably correlated with liquidity. Thus, we added two control variables into the regression: whether a firm had negative earnings in one year or not (*LOSS*) and share price at the end of the year (*PRICE*). *PRICE* was included to control for market makers' order processing costs, which are proportionately lower for higher-priced stocks. A negative coefficient for *PRICE* was expected (Muller et al., 2011). Table 5 reports the results of regressions with these additional control variables, and our interpretations did not alter.[7]

[7] We also added the interaction of *Loss* and *Financial Reporting Quality proxies*, and our results were qualitatively the same.

Table 5 The Role of Earnings Quality on Liquidity during Financial Crisis (Controlled for Performance)

| Liquidity | (1) Log(spread) | (2) Log(spread1) | (3) Log(spread) | (4) Log(spread1) | (5) Log(spread) | (6) Log(spread1) | (7) Log(spread) | (8) Log(spread1) | (9) Log(Spread) | (10) Log(Spread1) |
|---|---|---|---|---|---|---|---|---|---|---|
| Constant | –2.421*** | –2.121*** | –2.417*** | –2.120*** | –2.418*** | –2.118*** | –2.441*** | –2.143*** | –2.402*** | –2.102*** |
| | (–15.76) | (–13.78) | (–15.76) | (–13.79) | (–15.73) | (–13.76) | (–15.83) | (–13.90) | (–15.69) | (–13.72) |
| **Crisis** | **0.090*** ** | **0.108*** ** | **0.091*** ** | **0.109*** ** | **0.091*** ** | **0.108*** ** | **0.099*** ** | **0.116*** ** | **0.089*** ** | **0.104*** ** |
| | **(3.56)** | **(4.04)** | **(3.58)** | **(4.08)** | **(3.57)** | **(4.03)** | **(3.94)** | **(4.40)** | **(3.48)** | **(3.92)** |
| **AQ_ _JM** | **0.181** | **0.128** | | | | | | | | |
| | **(1.49)** | **(0.99)** | | | | | | | | |
| **Crisis*AQ_JM** | **–0.562*** ** | **–0.618*** ** | | | | | | | | |
| | **(–3.55)** | **(–3.80)** | | | | | | | | |
| **AQ_MJM** | | | **0.190** | **0.124** | | | | | | |
| | | | **(1.58)** | **(0.98)** | | | | | | |
| **Crisis*AQ_MJM** | | | **–0.549*** ** | **–0.599*** ** | | | | | | |
| | | | **(–3.48)** | **(–3.70)** | | | | | | |
| **AQ_AJM** | | | | | **0.191** | **0.134** | | | | |
| | | | | | **(1.58)** | **(1.06)** | | | | |
| **Crisis*AQ_AJM** | | | | | **–0.551*** ** | **–0.609*** ** | | | | |
| | | | | | **(–3.49)** | **(–3.76)** | | | | |
| **AQ_MBCFO** | | | | | | | **0.104** | **0.039** | | |
| | | | | | | | **(0.79)** | **(0.28)** | | |
| **Crisis*AQ_MBCFO** | | | | | | | **–0.525*** ** | **–0.589*** ** | | |
| | | | | | | | **(–3.16)** | **(–3.45)** | | |
| **AQ_PJM** | | | | | | | | | **0.264** ** | **0.209** |
| | | | | | | | | | **(2.11)** | **(1.62)** |
| **Crisis*AQ_PJM** | | | | | | | | | **–0.589*** ** | **–0.663*** ** |
| | | | | | | | | | **(–3.62)** | **(–4.01)** |
| Turnover | –0.334*** | –0.302*** | –0.334*** | –0.302*** | –0.334*** | –0.302*** | –0.334*** | -0.302*** | -0.334*** | -0.301*** |
| | (–23.22) | (–21.50) | (–23.21) | (–21.49) | (–23.21) | (–21.49) | (–23.23) | (–21.51) | (–23.19) | (–21.47) |
| Size | –0.482*** | –0.455*** | –0.483*** | –0.455*** | –0.482*** | –0.455*** | –0.482*** | –0.455*** | –0.483*** | –0.456*** |
| | (–51.93) | (–50.49) | (–51.95) | (–50.51) | (–51.90) | (–50.47) | (–51.95) | (–50.46) | (–52.08) | (–50.69) |
| Volatility | 0.306*** | 0.317*** | 0.307*** | 0.317*** | 0.307*** | 0.317*** | 0.304*** | 0.315*** | 0.308*** | 0.319*** |
| | (11.34) | (11.72) | (11.36) | (11.73) | (11.36) | (11.73) | (11.24) | (11.62) | (11.41) | (11.80) |
| Loss | 0.305*** | 0.324*** | 0.305*** | 0.324*** | 0.306*** | 0.324*** | 0.304*** | 0.322*** | 0.307*** | 0.326*** |
| | (13.17) | (13.58) | (13.16) | (13.57) | (13.18) | (13.59) | (13.07) | (13.46) | (13.23) | (13.65) |
| PRICE | –0.010*** | –0.010*** | –0.010*** | –0.010*** | –0.010*** | –0.010*** | –0.010*** | –0.010*** | –0.010*** | –0.010*** |
| | (–3.15) | (–3.55) | (–3.14) | (–3.54) | (–3.14) | (–3.55) | (–3.12) | (–3.52) | (–3.13) | (–3.53) |
| Industry FE | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| *N* | 4271 | 4271 | 4271 | 4271 | 4271 | 4271 | 4271 | 4271 | 4271 | 4271 |
| $R^2$ | 0.875 | 0.863 | 0.875 | 0.863 | 0.875 | 0.863 | 0.875 | 0.863 | 0.875 | 0.863 |
| Adj. $R^2$ | 0.874 | 0.862 | 0.874 | 0.862 | 0.874 | 0.862 | 0.874 | 0.862 | 0.874 | 0.862 |

