Credit Market Conditions and Economy-wide Consequences of Financial Reporting Quality*

Job Market Paper

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ABSTRACT

I examine the aggregate economic consequences of financial reporting quality (via its relation to the level of information asymmetry between firms and providers of capital). Economic theory argues that problems due to information asymmetry between borrowers and lenders in the credit markets can have economy-wide consequences by magnifying and prolonging the negative effects of an economic downturn. The literature refers to this effect of information asymmetry as the *financial accelerator effect* and argues that this effect contributes to the magnitudes of a business cycle and is an important source of a financial crisis. Using relevance, reliability, and persistence of reported earnings as financial reporting quality attributes, and the credit crisis of 2007-2008 as the setting, I find evidence that financial reporting quality is a key contributor to the financial accelerator effect. As a related research question, I examine the implications of the financial accelerator effect to a firm's cost of equity capital. I find that higher quality reported earnings are associated with lower levels of financial constraints risk, a risk factor that is derived based on the financial accelerator effect.

Keywords: Information Quality, Financial Reporting Quality, Earnings Quality, Macroeconomic Conditions, Financial Crisis, Cost of Capital, Expected Stock Returns

JEL Classification: D82; D92; G01; G12; G14; E32; M41

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1. Introduction

Economic theory suggests that problems due to information asymmetry between borrowers and lenders can have economy-wide consequences by magnifying and prolonging the negative effects of an economic downturn (Bernanke 1983; Bernanke and Gertler 1989). Prior literature refers to this effect of information asymmetry as the *financial accelerator effect* and argues that this effect influences the magnitude of a business cycle and is an important determinant of a financial crisis (Bernanke et al. 1996; Mishkin 1997). Accounting research contends that financial reporting quality plays an important role in reducing the information asymmetry between the firm and its investors, thereby improving the functioning of capital markets (Healy and Palepu 2001; Verrecchia 2001). In this paper, I examine the aggregate economic consequences of financial reporting quality. Specifically, I investigate the extent to which financial reporting quality (via its relation to information asymmetry) contributes to the financial accelerator effect during an economic downturn.

The financial accelerator effect is motivated by the information asymmetry literature. Information asymmetry between managers and outside investors forces firms with insufficient internal funds to choose debt financing over equity financing (Myers and Majluf 1984). One reason for the increased reliance on debt is that creditors are better able to monitor borrowers and reduce the problems associated with information asymmetry by, for example, requiring collateral and imposing restrictive covenants (Diamond 1984; Smith and Warner 1979). The cost of monitoring (such as the costs of restrictive covenants) is borne by the borrower rendering the costs of obtaining funds from outside the firm, *external funds*, more expensive than the costs of funds generated inside the firm, *internal funds*.

When the economy experiences a downturn, the net worth of borrowers decreases and, consequently, the problems associated with information asymmetry between borrowers and debt providers increase (Bernanke and Gertler 1989). For instance, a decline in a borrower's net worth increases incentives for the borrowing firm to undertake more risky investments because it now has less to lose if its investments go sour (Jensen and Meckling 1976; Myers 1977).[1] In order to alleviate the increased levels of problems associated with information asymmetry, lenders may increase the level of monitoring by imposing more restrictive covenants or increase the interest rates on new loans or even decline credit to firms that seek additional borrowing (Stiglitz and Weiss 1981). As a result of any of these actions by the lenders, the cost of external funds to the firm increases causing a decline in the firm's investments. This decline in investments leads to a further reduction in the borrower's net worth in the future. Thus, the initial downturn is amplified leading to further decline in economic activity and, consequently, creating a negative spiral. This theory forms the basis of the *financial accelerator effect*.

Following prior research (e.g., Bernanke et al. 1996), I adopt a cross-sectional identification strategy to examine the role of financial reporting quality in the financial accelerator effect. In the cross-section, the theory predicts that if the financial accelerator is in effect, at the onset of a credit crunch and conditional on the need for additional external funds, firms that suffer from information asymmetry problems will face a sharper increase in cost of credit and a sharper decline in the real economic activity. To the extent that financial reporting quality affects the level of information asymmetry (Frankel and Li 2004), I investigate whether firms that have lower financial reporting quality, conditional on the need for additional external funds, face a sharper increase in cost of credit and a sharper decline in the real economic activity, during a credit crunch.

[1] In other words, the extent of the problems (and, hence, the costs) associated with a given level of information asymmetry varies with economic conditions.

Following prior research (Francis et al. 2004; Schipper and Vincent 2003; Collins et al. 1997), I construct empirical proxies for financial reporting quality based on the relevance, reliability, and persistence of reported earnings. I then examine the cross-sectional variation in firms' interest expenses and real activity during the period from September 2007 through September 2008. This was when the economy experienced a credit crunch due to a steep decline in land and property values which firms typically use as collateral when borrowing. I find that, conditional on the need for external financing, firms which have lower financial reporting quality report higher interest expense during the crisis period providing evidence that these firms face a higher cost of credit than firms with higher financial reporting quality. More importantly, using inventory growth and asset growth as measures of real activity, I find that such firms experience a sharper decline in inventory and asset growth during this period of low credit availability. In addition, my results indicate that these firms experience a greater stock price decline during this period. In further analysis, I provide evidence that firms which are dependent on external financing and have lower financial reporting quality perform no differently from other firms in terms of real economic activity during periods of normal levels of credit availability. Collectively, the evidence suggests that lower financial reporting quality plays a role in magnifying and prolonging the negative consequences of an economic downturn and is one determinant of the financial accelerator effect.

The financial accelerator theory also has implications for a firm's cost of equity capital. The theory argues that the investments and cash flows of firms which depend on external financing and suffer from information asymmetry problems covary with credit conditions. Recent studies show, both theoretically and empirically, that such firms face a non-diversifiable risk and command higher expected stock returns (e.g., Livdan et al. 2008; Whited and Wu 2006). Collectively, this literature identifies a common risk factor, *financial constraints risk*, which

improves the explanatory power of existing asset pricing models. Thus, as a second research question of this study, I investigate whether financial reporting quality, through its effect on information asymmetry, is associated with the level of financial constraints risk and, consequently, its cost of raising equity.

The second set of empirical tests in this study examines the relation between financial reporting quality, financial constraints risk and a firm's cost of equity capital in two alternative test settings. First, using a multi-factor asset pricing model (Fama and French 1993), I examine whether the cross-sectional variation in the level of financial constraints risk can be explained by variation in firms' reporting quality. I find that all the three information quality attributes are significantly negatively related to financial constraints risk. As a second approach, I examine the consequences of earnings restatements announcements on the level of financial constraints risk. I find that, post-restatement, the level of financial constraints risk faced by a firm declines. Taken together with the evidence in the prior literature that suggests that post-restatement a firm's information environment improves (Wilson 2008; Frieder and Shanthikumar 2008), the findings of this test corroborate the earlier finding that information quality is negatively related to financial constraints risk.

Combining insights from both the literature on the financial accelerator effect and the established literature that examines the consequences of financial reporting quality, this study provides evidence consistent with the notion that the financial accelerator theory, with its roots in information asymmetry, is one channel through which financial reporting quality has economy-wide consequences. This finding opens up the possibility for future research to examine the impact of financial reporting quality on business cycles and financial crises. The results of this study may be of interest to market observers and policy makers. While, the typical response to a financial crisis has been to improve transparency in financial institutions, this study shows that

financial reporting quality amongst non-financial firms is also of economic importance during periods of crisis.

This study also furthers our understanding on how information quality affects the cost of equity capital. The relation between information quality and cost of capital is of significant academic interest (e.g., Botosan 1997; Easley and O'Hara 2004; Francis et al. 2004, 2005; Lambert et al., 2007, 2008; Hughes et al. 2007; Core et al. 2008). However, the literature is largely silent on the precise mechanism through which information quality affects the cost of capital (Leuz and Wysocki 2008). My findings suggest that financial constraints risk serves as one mechanism through which information quality can affect cost of capital in competitive capital markets.

Finally, my study advances the literature examining the consequences of financial reporting quality on a firm's investments. Recent papers suggest that enhanced financial reporting can have important economic implications such as increased investment efficiency (e.g., Healy and Palepu 2001; Bushman and Smith 2001; Lambert et al. 2007; Biddle and Hillary 2006; Biddle et al. 2008). The evidence in this study that firms with poor financial reporting quality experience sharper decline in real economic activity during periods of credit crunch provides additional insight into the relation between financial reporting quality and investment efficiency under varying credit conditions.

The rest of this paper is organized as follows. Section 2 provides a review of the related literature and develops the hypotheses. Section 3 describes the key variables and the methodology used in this paper. Section 4 presents the results on the empirical analyses on the relation between credit conditions and financial reporting quality and provides evidence on the effect of information quality on financial constraints risk. Section 5 concludes.

2. Literature Review and Hypothesis Development

2.1 Overview of Financial Accelerator Theory and Financial Reporting Quality

The literature on information asymmetry (Myers and Majluf 1984) argues that firms have an information advantage over providers of capital because firms know more about the investment projects they want to undertake than do the providers of capital. As a consequence of this information asymmetry, capital markets suffer from adverse selection problems wherein firms tend to seek external capital when their private information suggests that the investments are more likely prone to failure (Myers 1984). An alternative consequence of information asymmetry is moral hazard wherein managers using external financing have an increased incentive to take higher levels of risk (Jensen and Meckling 1976). As a result of adverse selection and moral hazard, firms suffering from information asymmetry have limited access to equity capital markets and rely heavily on credit markets and bank loans. While the information asymmetry problems still exist in the credit markets, financial institutions such as banks have the ability to monitor borrowers and reduce the problems of adverse selection and moral hazard (Diamond 1984). Further, in the credit markets, lenders may require the borrower to pledge assets as collateral in order to ensure that it will return the money.[2] These costs of monitoring are borne by the borrower and, hence, the cost of external finance increases and is greater than the cost of internal finance. The difference between the costs of internal and external finance is referred to as *external finance premium*.

Building on the above information asymmetry theory, Bernanke (1983), Bernanke and Gertler (1989) and Kiyotaki and Moore (1997) argue that changes to the economic conditions alter the external finance premium a firm bears due to changes in the extent of information

[2] It is also possible that firms suffering from information asymmetry problems may face credit rationing, whereby the firms are simply unable to obtain all the debt financing they would like to obtain at the prevailing market interest rate (Stiglitz and Weiss 1981, 1983).

asymmetry problems. For example, when an economic downturn reduces the value of collateral, the borrower has increased incentives to engage in moral hazard because the borrower has less to lose. In response, lenders increase monitoring and ration credit. Thus, the increased level of problems related to information asymmetry raises the external finance premium during an economic downturn. The increased cost of external funds causes firms to forgo investments. The reduced amount of investment reduces future cash flows of the firm resulting in the further decline in the creditworthiness of the firm and, thus, amplifying the initial economic shock. In sum, a reduction in net worth that would have had a small effect if markets were efficient is exaggerated and prolonged due to information asymmetry problems in credit markets.

More importantly, Bernanke and Gertler (1989) argue that the changes in the firm-level information asymmetry could lead not only to firm-specific effects but also to economy-wide effects. Economic theory refers to this effect as the *financial accelerator effect.* This financial accelerator effect applies, in principle, to any shock that affects borrowers' balance sheets or cash flows.[3] For example, variants of the financial accelerator theory have been proposed for shocks due to monetary policy effects on interest rates, deterioration in banks' balance sheets and bank panics (Kashyap, Stein and Wilcox 1993; Bernanke and Gertler 1995).[4] Although the underlying theories are diverse, the common prediction is that information asymmetry in the credit markets propagates shocks to the economy that lead to fluctuations in aggregate economic activity. Evidence suggests that the financial accelerator theory is operative during periods when credit availability is low (Bernanke et al. 1996). For example, Bernanke (1983) and Mishkin (1991) show that the spread between Moody's Baa corporate bonds (low quality borrowers) and

[3] In addition, the financial accelerator effect is equally applicable to a positive shock as it is to a negative shock.
[4] In a bank panic, depositors fearing the safety of their deposits, withdraw their deposits from the banking system causing banks to fail.

the long-term U.S. Treasury bond rate (high quality borrower) widens during periods of crises.[5] The financial accelerator effect is economically important. For instance, Bernanke et al. (1999) argue that the financial accelerator effect has significant influence on the length and magnitude of business cycles. More importantly, Mishkin (1991, 1997) argues that information asymmetry between borrowing firms and lenders is a significant contributor to the occurrence of financial crises. Figure 1 summarizes the above discussion on the financial accelerator effect.

Research in accounting highlights that disclosures and the quality of financial reporting play an important role in reducing the information asymmetry between the firm and its investors and in improving the functioning of capital markets (e.g., Healy and Palepu 2001; Verrecchia 2001). For example, Frankel and Li (2004) provide empirical evidence that financial reporting quality affects information asymmetry between managers and outsiders. More importantly, recent research provides evidence that lenders are increasingly relying on financial reports to provide credit (e.g., Petersen and Rajan 2002). Thus, by affecting the levels of information asymmetry between the firms and the credit markets, higher financial reporting quality could play an important role in the financial accelerator effect. In this study, I examine whether financial reporting quality is a determinant of the amplification of shocks to overall economic activity.

Although the financial accelerator seems intuitive, examining this mechanism empirically is not entirely straightforward. In particular, Bernanke et al. (1996) argue that a time-series approach to understand the lead-lag relationship between aggregate credit market imperfections

[5] A related stream of literature empirically examines the variations in financing and real activity of firms that depend on external finance (e.g., Fazzari et al. 1988). Hubbard (1998) provides a survey of this literature. However, the focus of this literature is on such firms' investment and financing decisions rather on the macroeconomic implications of problems due to information asymmetry which is the focus of this study.

and aggregate output pose significant identification problems.[6] They suggest a cross-sectional identification strategy to examine the financial accelerator effect.[7] The theory predicts that economic downturns will have different effects on firms facing information asymmetry than firms that do not, depending on their respective need for external finance. Specifically, the theory argues that if the financial accelerator is in effect, at the onset of a credit crunch, borrowers with information asymmetry problems will face higher costs of credit.[8] In addition, the real economic activity of these firms will fall more sharply than that of firms who either have sufficient internal funds or have lower information asymmetry problems. These predictions lead me to compare the behavior of higher financial reporting quality firms and lower financial reporting quality firms at the onset of an economic downturn. I predict that firms that have lower financial reporting quality and depend on external financing will incur increased costs of borrowing and will experience sharper decline in real activity at the onset of an economic downturn.

However, the empirical relation between financial reporting quality and the financial accelerator effect is not straightforward for three reasons. First, the financial accelerator theory is based on information asymmetry in the credit markets, including banks. Typically, banks have access to a firm's information over and beyond the financial reports. Hence, the level of financial reporting quality may have no bearing on the financial accelerator effect. Second, Myers (1984) argues that adverse selection problems are generally more likely to be severe in the equity market than in debt markets because equity values are more sensitive to information than debt. This suggests that financial reporting quality may not be a significant factor in the financial

[6] Time series identification is difficult because the theory relating the timing of aggregate output to aggregate credit is not unambiguous.

[7] Although cross-sectional tests of the financial accelerator are not without identification problems of their own, they offer a more promising way of distinguishing the financial accelerator from its alternatives than do tests based on aggregates.

[8] In support of this view, Korajczyk and Levy (2003) find that constrained firms borrow more when collateral values are highest.

accelerator effect. Third, House (2006) argues theoretically that if firms are able to obtain equity financing during economic downturns, then the financial accelerator effect will be suppressed. Under such a circumstance, we cannot expect any relation between financial reporting quality and financial accelerator effect. In sum, the role of financial reporting quality in amplifying economic shocks is ultimately an empirical question. Accordingly, I state below my hypotheses in the alternative form.

H1: Conditional on the need for additional external financing, firms that have lower financial reporting quality will incur costs of borrowing that differ from firms with higher financial reporting quality, during an economic downturn.

H2: Conditional on the need for additional external financing, firms that have lower financial reporting quality will engage in levels of real economic activity that differ from firms with higher financial reporting quality, during an economic downturn.

In this study, I examine inventory and asset growth as measures of real activity. One shortcoming of examining these measures of real activity is that they do not capture the lost investment opportunities of the firm. In order to overcome this limitation, I examine the stock price performance of firms during this period. I expect that firms with lower financial reporting quality and a greater dependence on external finance will have a sharper decline in stock prices relative to other firms. However, as discussed above, there are reasons to believe that financial reporting quality will not have any bearing on the financial accelerator effect. Accordingly, I state my hypothesis in the alternative form as:

H3: Conditional on the need for additional external financing, firms that have lower financial reporting quality will have stock returns that differ from firms with higher financial reporting quality, during an economic downturn.

2.2 Cost of Equity Capital Consequences of the Financial Accelerator Theory

While the financial accelerator theory focuses on credit market imperfections and the propagation of shocks to the economy, it has important implications for a firm's cost of equity capital. In this section, I first provide a brief overview of the existing theoretical literature that

examines the relation between information quality and cost of capital. Subsequently, I discuss the implication of the financial accelerator effect on a firm's cost of equity capital.

There has been considerable debate in the theoretical literature on whether and how a firm's information quality affects its cost of capital (Figure 2). One strand of literature assumes perfect competition in equity markets (see e.g., Barry and Brown 1985; Lambert et al. 2007, 2008; Hughes, Liu and Liu 2007) and suggests that firms with higher information quality have lower conditional covariances with the market, and as a consequence, lower conditional betas and lower expected returns. This literature is referred to as the estimation risk literature and is represented by Link 1 in Figure 2. Overall, the following two-step link is suggested by the estimation risk literature: (1) firms with higher information quality have lower forward-looking betas; and (2) lower forward-looking betas lead to lower cost of equity.

Operating under the assumption of imperfect competition in capital markets, another strand of literature (e.g., Easley and O'Hara 2004, Lambert et al. 2008) argues that information quality affects the cost of equity capital through its effect on the information asymmetry amongst investors (Link 3 of Figure 2). Information asymmetry induced by poor quality earnings can increase the adverse selection risk for liquidity providers, which can lead to higher liquidity cost and, hence, higher cost of capital (e.g., Amihud and Mendelson 1986). Alternatively, information asymmetry could give rise to a non-diversifiable "information risk" as less informed investors are always at a disadvantage in their portfolio allocations relative to well informed investors (e.g., Easley and O'Hara 2004).

The financial accelerator theory provides an additional mechanism through which information quality can have an effect on a firm's cost of capital. As discussed above, the financial accelerator theory argues that the cost of the external finance premium varies with economic conditions due to changes in the levels of information asymmetry. Further, the theory

predicts that, during an economic downturn, firms that depend on external finance and suffer from information asymmetry experience a greater increase in cost of credit as well as a sharper decline in investments and future performance than firms that have internal funds or have lower information asymmetry. Collectively, these predictions suggest that the investments and cash flows of firms that depend on external finance and suffer from information asymmetry problems covary. This implies that the risk faced by these firms is non-diversifiable (Link 2 of Figure 2). Accordingly, the equity capital providers will demand a higher rate of return from such firms.

Building on the above insights from the financial accelerator theory, Lamont et al. (2001), Whited and Wu (2006), Gomes et al. (2006) and Livdan et al. (2008) argue that information asymmetry between firms and lenders creates an important source of variation in investment returns and provides a common risk factor that can improve the pricing of expected stock returns in the cross-section. This risk factor, referred to as *financial constraints risk*, earns a positive premium of 2.76% per annum (Whited and Wu 2006). As discussed above, higher financial reporting quality is expected to decrease the information asymmetry between firm and lenders. This decreases the level of financial constraints risk faced by a firm and, consequently, its cost of raising equity capital. Accordingly, I examine whether financial reporting quality is associated with cost of equity capital through its effect on financial constraints risk. Examining the effects of information quality on the financial constraints risk factor opens up the possibility that information quality can affect cost of capital by affecting a firm's investments.[9] I expect that firms with lower financial reporting quality have a higher financial constraints risk. I state this hypothesis in the alternative form.

H4: Lower level of financial reporting quality is associated with a higher level of financial constraints risk.

[9] Thus far, the literature has largely treated the effect of information quality on cost of capital through the investments channel as an indirect effect (see e.g., Lambert et al 2007).

3. Data and Methodology

3.1 Examining the role of Financial Reporting Quality in the Financial Accelerator Effect

The first set of empirical tests in this study examines the relation between financial reporting quality and the financial accelerator effect. Specifically, I expect that, at the onset of a credit crunch, borrowers with poor financial reporting quality that depend on external finance will face higher costs of credit. In addition, the real economic activity of these firms will fall more sharply than that of firms who either have plenty of internal funds or have lower information asymmetry problems. Accordingly, the research design involves the choice of an economic downturn that is suitable to examine the financial accelerator theory as well as a methodology to identify a firm's dependence on external finance and the level of financial reporting quality. I next discuss these three research design choices.

3.1.1. Period of Economic Downturn

I focus on the credit crisis of 2007-2008 as the episode of economic downturn. While there have been several incidents of economic downturns prior to 2007, the credit crisis of 2007-2008 suits this study for three reasons. First, the credit crisis followed the subprime meltdown wherein the value of real estate, which is typically used as collateral by firms, fell sharply. Second, as per the predictions of the financial accelerator theory, the decline in collateral values resulted in a credit crunch starting August 2007.[10] Third, the credit crisis resulted in a decline in real activity (Tong and Wei 2008). Accordingly, underlying the credit crisis is a clear role for non-financial firms where in these firms first experienced a decline in collateral values, then faced a difficulty in obtaining credit and, consequently, experienced a decline in real activity.

[10] As discussed above, the financial accelerator theory predicts that this decline in collateral values should increase information asymmetry problems leading to a decline in credit.

Thus, the credit crisis is an intuitively appealing setting to examine the role of financial reporting quality of non-financial firms in the financial accelerator effect. [11]

The extent and timing of the credit crunch can be examined by observing the *TED spread.* The TED spread is the difference between the risky London Interbank Offered Rate (LIBOR) and the risk-free U.S. Treasury bill rate (Figure 3). In times of uncertainty, banks charge higher interest for unsecured loans, which increases the LIBOR rate. Consequently, the TED spread widens in times of crises. The TED spread fluctuates over time, but historically has often remained within the range of 10 and 50 bps (0.1% and 0.5%), until 2007.

It can be observed from Figure 3 that the TED spread increased dramatically in August 2007 indicating the start of the credit crunch. Accordingly, I focus on firm performance starting September 2007. Starting March 2008, the Federal Reserve began undertaking measures to increase lending activities in the credit markets.[12] However, the TED spreads continued to remain high post-March 2008 indicating the continuation of the credit crunch. Thus, I examine the September 2007-March 2008 as well as the March 2008-September 2008 periods.