**Log(spread)** is the log value of the yearly median quoted spread (defined as the difference between the bid and ask price divided by the mid-point and measured at the end of each trading day), and **log(spread1)** is the log value of the yearly mean quoted spread. **Crisis** is a dummy variable, which equals 1 if the observation is from 2008 and 2009 and is 0 otherwise. **AQ_JM, AQ_MJM, AQ_AJM, AQ_MBCFO,** and **AQ_PJM** are five proxies of earnings quality (defined as the product of –1 and the absolute value of discretionary accruals; discretionary accruals were estimated using the cross-sectional Jones model, the cross-sectional modified Jones model, the cross-sectional adapted Jones model, the cross-sectional modified Jones model with book-to-market ratio and cash flow from operations, and the cross-sectional modified Jones model with the last-year ROA). **Turnover** is the log value of last year's median share turnover, which is defined as daily US$ trading volume divided by the market value at the end of each trading day. **Size** is the log value of last year's median market value of equity, which is defined as stock price times the number of shares outstanding (in US$ million). **Volatility** is the log value of last year's median share volatility, which is defined as the standard deviation of daily stock returns in a given year. **Loss** is a dummy variable, which equals 1 if net

income is negative in a given year and 0 otherwise. **PRICE** is the ending trading price in a given year. The table reports OLS coefficient estimates and (in parentheses) *t*-statistics based on robust standard errors that are heteroscedasticity-consistent and clustered by firm. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

Finally, we have emphasized here that financial reporting quality may increase or decrease liquidity. However, it can be argued that firms that suffer from a decrease in liquidity may have a greater incentive to manipulate earnings. In this case, it is the illiquidity that affects the quality of financial reporting, rather than the other way around. Thus, our results may be driven by this factor. To address this reverse causality, we averaged the discretionary accruals of years *t-2*, *t-1*, and *t* and multiplied this number by –1 to serve as a proxy for financial reporting quality. Table 6 reports the results of regressions using the average past earnings quality proxy, and, once more, our inferences remained intact.

Table 6 The Role of Earnings Quality in Liquidity during the Financial Crisis (Average Discretionary Accruals as EQ)

| Liquidity | (1) Log(spread) | (2) Log(spread1) | (3) Log(spread) | (4) Log(spread1) | (5) Log(spread) | (6) Log(spread1) | (7) Log(spread) | (8) Log(spread1) | (9) Log(spread) | (10) Log(spread1) |
|---|---|---|---|---|---|---|---|---|---|---|
| Constant | –2.085*** | –1.729*** | –2.082*** | –1.729*** | –2.085*** | –1.728*** | –2.109*** | –1.758*** | –2.096*** | –1.743*** |
| | (–11.27) | (–9.40) | (–11.21) | (–9.37) | (–11.24) | (–9.37) | (–11.28) | (–9.45) | (–11.39) | (–9.55) |
| **Crisis** | **0.074**** | **0.073**** | **0.069*** | **0.068*** | **0.073**** | **0.072*** | **0.072**** | **0.071*** | **0.088**** | **0.085**** |
| | **(2.10)** | **(1.98)** | **(1.94)** | **(1.83)** | **(2.07)** | **(1.94)** | **(1.97)** | **(1.84)** | **(2.46)** | **(2.28)** |
| **AQ_JM** | **–0.472*** | **–0.515*** | | | | | | | | |
| | **(–1.80)** | **(–1.92)** | | | | | | | | |
| **Crisis*AQ_JM** | **–0.902***** | **–0.995***** | | | | | | | | |
| | **(–3.09)** | **(–3.30)** | | | | | | | | |
| **AQ_MJM** | | | **–0.442*** | **–0.494*** | | | | | | |
| | | | **(–1.67)** | **(–1.82)** | | | | | | |
| **Crisis*AQ_MJM** | | | **–0.943***** | **–1.036***** | | | | | | |
| | | | **(–3.19)** | **(–3.39)** | | | | | | |
| **AQ_AJM** | | | | | **–0.460*** | **–0.497*** | | | | |
| | | | | | **(–1.76)** | **(–1.86)** | | | | |
| **Crisis*AQ_AJM** | | | | | **–0.902***** | **–1.001***** | | | | |
| | | | | | **(–3.09)** | **(–3.32)** | | | | |
| **AQ_MBCFO** | | | | | | | **–0.552*** | **–0.611**** | | |
| | | | | | | | **(–1.90)** | **(–2.03)** | | |
| **Crisis*AQ_MBCFO** | | | | | | | **–0.989***** | **–1.099***** | | |
| | | | | | | | **(–2.95)** | **(–3.16)** | | |
| **AQ_PJM** | | | | | | | | | **–0.581**** | **–0.630**** |
| | | | | | | | | | **(–2.06)** | **(–2.20)** |
| **Crisis*AQ_PJM** | | | | | | | | | **–0.779***** | **–0.893***** |
| | | | | | | | | | **(–2.55)** | **(–2.86)** |
| Turnover | –0.338*** | –0.307*** | –0.338*** | –0.307*** | –0.338*** | –0.307*** | –0.338*** | –0.307*** | –0.338*** | –0.307*** |
| | (–20.39) | (–18.96) | (–20.40) | (–18.99) | (–20.39) | (–18.98) | (–20.47) | (–19.05) | (–20.40) | (–18.98) |
| Size | –0.505*** | –0.480*** | –0.505*** | –0.480*** | –0.505*** | –0.480*** | –0.505*** | –0.480*** | –0.505*** | –0.480*** |
| | (–51.22) | (–49.81) | (–50.99) | (–49.64) | (–51.02) | (–49.67) | (–51.48) | (–50.05) | (–51.30) | (–49.86) |
| Volatility | 0.377*** | 0.399*** | 0.378*** | 0.400*** | 0.377*** | 0.400*** | 0.374*** | 0.396*** | 0.376*** | 0.398*** |
| | (11.71) | (12.24) | (11.73) | (12.25) | (11.72) | (12.25) | (11.51) | (12.06) | (11.72) | (12.27) |
| Industry FE | Y | Y | Y | Y | Y | Y | Y | Y | Y | Y |
| *N* | 3398 | 3398 | 3398 | 3398 | 3398 | 3398 | 3398 | 3398 | 3398 | 3398 |
| $R^2$ | 0.877 | 0.865 | 0.877 | 0.865 | 0.877 | 0.865 | 0.877 | 0.865 | 0.877 | 0.865 |
| Adj. $R^2$ | 0.876 | 0.864 | 0.876 | 0.864 | 0.876 | 0.864 | 0.876 | 0.864 | 0.876 | 0.864 |