3.1.2 Measuring External Finance Dependence

In order to identify firms that are dependent on external finance, I follow the extant literature (e.g., Lamont et al. 2001; Whited and Wu 2006) and construct a firm-level index that measures the extent to which firms depend on external finance to fund their investments. Following the literature, I refer to firms that are heavily dependent on costly external finance as *financially constrained* firms and the firm-level index that measures the external finance dependence as the *financial constraints index.* I follow Whited and Wu (2006) to construct the

[11] For example, the recession of 1981 -1982 was preceded by a period of tightening of monetary policy. While the financial accelerator theory predictions are identical in this setting, the role of financial reporting quality of non-financial firms is less intuitive in this setting.

[12] See, Federal Reserve Board Press Release March 11, 2008. (http://www.federalreserve.gov/newsevents/press/monetary/20080311a.htm)

index and select my sample by first deleting any firm-year observations with missing data or for which total assets, the gross capital stock, or sales are either zero or negative. I also delete any firm-year that experienced a growth more than 150% of the book value of its assets to eliminate observations that reflect a merger or acquisition. I omit all firms whose primary SIC classification is between 4900 and 4999 or between 6000 and 6999 since the Whited and Wu (2006) investment model is inappropriate for regulated or financial firms. Most importantly, I only include a firm if it has at least eight consecutive quarters of complete data and if it never has more than two quarters of negative sales growth. This last criterion is particularly important since I want to look at firms that face external finance constraints rather than firms that are in financial distress. The financial constraint measure, *FC*, for a firm *i* in a period *t* is calculated as:

$$FC_{i,t} = \begin{array}{l} -0.091CF_{i,t} - 0.062DIVPOS_{i,t} + 0.021TLTD_{i,t} - 0.044LNTA_{i,t} \\ +0.102ISG_{i,t} - 0.035SG_{i,t} \end{array} \quad (1)$$

in which *CF* is the ratio of cash flow to total assets, *DIVPOS* is an indicator that takes the value of one if the firm pays cash dividends, *TLTD* is the ratio of the long term debt to total assets, *LNTA* is the natural log of total assets, *ISG* is the firm's three-digit industry sales growth, and *SG* is firm sales growth. All variables are deflated by the replacement cost of total assets as the sum of the replacement value of the capital stock plus the rest of the total assets. The computation of the replacement value of the capital stock is detailed in Whited (1992). As Whited and Wu (2006) point out, firm-level sales growth and industry sales growth capture the intuition that only firms with good investment opportunities are likely to want to invest enough to be constrained. Other variables in the index capture the firm's financial health.

3.1.3 *Measuring Financial Reporting Quality*

Recent studies attempt to measure the quality of accounting information provided to outside investors by analyzing the properties of a firm's reported earnings. Specifically, research

suggests that the value-relevance of earnings (e.g., Collins, Maydew and Weiss 1997), earnings smoothing using accruals (e.g., Francis et al. 2004), and earnings persistence (e.g., Schipper and Vincent 2003) can capture important dimensions of a firm's information quality. Following this line of research, I use three alternative measures of financial reporting quality: Accruals Quality (*FRQ1_AQ*), Relevance (*FRQ2_Relevance*), Persistence (*FRQ3_Persistence*).

Following Francis et al. (2005), I measure Accruals Quality (*FRQ1_AQ*) by, first, estimating the below cross-sectional regression for each year and each of the 48 Fama and French (1997) industries (at least 20 observations are required for each regression):

$$\mathrm{TCA_{it}} = \beta_{0t} + \beta_{1t}1/\mathrm{ATA_{i,t}} + \beta_{2t}\mathrm{CFO_{i,t-1}} + \beta_{3t}\mathrm{CFO_{i,t}} + \beta_{4t}\mathrm{CFO_{i,t+1}} + \beta_{5t}\Delta\mathrm{REV_{it}} + \beta_{6t}\mathrm{PPE_{it}} + \varepsilon_{it} \quad (2)$$

where, for year *t* and firm *i*, *TCA* is total current accruals and is calculated as the difference between income less the cash flow from operations, *ATA* is the average total assets, *CFO* is the cash flow from operations, ΔREV is the change in sales less change in accounts receivables, *PPE* is the property, plant and equipment. The accruals quality is estimated for each firm *i* and each year *t* as the standard deviation of residuals from the above cross-sectional regression over the period *t-4* to *t*.

Relevance (*FRQ2_Relevance*) is the adjusted-R^2 from a firm-specific time-series regression. The regression model used is:

$$P_{i,t} = \beta_{0i} + \beta_{1i}E_{i,t} + \beta_{2i}BV_{i,t} + \varepsilon_i \quad (3)$$

where P_{it} is the price-per-share of firm *i* three months after fiscal year-end *t*, E_{it} is the earnings-per-share of firm *i* during year *t*, and BV_{it} is the book-value-per-share of firm *i* at the end of year *t*. I run the model as a rolling regression over *t-10* and *t* and require that firms have a minimum of 5 yearly observations.

Persistence (*FRQ3_Persistence*) is estimated from the following time-series regression of earnings per share of a firm on its earnings per share in the previous year.

$$E_{i,t} = \alpha_{0i} + \alpha_{1i} E_{i,t-1} + \varepsilon_i \quad (4)$$

where, *EPS* is earnings per share for firm *i* in fiscal year *t*. Persistence for firm *i* in fiscal year *t* is the coefficient α_{1i} from estimating Equation (4) for the firm over rolling ten-year window for fiscal years *t-10* to *t*. I require that firms have a minimum of 5 yearly observations.

3.1.4 Methodology

To investigate hypotheses *H1* through *H3*, I examine whether an *ex ante* classification of firms by their characteristics in terms of degree of financial constraint and financial reporting quality *prior to* the credit crisis help explain the *ex post* magnitude of their cost of credit, and changes in their inventory levels, investments as well as stock price between September 2007 and September 2008. In order to mitigate operating cycle effects, I focus on firms with December fiscal year-ends only (see, Kashyap et al. 1994). The sample size for these tests varies between 1,131 and 2,221 observations depending on data availability.

To examine hypothesis *H1*, I use the following cross-sectional model:

$$\begin{aligned} \Delta InterestExpense_i = \; & \beta_0 + \beta_1 FC_i * FRQ_i + \beta_2 FRQ_i + \beta_3 \Delta Leverage_i \\ & + \beta_4 \Delta ROA_i + \beta_5 InterestCoverage_i + \varepsilon_i \end{aligned} \quad (5)$$

where, for firm *i,* $\Delta InterestExpense$ is the change in interest expense during the crisis period (September 2007 – September 2008) , FC is the level of financial constraints as of December 31, 2006 and FRQ is the level of financial reporting quality measured by either Accruals Quality (*FRQ1_AQ*), Relevance (*FRQ2_Relevance*) or Reliability (*FRQ3_Reliability*) as of December 31, 2006. As control variables, I include changes in leverage ($\Delta Leverage$) over the crisis period, change in profitability (ΔROA) over the crisis period and interest coverage ratio($InterestCoverage$) during the crisis period.[13,14]

[13] Changes in all continuous variables are calculated as the value of variable in period *t* minus the value of variable in period *t-1*. For ratio variables, the change is computed as value of variable in period *t* scaled by the value of variable in period *t-1*.

H2 examines the real activity of firms with varying levels of financial reporting quality during an economic downturn. I use inventory and asset growth as two measures of real activity. I examine inventory because prior literature (e.g., Kashyap et al. 1994) argues that firms cut back on the level of inventory holdings when their cost of financing increases. Accordingly, firms with lower financial reporting quality and higher dependence on external finance will cut back on inventory more sharply than other firms. In addition, there is little evidence of a decline in inventory demand at the start of a credit crunch (Blinder and Maccini 1991).[15]

I also examine the effect of *ex ante* financial reporting quality on the changes to the total assets of the firm during the crisis period considering that firms might either cut back on the investments and, in some cases, may indulge in fire-sales of their assets to overcome financing issues. Econometrically, I use the following cross-sectional models:

$$InventoryGrowth_i = \beta_0 + \beta_1 FC_i * FRQ_i + \beta_2 FRQ_i + \beta_3 \Delta Sales_i + \beta_4 INV\_SALES_i + \varepsilon_i \quad (6)$$

$$\begin{aligned} AssetGrowth_i = \; & \beta_0 + \beta_1 FC_i * FRQ_i + \beta_2 FRQ_i + \beta_3 TobinQ_i \\ & + \beta_4 Leverage_i + \beta_5 Z\_score_i + \varepsilon_i \end{aligned} \quad (7)$$

Following Kashyap et al. (1994), I define $InventoryGrowth$ as the change in natural logarithm of inventory levels of a firm i over the crisis period. Following prior studies that examine inventory movements I include as control variables the change in natural logarithm of sales, $\Delta Sales$, over the crisis period and the natural logarithm of the ratio of inventory to sales, INV_SALES. In Equation 7, $AssetGrowth$ is defined as the change in natural logarithm of assets levels of a firm i over the crisis period. As control variables, I include the firm's Tobin's Q ($TobinQ$) as a proxy for the firm's opportunity set, Z-Score as a measure of bankruptcy and leverage.

[14] While this specification is economically meaningful, one issue with this specification is that it suffers from a scale issue. Accordingly, I adopt an alternate specification using interest expense scaled by level of debt. This produces qualitatively similar results.

[15] Inventory demands could reduce during later stages of a recession due to a decline in consumer spending.

To examine hypothesis *H3*, I follow Daniel and Titman (1997) and examine a firm's stock returns based on its own characteristics. I study whether an *ex ante* classification of firms by their characteristics in terms of degree of financial constraint and financial reporting quality *prior to* the subprime crisis help predict the *ex post* magnitude of their stock price changes since September 2007. To be precise, I use the following model:

$$\begin{aligned} Ret_{it} = \quad & \alpha_0 + \beta_1 FC_{i,t-1} + \beta_2 FC_{i,t-1} * FRQ_{i,t-1} + \beta_3 Beta_{i,t-1} + \beta_4 Size_{i,t-1} \\ & + \beta_5 BTM_{i,t-1} + \beta_6 Momentum_{i,t-1} + \varepsilon_{i,t-1} \end{aligned} \quad (8)$$

Where, for firm *i*, *Ret* is the holding period return during the crisis, *FC* is the firm-level financial constraint as described in Equation (1), *FRQ* represents one of the three firm-level financial reporting quality attributes. *Beta* measures the correlation of the firm's stock returns with the overall market. *Size* is the market value of equity. *BTM* is the firm's book-to-market. *Momentum* is the growth in the firm's stock price over the last year, excluding the last month. All variables are measured as of December 31, 2006 to avoid look-ahead bias.

In order to avoid outliers and for ease of interpretation, I include *FC* and *FRQ* as rank variables in equations (5) through (8). Specifically, *FC* takes a value one for firms that experience above-median financial constraints and zero otherwise. *FRQ* takes a value one for firms that have below-median financial reporting quality and zero otherwise.[16]

3.2 Examining the Relation between Financial Reporting Quality and Financial Constraints Risk

Hypothesis *H4* examines the relation between financial reporting quality and financial constraints risk. Specifically, the financial accelerator theory predicts that the cash flow of firms subject to information asymmetry problems in the credit markets will covary and pose a non-diversifiable risk. In order to test these predictions, I employ the financial constraints risk factor proposed by Whited and Wu (2006). Since the empirical question aims at understanding whether

[16] The choice of two-levels is driven by the sample size and the ease of interpretability.

equity holders price this risk in the long-run, this part of the study focuses on the period 1992-2007 instead of the crisis period. The two most important constructs for the tests are financial reporting quality and financial constraints risk. The measures of financial reporting quality have been discussed before. Accordingly, I next discuss the measurement of financial constraints risk.

3.2.1 Measuring Financial Constraints Risk

I construct the monthly financial constraints risk factor (*FC_FAC*) as described in Whited and Wu (2006). The construction of this factor is similar to the construction of the factors in Fama and French (1993) and involves forming portfolios based on the financial constraints index, *FC*, discussed earlier. Next, I estimate for each stock in each year its financial constraints beta, using the past 50 monthly returns, with a minimum requirement of 36 monthly returns.

$$Ret_{it} = \beta_0 + \beta_{mkt} MKTRF_t + \beta_{size} SMB_t + \beta_{btm} HML_t + \beta_{mom} UMD_t + \beta_{FC} FC\_FAC_t + \varepsilon \quad (9)$$

where, $Ret_{i,t}$ is the monthly returns for stock *i* and incorporates delisting returns for the firms that delist from the exchanges within the estimation period. If the delisting return is missing in *CRSP*, I substitute it with the average delisting return from Shumway (1997) and Shumway and Warther (1999). *MKTRF*, *SMB* and *HML* are the Fama and French (1993) factors while *UMD* is the Carhart (1997) momentum factor. I use the estimated loading on the *FC_FAC*, $\hat{\beta}_{FC_{i,t}}$, as the firm-specific measure of financial constraints risk. The requirement of 50 monthly returns results in the loss of the initial four years of observations. Accordingly, the final sample period is from 1992 to 2007 with 31,769 firm-year observations with the financial constraints risk factor. However, the sample size for each of the multivariate tests varies based on the availability of the other data variables.

4.3 Methodology

In order to test hypotheses *H4*, I adopt the following cross-sectional regression model:

$$\hat{\beta}_{FC_{i,t}} = \gamma_0 + \gamma_1 FRQ_{i,t} + \sum_{j=1}^{5} \gamma_{i,t} Controls_{i,t} + \varepsilon_{i,t} \quad (10)$$

Where, $\hat{\beta}_{FC_{i,t}}$ is the firm-specific measure of financial constraints risk estimated as loading on the *FC_FACTOR* in Equation (2), *FRQ* is one of the three alternative measures of financial reporting quality i.e. Relevance, Persistence or Accruals Quality. The control variables that are included are those suggested by the financial constraints literature as variables that may have an effect on the firm's financial constraints. Specifically, I use Age (*Age*), Tobin's Q (*TobinQ*), Asset Tangibility (*AssetTangibility*), Z-Score (*ZScore*) and Leverage (*Leverage*) as control variables. *Age* is included because older firms generally have better access to capital than younger firms. They also have an established reputation and history of borrowing and, hence, typically, face lower financial constraints. All else constant, firms that face a larger investment opportunities stand to lose more due to financial constraints and, hence, face higher financial constraints risk. Accordingly, I employ Tobin's Q as a measure of firm's investment opportunities. While the sample selection ensures that I do not pick financially distressed firms, it is nevertheless important to control for a firm's financial distress level. I use Z-Score to control for the firm's distress condition. I also include leverage to capture the fact that the financial constraints risk factor is associated with credit market imperfections.

The sample that I use to examine the effect of financial reporting quality on financial constraints risk is an unbalanced panel dataset with multiple firms and multiple years. In addition, most of the measures I use are rolling time series measures. Accordingly, the standard errors of the coefficients in the model will be biased and could lead to incorrect statistical inferences due to cross-sectional dependence and time-series dependence in the observations (Wooldridge 2007). I follow Cameron, Gelbach and Miller (2006), Petersen (2009), and Gow, Ormazabal, and Taylor (2008) and cluster the standard errors by firm and by year that are also corrected for heteroskedasticity.

According to hypothesis *H4*, if poor financial reporting quality is associated with an increase in financial constraints risk, we expect a positive sign on γ_1.

4. Results and Discussion

4.1 Financial Reporting Quality and the Financial Accelerator Effect

Table 1 presents the median values of cost of debt, inventory growth and asset growth during the crisis period. In addition to the statistics for the overall sample, the table also shows the statistics for two subsamples, representing (1) the firms that have low financial reporting quality and high external finance dependence, and (2) other firms. One suggestive (albeit crude) comparison that can be made based on these statistics is that firms which have low financial reporting quality and high external finance dependence experienced a higher cost of debt (by 27 basis points per quarter) and a lower growth in inventory (by 2.38%), as well as in total assets (by 0.66%), than firms that either have higher financial reporting quality or low external finance dependence. In order to obtain better understanding of this relationship, I next present the results of the multivariate analysis.

4.1.1 Main Results

Table 2 presents the results of the multivariate analysis of financial reporting quality on cost of debt during the crisis period. Columns (1) through (3) examine the change in interest expense over September 2007 and March 2008. Each column presents the results with one of the three financial reporting quality attributes studied in this paper. A positive coefficient on the interaction term between Financial Constraint, *FC*, and the financial reporting quality measure, *FRQ* means that firms with higher external finance dependence and low financial reporting quality experience an increase in interest expense. The results provide evidence in support of this relation. For example, using accruals quality as the financial reporting quality attribute, the interaction term (*FC*FRQ1_AQ*) has a positive and significant coefficient of 1.29. The

interaction terms in columns (2) and (3) also have a positive and significant coefficient. Columns (4) and (5) present the results of expanding the window of observation. For brevity, I present the results with accruals quality as the financial reporting quality attribute. The results suggest that the coefficients on the interaction terms continue to be positive and significant over the September 2007 and June 2008 period as well as the September 2007 and September 2008 period indicating the continuation of increase in cost of credit alongside the continuation of the crisis. An additional insight from Table 2 is that poor financial reporting quality in itself does not cause firms to face higher interest expense as indicated by the non-positive coefficients on the financial reporting quality attributes (*FRQ1_AQ*, *FRQ2_Relevance* and *FRQ3_Persistence*). Collectively, the evidence suggests that firms with poor financial reporting quality and high levels of external finance dependence experience an increase in cost of credit during a credit crunch.

While suggestive, change in interest expense has serious shortcomings as a measure cost of credit. First, an increase in cost of credit may be reflected as more restrictive covenants and additional collateral requirements rather than as an increase in interest expense. In addition, firms face difficulty in obtaining additional credit the cost of which cannot be captured by change in interest expense. Accordingly, to provide further evidence on the relation between financial reporting quality and financial accelerator effect, I next examine the real activity of firms during the crisis period.

Table 3 presents the results of the multivariate analysis of financial reporting quality on real activity during the crisis period. Panel A examines changes to inventory holdings while Panel B examines changes to total assets. In each of the panels, Columns (1) through (3) examine the change in interest expense over September 2007 and March 2008. A negative coefficient on the interaction term between financial constraint, *FC*, and the financial reporting quality

measure, *FRQ* indicates that firms with higher external finance dependence and low financial reporting quality experience a sharper decline in real activity than other firms. The results provide evidence in support of this relation. For example, the results in Column (1) of Panel A shows that the interaction term (*FC*FRQ1_AQ*) has a negative and significant coefficient of -0.037 suggesting that poor financial reporting quality firms that depend on external finance experienced a sharper decline in inventory levels. In addition, the results suggest that the coefficients on the interaction terms continue to be negative and significant over September 2007 and June 2008 period as well as September 2007 and September 2008 period indicating the continuation of decline of inventory holdings. Results using other financial reporting quality attribute provide similar insights. Results based on total assets as a measure of real activity (Panel B) provide additional evidence of a sharper decline in real activity for firms with poor financial reporting quality and higher external finance dependence during a credit crunch. Interestingly, Table 3 provides additional evidence that poor financial reporting quality in itself does not affect a firm's real activity as indicated by the non-negative coefficients on the financial reporting quality attributes (*FRQ1_AQ*, *FRQ2_Relevance* and *FRQ3_Persistence*).

In sum, results in Tables 2 and 3 provide evidence that suggests that financial reporting quality is a source of a financial accelerator effect.

4.1.2 Comparison with Periods of Normal Levels of Credit Availability

While the results from the 2007-2008 period are consistent with financial reporting quality as a source of the financial accelerator effect, they leave open the possibility that the findings I document are always present, so that there is nothing unique happening during the credit crisis. One way to disentangle this alternate hypothesis is to repeat the analysis in periods of normal credit availability. If the financial reporting quality has a role to play in the financial accelerator, I expect that firms with low financial reporting quality and high external finance

dependence do not experience a significantly different cost of credit or significantly different levels of real activity during periods of normal credit availability.

I choose four windows of normal credit availability prior to the crisis – September 2006 to March 2007, September 2004 to March 2005, September 2004 to June 2005 and September 2004 to September 2005. Figure 3 indicates that these periods have low TED spreads indicating that there were no lending issues during these periods. While the reasons for the choice of these four periods are not unambiguous, September 2006 to March 2007 was chosen based on the reason that this period would have investment opportunities and market demands very similar to the crisis period. However, this period may be contaminated by the subprime crisis. Accordingly, I also pick the 2004-2005 period as an alternate period. This period is not contaminated by the subprime crisis but may have investment conditions different from 2007-2008. More importantly, Figure 3 indicates that the TED spread in this period was below 50 bps suggesting that this period experienced normal levels of credit availability.

Table 4 presents the results of this analysis. Specifically, I repeat the analysis of cost of credit (Equation 5), inventory growth (Equation 6) and total asset growth (Equation 7) for the periods of normal credit availability. Results presented in Panel A suggest that the interest expense of firms with low financial reporting quality and high external finance dependence is not significantly different from the interest expense of other firms. Results in Panel B and Panel C of Table 4 indicate that the inventory holding and asset growth of firms with low financial reporting quality and high external finance dependence is not significantly different from the inventory holding and asset growth of other firms. Collectively, the evidence in Table 4 suggests that firms with low financial reporting quality and high external finance dependency perform no worse in periods of normal credit availability.

4.1.3 Stock Price Performance

Next, I examine whether an *ex ante* classification of firms by their characteristics in terms of degree of external finance dependence and financial reporting quality *prior to* the credit crisis help predict the *ex post* magnitude of their stock price changes since September 2007. The results are presented in Table 5. Panel A examines the stock price performance during the crisis period. After controlling for the Fama and French (1993) factors as well as the Carhart (1997) momentum factor, the co-efficient on the interaction term between financial constraints and the financial reporting quality variable has a significant negative coefficient. Specifically, using accruals quality as the measure of financial reporting quality, I find that firms that have low information quality and are dependent on external financing generate a 7.90% lower return than other firms. Other measures of financial reporting quality provide qualitatively similar results. Panel B examines this relation in the period prior to the crisis from March 2007-July 2007. In contrast to the crisis period, I observe that the financial reporting quality has no predictive ability on the stock performance prior to the crisis.

This suggests that the equity markets react to the decline in economic activity of firms that have poor information quality and depend on external finance. In sum, these results further bolster the findings that financial reporting quality has an important role in the financial accelerator effect.