**Log(spread)** is the log value of the yearly median quoted spread (defined as the difference between the bid and ask price divided by the mid-point and measured at the end of each trading day), and **log(spread1)** is the log value of the yearly mean quoted spread. **Crisis** is a dummy variable, which equals 1 if the observation is from 2008 and 2009 and is 0 otherwise. **AQ_JM, AQ_MJM, AQ_AJM, AQ_MBCFO,** and **AQ_PJM** are five proxies of earnings quality (defined as the average value of year t-2, t-1, and t's AQ. **AQ** is the product of –1 and the absolute value of discretionary accruals; discretionary accruals were estimated using the cross-sectional Jones model, the cross-sectional modified Jones model, the cross-sectional adapted Jones model, the cross-sectional modified Jones model with book-to-market ratio and cash flow from operations, and the cross-sectional modified Jones model with the last-year ROA). **Turnover** is the log value of last year's median share turnover, which is defined as daily US$ trading volume divided by the market value at the end of each trading day. **Size** is the log value of last year's median market value of equity, which is defined as stock price times the number of shares outstanding (in US$ million). **Volatility** is the log value of last year's median share volatility, which is defined as the standard deviation of daily stock returns in a given year. The table reports OLS coefficient estimates and (in parentheses) *t*-statistics based on robust standard errors that are heteroscedasticity-consistent and clustered by firm. *, **, *** denote significance at the 10%, 5%, and 1% levels, respectively.

## IV. Conclusion

This paper examined the impact of financial reporting quality on the liquidity of the equity market during the recent financial crisis (and by extension, any financial crisis). Many studies have attempted to explore the possible reasons for the illiquidity of the financial market (Copeland & Galai, 1983; Glosten & Milgrom, 1985; Stoll, 1989; Callahan et al., 1997; Laux et al., 2010), and some have claimed that accounting plays a negative role but provided inadequate evidence for this assertion (Barth et al., 2010; Laux et al., 2010). Moreover, previous research typically focused on particular items (such as financial items measured by fair value) and financial institutions. However, such a narrowly focused approach might not provide a complete picture of the role played by accounting in financial meltdowns.

In contrast, we adopted a broader perspective to guide our research design. Our sample included not only financial firms but also non-financial firms. We examined the quality of the financial reporting system as a whole (rather than just fair-value accounting). Based on previous findings regarding information asymmetry and investor confidence (Liao et al., 2010), we conjectured that, during the recent financial crisis, uncertainty and information risk were much greater than before the crisis, and if financial reporting was known to be reliable, it would have helped mitigate information uncertainty and helped restore investor confidence. This would mean that accounting may play a more observable role in liquidity, and we would find evidence that firms that provided high-quality financial information were less adversely affected by the crisis. Our findings supported this prediction, and the effect was manifested in financial firms with even lower investor confidence. Our results were robust after controlling for possible confounding factors and have the potential to help resolve the controversy regarding the role of accounting in the crisis.

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