4.2 Financial Reporting Quality and Financial Constraints Risk

Evidence in Tables 2 through 5 suggests that the cash flows of firms subject to information asymmetry problems in the credit markets covary. This poses as a non-diversifiable risk (Livdan et al. 2008) for which the equity holders will demand a higher returns. This risk is captured by the financial constraints risk factor (Whited and Wu 2006). Accordingly, I next

examine whether the financial reporting quality of a firm affects its level of financial constraints risk.

4.2.1 Multivariate analysis

Table 6 presents the results of the analysis of the relation between financial reporting quality and financial constraints risk. Panel A of Table 6 provides the summary statistics for the variables used in this part of the study. Each of the three columns of Panel B of Table 6 presents the results of Equation 10 with one of the three financial reporting quality attributes studied in this paper. A positive coefficient on an attribute means that the attribute is positively associated with financial constraints risk. Column 1 shows that the *FRQ1_AQ* has a positive significant coefficient of 0.043 indicating that lower accruals quality is associated with higher financial constraints risk. Similarly, Columns 2 and 3 indicate that Relevance and Persistence have a positive significant coefficient of 0.043 and 0.027 respectively. Collectively, these results provide evidence that poorer financial reporting quality is associated with higher financial risk.

The sign on the control variables adds further credibility to the results in Table 6. Specifically, the *Age* variable is negative and significant suggesting that older firms have better access to capital. Similarly, the negative sign on *AssetTangibility* suggests that firms that have higher levels of tangible assets can use these assets as collateral to borrow capital. Hence, these firms, on average, face lower financial constraints risk. All else equal, a financially constrained firm that faces a greater investment opportunity set stands to lose more than a similar firm facing fewer growth opportunities. The positive and significant coefficient on *TobinQ* corroborates this theory. It is also noteworthy that in two of the three regressions, the *ZScore* variable is insignificant suggesting that financial distress is not driving the results.

While the two stage approach consisting of first estimating the measure of financial constraints risk (Equation 9) and, then, employing a panel data model to examine the information

quality effects on this risk (Equation 10) is common, it is econometrically inefficient in its use of information in the data. In order to exploit the full information in the data, I adopt a random coefficient hierarchical linear model approach (Greene 2008). Specifically, I substitute Equation (9) into Equation (10) to arrive at the following specification:

$$\begin{aligned} Ret_{it} = \quad & \beta_0 + \beta_{mkt} MKTRF_t + \beta_{size} SMB_t + \beta_{btm} HML_t + \beta_{mom} UMD_t + \gamma_1 FC\_FAC_t \\ & + \gamma_2 FC\_FAC_t * FRQ_{i,t} + \gamma_3 FC\_FAC_t * Age_{i,t} + \gamma_4 FC\_FAC_t * Asset\_Tangibility_{i,t} \\ & + \gamma_5 FC\_FAC_t * Tobin\_Q_{i,t} + \gamma_6 FC\_FAC_t * Leverage_{i,t} + \gamma_7 FC\_FAC_t * Z\_Score_{i,t} + \varepsilon \end{aligned} \quad (11)$$

The above equation is estimated as a random coefficient model wherein the coefficients of the above specifications are allowed to vary for each firm. Next, the mean effect across all firms is estimated.[17] The coefficient of interest in the above equation is γ_2. The results of this model are presented in Panel C of Table 6. The coefficient on the interaction term FC_FAC*FRQ is positive and significant using all the three financial reporting quality measures. This suggests that firms with lower financial reporting quality and external finance dependence earn a positive premium. In other words, equity investors consider these firms risky and expect a higher return to hold the stocks of these firms.

In sum, the regression results in Table 6 indicate that financial reporting quality is negatively associated with financial constraints risk.

4.2.2 Effect of Restatements Announcements on Financial Constraints Risk

While Table 6 provide evidence that lower financial reporting quality is associated with higher financial constraints risk, it is possible that these measures might be correlated with an omitted variable. In order to rule out this possibility, I relate the financial constraints risk loadings with an exogenous indicator of accounting quality. Specifically, I examine the behavior of the financial constraints risk loading around the period of announcement of restatements. In

[17] PROC MIXED in SAS was used for this analysis.

order to more precisely understand the effect of these announcements, I examine the monthly financial constraints risk factor loadings, as against the year-end betas as used in Equation (9).

I examine a sample of accounting restatements from the two Government Accountability Office (GAO) reports, which include restatements due to accounting irregularities made by public firms between January 1, 2002 and September 30, 2005 (GAO 2006). The subset of these restatements may have very little to do with information quality, such as accounting for mergers and acquisitions. Accordingly, I distinguish between the restatements in core items (includes the correction of errors in cost or expense accounting, assets or inventory accounts, or revenue recognition), and other restatements (such as non-operating or merger-related items) as defined in the prior literature (e.g., Palmrose et al. 2004). The final sample comprises 462 restatements. A firm-month is classified as an event month if a restatement was reported within a year prior to the month.

Prior literature provides evidence that suggests that post-restatement a firm's information environment improves (e.g., Wilson 2008; Frieder and Shanthikumar 2008). For example, Frieder and Shanthikumar (2008) show that analyst forecast dispersion decreases 3-6 months after, consistent with decrease in firm-specific uncertainty and improvement in information quality post-restatement announcements. The improved information quality may be attributable to increased scrutiny post-restatements. Accordingly, I expect that the financial constraint loadings should decline post-restatements.

Table 7 compares the average magnitudes of the monthly financial constraints risk loading for the restating and the control sub-samples. Taken as a whole, the financial constraints risk factor loading is lower for the restatement sample when compared to the control sample. This difference of -0.90 is statistically significant. Interestingly, upon closer observation I find that only the "Core Restatements" group experiences this decline in financial constraints risk.

The "Other Restatements" group does not experience any decline. This seems logical given that only a major accounting related restatement will enhance external as well as managerial scrutiny. Table 7 also shows that the loadings on the other risk factors also change post a restatement announcements and this change is dependent on whether the restatement is a "Core Restatement". These results are only presented for the sake of completeness and are out of the scope of this study. In sum, the results in Table 7 further bolster the evidence that financial reporting quality affects financial constraints risk.

5. Conclusion

Economy-wide consequences of financial reporting quality are of interest to academics and policy-makers. In this study, I examine the financial accelerator effect as one mechanism through which financial reporting quality of non-financial firms could have economy-wide consequences by propagating and magnifying shocks to the economy leading to fluctuations in aggregate economic activity. I find that financial reporting quality is an important contributor to the financial accelerator effect. Specifically, adopting a cross-sectional identification strategy suggested by prior research and using relevance, reliability, and persistence of reported earnings as financial reporting quality attributes, I find that firms that are dependent on external financing and have lower financial reporting quality face an increased interest expense and a decline in real activity at the onset of the credit crunch of 2007-2008. I also examine a related implication of the financial accelerator effect on a firm's cost of equity capital. I find that lower levels of financial reporting quality are associated with higher levels of financial constraints risk suggesting that financial constraints risk is one mechanism through which financial reporting quality can affect a firm's cost of equity capital.

This study opens up avenues for future research that could examine the economy-wide consequences of financial reporting. For instance, future studies could examine how aggregate

financial reporting quality at the onset of an economic downturn affects the length and magnitude of the downturn. Another possibility for future research is to examine the role of financial reporting quality in the financial accelerator effect when the source of the economic shock is an increase in real interest rate or a bank panic rather than a decline in collateral value. Future research can also focus on quantifying the economic significance of the financial accelerator effect of financial reporting quality.

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Appendix 1 – Variable Definitions

Measures of Financial Reporting Quality:

Accruals Quality = Accruals Quality (*FRQ1_AQ*) is calculated by, first, estimating the below cross-sectional regression for each year and each of the 48 Fama and French (1997) industries (at least 20 observations are required for each regression):

$$\mathrm{TCA_{it}} = \beta_{0t} + \beta_{1t}1/\mathrm{ATA_{i,t}} + \beta_{2t}\mathrm{CFO_{i,t-1}} + \beta_{3t}\mathrm{CFO_{i,t}} + \beta_{4t}\mathrm{CFO_{i,t+1}} + \beta_{5t}\Delta\mathrm{REV_{it}} + \beta_{6t}\mathrm{PPE_{it}} + \varepsilon_{it}$$

where, for year *t* and firm *i*, *TCA* is total current accruals and is calculated as the difference between income (Compustat Data18) less the cash flow from operations (Compsutat Data308), *ATA* is the average total assets (Compustat Data6), *CFO* is the cash flow from operations, ΔREV is the change in sales (Compustat Data12) less change in accounts receivables (Compustat Data2), *PPE* is the property, plant and equipment (Compustat Data8). The accruals quality is estimated for each firm *i* and each year *t* as the standard deviation of residuals from the above cross-sectional regression over the period *t-4* to *t*.

Relevance = Relevance (*FRQ2_Relevance*) is the adjusted-R^2 from a firm-specific time-series regression. The regression model used is:

$$P_{i,t} = \beta_{0i} + \beta_{1i}E_{i,t} + \beta_{2i}BV_{i,t} + \varepsilon_i$$

where P_{it} is the price-per-share of firm *i* three months after fiscal year-end *t*, E_{it} is the earnings-per-share of firm *i* during year *t*, BV_{it} is the book-value-per-share of firm *i* at the end of year *t*. I run the model as a rolling regression over *t-10* and *t* and require that firms have a minimum of 5 yearly observations.

Persistence = Persistence (*FRQ3_Persistence*) is estimated from the following time-series regression of earnings per share of a firm on its earnings per share in the previous year.

$$E_{i,t} = \alpha_{0i} + \alpha_{1i}E_{i,t-1} + \varepsilon_i$$

where, *E* is earnings the for firm *i* in fiscal year *t* (Compustat Data18). Persistence for firm *i* in fiscal year *t* is the coefficient, $\alpha_{1i}$from estimating the above equation for the firm over rolling ten-year window for fiscal years *t-10* to *t* and require that firms have a minimum of 5 yearly observations.

Other Variables:

ΔInterestExpense = Change in interest expense (Compustat Data22)

InventoryGrowth = Change in natural logarithm of inventory (Compustat Data38)

ΔROA =Change in profitability, where profitability is measured as earnings scaled by assets (Compustat Data8 scaled by Compustat Data44)

InterestCoverage =Interest coverage ratio is measured as earnings scaled by interest expense. (Compustat Data8 scaled by Compustat Data22)

Age = Measured as the natural logarithm of the number of years since the time the firm first appeared in CRSP.

TobinQ = Tobin's Q is measured as the ratio of the market value of total assets (Compustat Data6 + (Compustat Data25 * Compustat Data199) – Compustat Data60 – Compustat Data74) to book value of total assets (Compustat Data6).

ZScore = Z-Score is calculated as 1.2 * working capital (Compustat Data179) / total assets (Compustat Data6) + 1.4 * retained earnings (Compustat Data36) / total assets (Compustat Data6) + 3.3 * income before extraordinary items (Compustat Data123) / total assets (Compustat Data6) + 0.6 * shares outstanding (Compustat Data25) * price (Compustat Data199) / total liabilities (Compustat Data181) + 1 * sales (Compustat Data12) / total assets (Compustat Data6).

InventoryGrowth = Change in natural logarithm of inventory (Compustat Data38)

AssetGrowth = Change in natural logarithm of assets (Compustat Data44)

FC = Following, Whited and Wu (2006), I measure financial constraints as

$$FC_{i,t} = -0.091CF_{i,t} - 0.062DIVPOS_{i,t} + 0.021TLTD_{i,t} - 0.044LNTA_{i,t} + 0.102ISG_{i,t} - 0.035SG_{i,t}$$

in which *CF* is the ratio of cash flow (Compustat Data108) to total assets (Compustat Data44), *DIVPOS* is an indicator that takes the value of one if the firm pays cash dividends (Compustat Data89), *TLTD* is the ratio of the long term debt (Compustat Data51) to total assets, *LNTA* is the natural log of total assets, *ISG* is the firm's three-digit industry sales growth, and *SG* is firm sales growth (Compustat Data2). All variables are deflated by the replacement cost of total assets as the sum of the replacement value of the capital stock plus the rest of the total assets. The computation of the replacement value of the capital stock is detailed in Whited (1992).

Figure 1: Financial Accelerator Theory

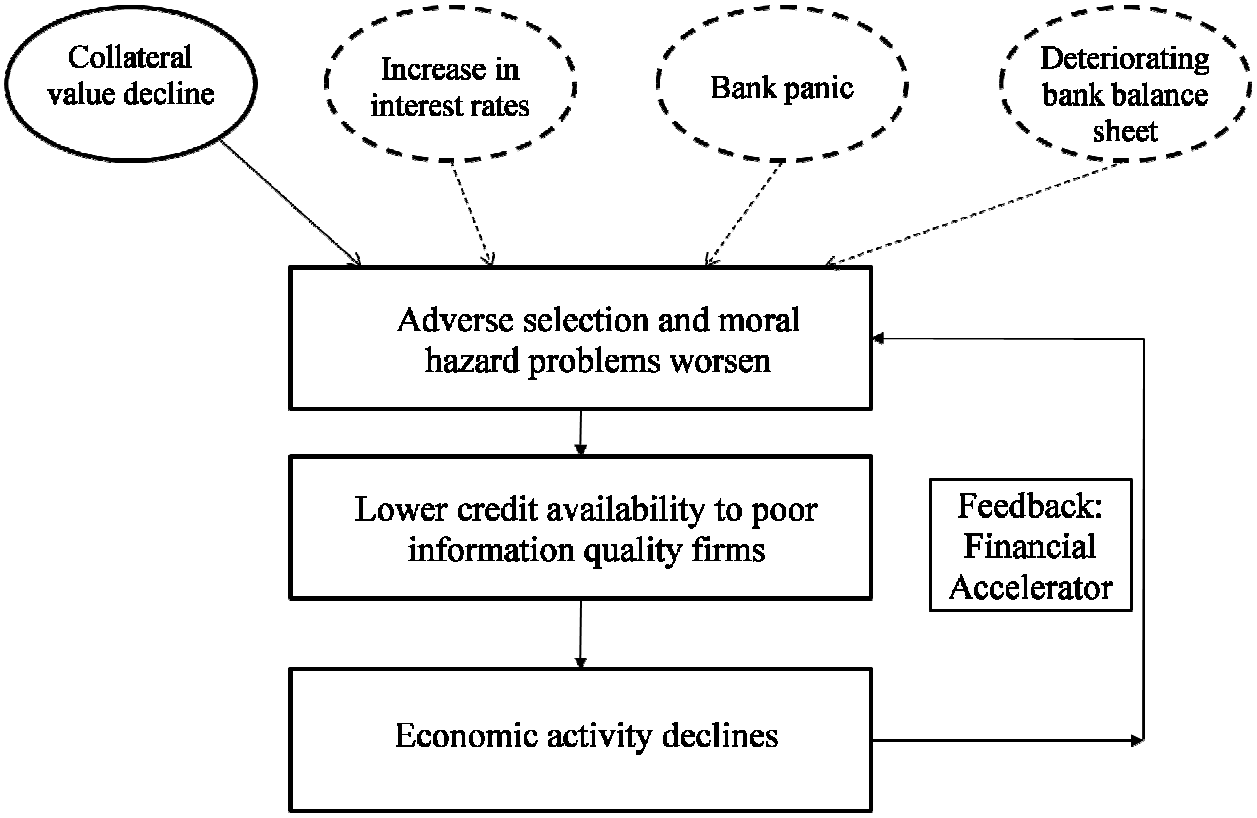

Figure 2: Information Quality, Financial Constraints Risk and Expected Stock Returns

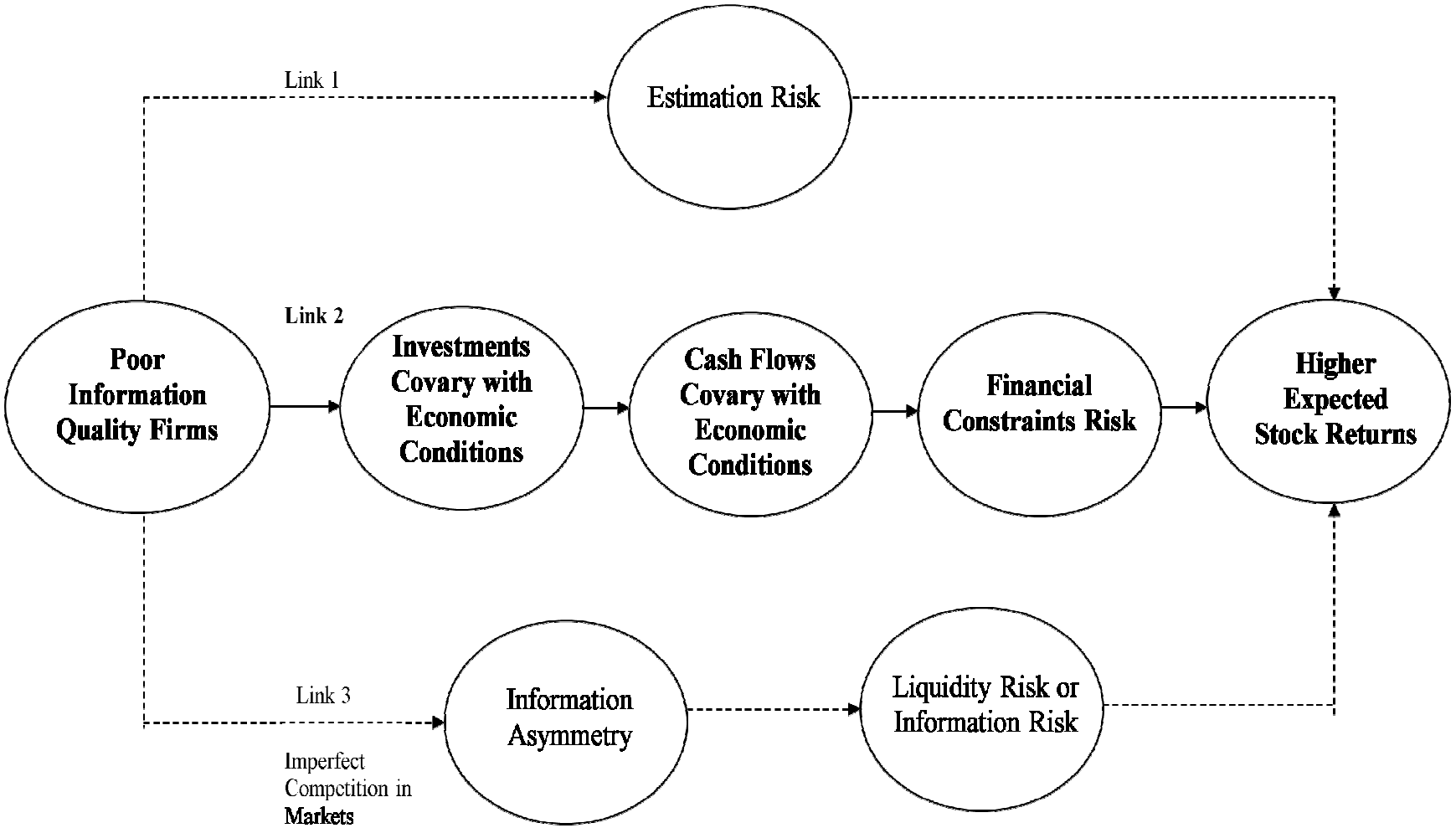

Figure 3: TED Spread

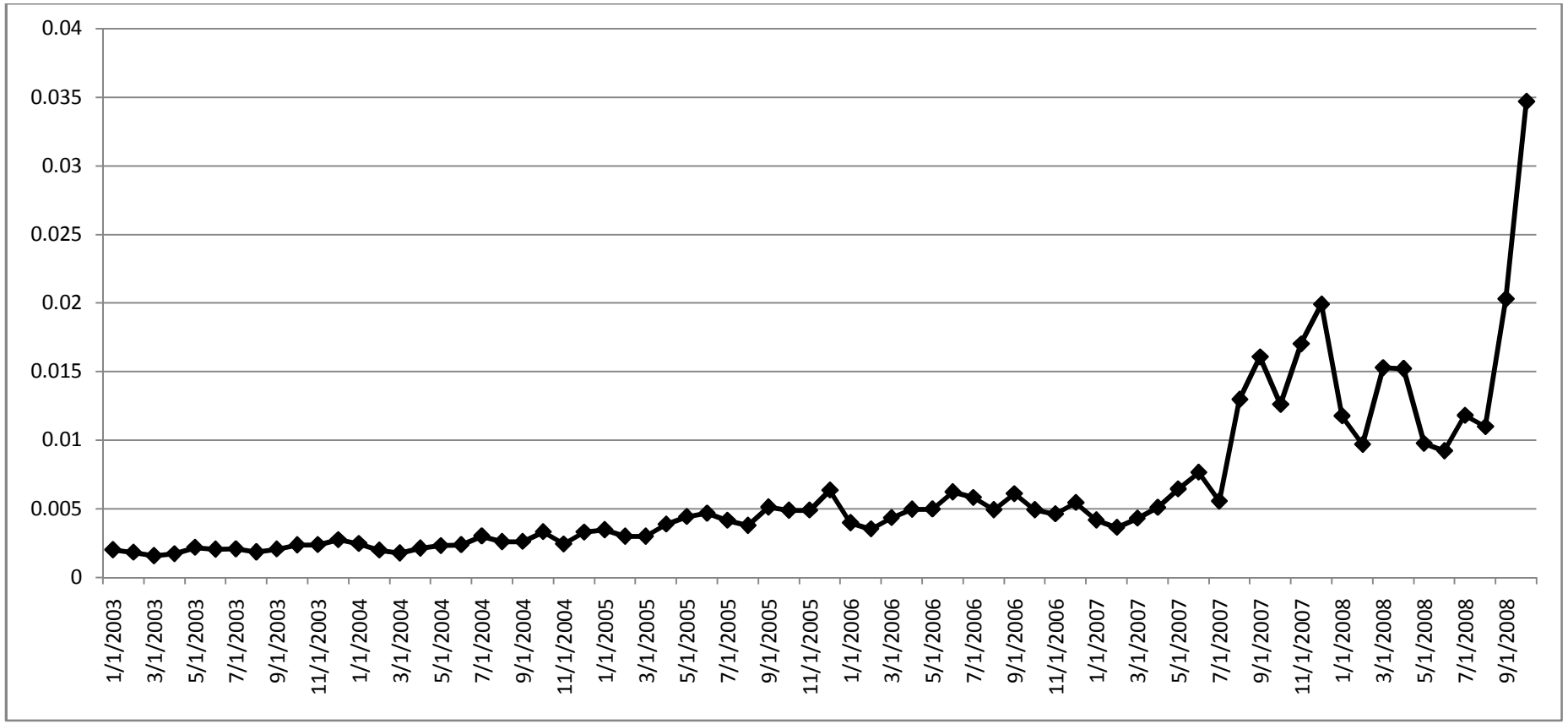

Figure Notes: The above figure presents the *TED spread* (as a percentage) between 1/1/2003 and 10/1/2008. The *TED spread* is the difference between the risky London Interbank Offered Rate (LIBOR) and the risk-free U.S. Treasury bill rate. The *TED spread* captures the extent of credit availability for non-financial firms where the lower values of *TED Spread* indicates greater credit availability.

Table 1
Descriptive Statistics

	Full Sample	Firms with low financial reporting quality and high FC	All other firms
Interest Rate (Quarterly)	1.79%	1.99%	1.72%
Inventory Growth	5.26%	3.40%	5.78%
Asset Growth	5.86%	5.49%	6.15%
Number of Firms	1,279	280	1,019

Table notes: This table presents median values of the quarterly interest rate, inventory growth and asset growth during the crisis period for the full sample as well as sub-samples of firms with low financial reporting quality and external finance dependency and other firms. *Interest Rate* is defined as a firm's interest expense in a given fiscal quarter scaled by the outstanding debt in that quarter. The inventory growth and asset growth are measured over the period September 2007 and March 2008 and the interest rate is measured as of fiscal quarter ending September 2007. Firms are classified into low and high financial reporting quality subsamples based on the median value of Accruals Quality (*FRQ1_AQ*). Firms are classified into low and high financial constraint subsamples based on the median value of the financial constraints index, *FC*.

Table 2
Effect of Financial Reporting Quality on Interest Expenses during the Credit Crisis

	Expected Sign	Sep07 - Mar08	Sep07 - Mar08	Sep07 - Mar08	Sep07 - Jun08	Sep07 - Sep08
Intercept	+	-0.957***	-1.317***	-0.896***	-1.128***	-1.221***
		(-4.64)	(-4.04)	(-3.03)	(-4.36)	(-3.33)
*FC*FRQ1_AQ*	+	1.299***			1.983***	2.504***
		(6.23)			(6.52)	(4.84)
*FC*FRQ2_Relevance*	+		1.161***			
			(5.52)			
*FC*FRQ3_Persistence*	+			1.327***		
				(5.27)		
FRQ1_AQ	+/-	-0.469**			-0.865***	-1.093**
		(-2.18)			(-2.69)	(-2.00)
FRQ2_Relevance	+/-		-0.035			
			(-0.11)			
FRQ3_Persistence	+/-			-0.639*		
				(-1.80)		
ΔLeverage	+	0.008***	0.008***	0.008***	0.007***	0.008***
		(6.98)	(7.06)	(7.14)	(8.89)	(8.26)
ΔROA	-	0.212	0.221	0.222	0.026	-0.053
		(1.21)	(1.28)	(1.27)	(0.11)	(-0.22)
InterestCoverage	-	0.000	0.000***	0.000**	0.000	0.000
		(1.38)	(3.16)	(2.12)	(-0.84)	(-1.39)
R-squared		0.267	0.271	0.272	0.225	0.268
Obs		1,131	1,131	1,131	1,106	1,029

Table notes: This table presents the results of the regressions that investigate the effects of financial reporting quality on cost of credit during the credit crisis period of September 2007 and September 2008. Specifically, the following model is used:

$$Model: \Delta InterestExpense_i = \beta_0 + \beta_1 FC_i * FRQ_i + \beta_2 FRQ_i + \sum_{j=1}^{3} \beta_j Controls_j + \varepsilon_i$$

The dependent variable is the change in interest expense over the periods mentioned in the column headings. *ΔLeverage* is the changes in interest bearing debt of the firm. The three financial reporting quality measures used are Accruals Quality (*FRQ1_AQ*), relevance of earnings (*FRQ2_Relevance*) and persistence of earnings (*FRQ3_Persistence*). The financial reporting quality variables are included as rank variables that take a value one if the firm has low financial reporting quality and zero if the firm has high financial reporting quality. *FC* is the level of financial constraints faced by the firm and is included as a rank variable that takes a value one if the firm has high levels of financial constraints and, zero otherwise. Financial reporting quality variables and financial constraints are measure as of the end of the fiscal year 2006. *ΔROA* is the change in profitability over the period. ROA is measured as earnings before extraordinary items scaled by assets. *InterestCoverage* is the interest coverage ratio of the firm at the end of the period of analysis. The Huber-White heteroscedasticity-robust t-statistics with standard errors clustered by firm are presented in parenthesis. *, ** and *** indicate significance at 5%, 10% and 1% respectively (two-tailed tests).

Table 3
Effect of Financial Reporting Quality on Real Activity during the Credit Crisis Period

Panel A: Inventory

	Expected Sign	Sep07 - Mar08	Sep07 - Mar08	Sep07 - Mar08	Sep07 - Jun08	Sep07 - Sep08
Intercept	+	0.084***	0.073***	0.076***	0.097***	0.110***
		(8.05)	(6.06)	(7.66)	(7.71)	(7.09)
*FC*FRQ1_AQ*	-	-0.037**			-0.050***	-0.032*
		(-2.33)			(-3.46)	(-1.70)
*FC*FRQ2_Relevance*	-		-0.024**			
			(-2.30)			
*FC*FRQ3_Persistence*	-			-0.028***		
				(-2.77)		
FRQ1_AQ	+/-	0.007			0.009	-0.003
		(0.56)			(0.59)	(-0.20)
FRQ2_Relevance	+/-		0.018*			
			(1.98)			
FRQ3_Persistence	+/-			0.016*		
				(1.65)		
ΔSALES	+	0.241***	0.240***	0.240***	0.331***	0.484***
		(7.44)	(7.35)	(7.42)	(10.26)	(12.31)
INV_SALES	+	0.029***	0.028***	0.028***	0.026***	0.036***
		(3.83)	(3.78)	(3.78)	(2.76)	(3.25)
R-squared		0.082	0.079	0.080	0.123	0.214
Obs		1,299	1,299	1,299	1,284	1,181

Panel B: Total Assets

	Expected Sign	Sep07 - Mar08	Sep07 - Mar08	Sep07 - Mar08	Sep07 - Jun08	Sep07 - Sep08
Intercept	+	0.014	0.028***	0.023*	0.028*	-0.001
		(1.37)	(2.66)	(1.87)	(1.65)	(-0.04)
*FC*FRQ1_AQ*	-	-0.028***			-0.037***	-0.036***
		(-3.76)			(-4.09)	(-2.87)
*FC*FRQ2_Relevance*	-		-0.028***			
			(-2.82)			
*FC*FRQ3_Persistence*	-			-0.028***		
				(-3.63)		
FRQ1_AQ	+/-	0.031***			0.047***	0.057***
		(4.71)			(5.51)	(5.58)
FRQ2_Relevance	+/-		0.007			
			(1.27)			
FRQ3_Persistence	+/-			0.014*		
				(1.97)		
Tobin's Q	+	0.010***	0.011***	0.010***	0.010***	0.023***
		(4.97)	(6.52)	(6.04)	(2.60)	(3.22)
Leverage	+	-0.020	-0.021	-0.021	-0.012	-0.016
		(-1.28)	(-1.36)	(-1.39)	(-0.61)	(-0.66)
Z – Score	-	0.000	0.000	0.000	0.000	0.000
		(-0.09)	(-0.32)	(-0.23)	(-0.47)	(-0.65)
R-squared		0.021	0.020	0.018	0.017	0.030
Obs		1,559	1,559	1,559	1,548	1,429

Table notes: This table presents the results of the regressions that investigate the effects of financial reporting quality on real activity during the credit crisis period of September 2007 and September 2008. Panel A presents the results of the following model:

$$Model: InventoryGrowth_i = \beta_0 + \beta_1 FC_i * FRQ_i + \beta_2 FRQ_i + \sum_{j=1}^{2} \beta_j Controls_i + \varepsilon_i$$

Where $InventoryGrowth$ is change in the natural logarithm of inventory levels of a firm *i* over the period mentioned in the heading row of each column of the table. The three financial reporting quality measures used are Accruals Quality (*FRQ1_AQ*), relevance of earnings (*FRQ2_Relevance*) and persistence of earnings (*FRQ3_Persistence*). The financial reporting quality variables are included as rank variables that take a value one if the firm has low financial reporting quality and zero if the firm has high financial reporting quality. *FC* is the level of financial constraints faced by the firm and is included as a rank variable that takes a value one if the firm has high levels of financial constraints and, zero otherwise. Financial reporting quality variables and financial constraints are measure as of the end of the fiscal year 2006. $\Delta Sales$ is the change in natural logarithm of sales and , INV_SALES is the natural logarithm of the ratio of inventory to sales. Panel B presents the results of the following model:

$$Model: AssetGrowth_i = \beta_0 + \beta_1 FC_i * FRQ_i + \beta_2 FRQ_i + \sum_{j=1}^{3} \beta_j Controls_i + \varepsilon_i$$

$AssetGrowth$ is defined as the change in natural logarithm of assets levels of a firm *i* over the crisis period. $TobinQ$is the firm's Tobin's Q, *Z-Score* is the Altman's Z-Score measure of bankruptcy and *Leverage* is the leverage of the firm – all variable measured as of the end of fiscal year 2006. The Huber-White heteroscedasticity-robust t-statistics with standard errors clustered by firm and by year are presented in parenthesis. *, ** and *** indicate significance at 5%, 10% and 1% respectively (two-tailed tests).

Table 4
Comparison of Results from Credit Crisis Period with Results from Periods of Normal Credit Availability

Panel A: Cost of Credit

	Expected Sign	Sep06-Mar07	Sep06-Mar07	Sep06-Mar07	Sep04-Mar05	Sep04-Jun05	Sep04-Sep05
Intercept	+	0.002	0.385	0.372*	-0.272	-0.383	-0.819
		(0.01)	(1.47)	(1.67)	(-0.49)	(-0.63)	(-0.75)
*FC*FRQ1_AQ*	-	-0.385			-0.835	-0.593	-1.409
		(-1.23)			(-0.96)	(-0.56)	(-1.01)
*FC*FRQ2_Relevance*	-		-0.074				
			(-0.27)				
*FC*FRQ3_Persistence*	-			-0.047			
				(-0.16)			
FRQ1_AQ	+/-	0.495			0.715	0.595	0.439
		(1.54)			(0.66)	(0.48)	(0.32)
FRQ2_Relevance	+/-		-0.267				
			(-0.84)				
FRQ3_Persistence	+/-			-0.293			
				(-0.92)			
ΔLeverage	+	0.011***	0.011***	0.011***	0.026***	0.030***	0.028***
		(13.40)	(13.25)	(13.20)	(5.18)	(3.50)	(2.67)
ΔROA	-	-0.287	-0.293	-0.291	0.509	0.418	2.247*
		(-1.05)	(-1.11)	(-1.09)	(1.06)	(0.85)	(1.74)
InterestCoverage	-	0.000*	0.000	0.000*	0.000	0.000	0.000
		(-1.86)	(-1.59)	(-1.66)	(0.53)	(1.28)	(-0.53)
R-squared		0.310	0.308	0.308	0.684	0.623	0.515
Obs		1,250	1,250	1,250	1,389	1,357	1,300

Panel B: Inventory

	Expected Sign	Sep06-Mar07	Sep06-Mar07	Sep06-Mar07	Sep04-Mar05	Sep04-Jun05	Sep04-Sep05
Intercept	+	0.047***	0.057***	0.041**	0.089***	0.085***	0.084***
		(3.14)	(3.76)	(2.49)	(7.48)	(6.42)	(5.40)
*FC*FRQ1_AQ*	+/-	-0.029			-0.014	0.000	-0.015
		(-1.54)			(-0.57)	(-0.01)	(-0.67)
*FC*FRQ2_Relevance*	+/-		-0.020				
			(-1.36)				
*FC*FRQ3_Persistence*	+/-			-0.018			
				(-1.18)			
FRQ1_AQ	+/-	0.017			0.010	-0.002	0.007
		(1.17)			(0.46)	(-0.10)	(0.36)
FRQ2_Relevance	+/-		-0.001				
			(-0.04)				
FRQ3_Persistence	+/-			0.020			
				(1.19)			
ΔSALES	+	0.261***	0.262***	0.261***	0.372***	0.490***	0.690***
		(5.30)	(5.25)	(5.20)	(8.38)	(9.19)	(11.46)
INV_SALES	+	0.023**	0.023**	0.023**	0.039***	0.036***	0.048***
		(2.37)	(2.38)	(2.38)	(4.12)	(4.83)	(5.55)
R-squared		0.031	0.031	0.031	0.067	0.093	0.161
Obs		1,418	1,418	1,418	1,644	1,611	1,562

Panel C: Total Assets

	Expected Sign	Sep06-Mar07	Sep06-Mar07	Sep06-Mar07	Sep04-Mar05	Sep04-Jun05	Sep04-Sep05
Intercept	+	0.027**	0.024**	0.019	0.034***	0.037**	0.056**
		(2.39)	(2.28)	(1.64)	(3.59)	(2.41)	(2.29)
*FC*FRQ1_AQ*	+/-	-0.015			0.003	0.003	0.007
		(-1.63)			(0.37)	(0.24)	(0.49)
*FC*FRQ2_Relevance*	+/-		-0.007				
			(-0.64)				
*FC*FRQ3_Persistence*	+/-			-0.005			
				(-0.48)			
FRQ1_DA	+/-	0.003			0.005	0.007	0.009
		(0.44)			(0.68)	(0.94)	(0.82)
FRQ2_Relevance	+/-		0.005				
			(0.60)				
FRQ3_Persistence	+/-			0.012			
				(1.33)			
Tobin's Q	+	0.013***	0.013***	0.013***	0.007**	0.011***	0.018***
		(5.30)	(4.79)	(5.00)	(2.46)	(3.02)	(2.92)
Leverage	+	-0.001	-0.001	-0.001	-0.004	0.009	0.004
		(-0.07)	(-0.04)	(-0.04)	(-0.33)	(0.43)	(0.12)
Z – Score	-	0.000	0.000	0.000	0.000	0.000	0.000
		(1.39)	(1.29)	(1.29)	(1.06)	(0.89)	(0.64)
R-squared		0.022	0.020	0.021	0.009	0.012	0.018
Obs		1,666	1,666	1,666	1,412	1,387	1,350

Table notes: This table presents the results of the regressions that investigate the effects of financial reporting quality on cost of credit and real activity during the periods of normal credit availability. Panel A presents the results of the following model:

$$Model: \Delta InterestExpense_i = \beta_0 + \beta_1 FC_i * FRQ_i + \beta_2 FRQ_i + \sum_{j=1}^{3} \beta_j Controls_j + \varepsilon_i$$

The dependent variable is the change in interest expense over the periods mentioned in the column headings. *ΔLeverage* is the changes in interest bearing debt of the firm. The three financial reporting quality measures used are Accruals Quality (*FRQ1_AQ*), relevance of earnings (*FRQ2_Relevance*) and persistence of earnings (*FRQ3_Persistence*). The financial reporting quality variables are included as rank variables that take a value one if the firm has low financial reporting quality and zero if the firm has high financial reporting quality. *FC* is the level of financial constraints faced by the firm and is included as a rank variable that takes a value one if the firm has high levels of financial constraints and, zero otherwise. Financial reporting quality variables and financial constraints are measure as of the end of the fiscal year prior to the period of analysis. *ΔROA* is the change in profitability over the period. ROA is measured as earnings before extraordinary items scaled by assets. *InterestCoverage* is the interest coverage ratio of the firm at the end of the period of analysis. Panel B presents the results of the following model:

$$Model: InventoryGrowth_i = \beta_0 + \beta_1 FC_i * FRQ_i + \beta_2 FRQ_i + \sum_{j=1}^{2} \beta_j Controls_i + \varepsilon_i$$

Where $InventoryGrowth$ is change in the natural logarithm of inventory levels of a firm *i* over the period mentioned in the heading row of each column of the table. Panel C presents the results of the following model:

$$Model: AssetGrowth_i = \beta_0 + \beta_1 FC_i * FRQ_i + \beta_2 FRQ_i + \sum_{j=1}^{3} \beta_j Controls_i + \varepsilon_i$$

$AssetGrowth$ is defined as the change in natural logarithm of assets levels of a firm i over the crisis period. $TobinQ$is the firm's Tobin's Q, *Z-Score* is the Altman's Z-Score measure of bankruptcy and *Leverage* is the leverage of the firm – all variable measured as of the end of fiscal year 2006. The Huber-White heteroscedasticity-robust t-statistics with standard errors clustered by firm are presented in parenthesis. *, ** and *** indicate significance at 5%, 10% and 1% respectively (two-tailed tests).

Table 5
Financial Reporting Quality, Credit Conditions and Economic Activity: Evidence from Realized Stock Returns

Panel A: Credit Crisis Period

Variable	Sep07-Mar08	Sep 07-Mar 08	Sep 07-Mar 08	Sep 07-Jun08	Sep07–Sep08
Intercept	-0.227***	-0.190***	-0.199***	-0.269***	-0.203***
	(-13.99)	(-10.25)	(-10.97)	(-12.19)	(-8.84)
*FC * FRQ1_AQ*	-0.051***			-0.053**	-0.079***
	(-3.20)			(-2.45)	(-3.52)
*FC * FRQ2_Relevance*		-0.067***			
		(-4.58)			
*FC * FRQ3_Persistence*			-0.066***		
			(-4.32)		
FRQ1_AQ	0.026**			0.031*	0.044**
	(1.99)			(1.78)	(2.24)
FRQ2_Relevance		-0.003			
		(-0.21)			
FRQ3_Persistence			0.006		
			(0.42)		
Beta	0.037***	0.044***	0.044***	0.076***	0.062***
	(4.29)	(4.91)	(4.97)	(6.53)	(5.08)
BTM	0.009	0.001	0.001	-0.005	-0.087***
	(0.42)	(0.03)	(0.07)	(-0.16)	(-2.78)
MVE	0.006***	0.001***	0.001***	0.007***	0.005***
	(5.91)	(3.26)	(3.43)	(4.96)	(3.39)
Momentum	0.068***	0.066**	0.067***	0.065*	0.160***
	(2.57)	(2.54)	(2.58)	(1.80)	(4.23)
R-squared	0.044	0.041	0.039	0.045	0.048
Obs.	2,222	2,222	2,222	2,223	2,221

Panel B: Comparison with Other Periods

Variable	Mar07-Jul07	Mar07-Jul07	Mar07-Jul07	Sep06-Mar07	Sep04-Sep05
Intercept	-0.0134	-0.018	0.002	0.179***	0.410***
	(-0.78)	(-0.94)	(0.09)	(4.31)	(5.82)
*FC * FRQ1_AQ*	0.015			0.045	0.114
	(0.88)			(1.05)	(1.63)
*FC * FRQ2_Relevance*		0.006			
		(0.44)			
*FC * FRQ3_Persistence*			-0.000		
			(-0.01)		
FRQ1_AQ	0.003			0.004	-0.024
	(0.21)			(0.12)	(-0.42)
FRQ2_Relevance		0.010			
		(0.74)			
FRQ3_Persistence			-0.010		
			(-0.74)		
Beta	0.033***	0.033***	0.031***	-0.006	-0.099**
	(3.64)	(3.57)	(3.39)	(-0.24)	(-2.16)
BTM	0.019	0.021	0.019	0.087*	0.095
	(0.83)	(0.91)	(0.80)	(1.75)	(1.33)
MVE	0.004***	0.004***	0.003***	-0.002	-0.009
	(3.55)	(3.39)	(3.12)	(-1.42)	(-1.51)
Momentum	0.073***	0.073***	0.070**	-0.035	0.035
	(2.58)	(2.57)	(2.47)	(-0.73)	(0.75)
R-squared	0.015	0.015	0.014	0.004	0.008
Obs.	2,221	2,221	2,221	2,740	2,607

Table Notes: This table examines the relation between financial reporting quality and stock returns during periods of differing credit conditions. This table presents the results of the following regression model:

$$Model: Ret_{i,t} = \beta_0 + \beta_1 FC_{i,t-1} * FRQ_{i,t-1} + \beta_2 FRQ_{i,t-1} + \sum_{j=1}^{4} \beta_j Controls_{j,t-1} + \varepsilon_{i,t}$$

Panel A (Panel B) of this table presents the regression an *ex ante* classification of the firms based on their degrees of financial constraint and information quality *prior to* the crisis on their *ex post* stock price performance during the credit crisis (during periods of normal credit conditions). The dependent variable is the buy-and-hold raw return during the period mentioned in the header row of each column in the table. The three financial reporting quality measures used are Accruals Quality (*FRQ1_AQ*), relevance of earnings (*FRQ2_Relevance*) and persistence of earnings (*FRQ3_Persistence*). The financial reporting quality variables are included as rank variables that take a value one if the firm has low financial reporting quality and zero if the firm has high financial reporting quality. *FC* is the level of financial constraints faced by the firm and is included as a rank variable that takes a value one if the firm has high levels of financial constraints and, zero otherwise. *Beta* measures the correlation of the firm's stock returns with the overall market. *Size* is the market value of equity. *BTM* is the firm's book-to-market. *Momentum* is the growth is the firm's stock price over the last year, excluding the last month. All independent variables are measured as of the end of the year prior to the period of analysis. The Huber-White heteroscedasticity-robust t-statistics with standard errors clustered by firm are presented in parenthesis. *, ** and *** indicate significance at 5%, 10% and 1% respectively (two-tailed tests).

Table 6
Effect of Financial Reporting Quality on Financial Constraints Risk

Panel A: Summary Statistics

	N	Mean	Std Dev	Q1	Median	Q3
$\hat{\beta}_{FC}$	31,769	0.126	0.844	-0.395	0.027	0.548
FRQ1_AQ	31,362	-0.064	0.054	-0.021	-0.047	-0.094
FRQ2_Relevance	22,819	-0.385	0.388	-0.717	-0.442	-0.089
FRQ3_Persistence	25,843	-0.307	0.353	-0.557	-0.314	-0.058
Age	31,598	2.873	0.621	2.398	2.773	3.434
Asset_Tangibility	31,750	0.293	0.222	0.117	0.234	0.416
Tobin_Q	30,380	1.863	1.156	1.084	1.456	2.186
Z_score	31,106	4.808	13.281	1.918	3.266	5.382
Leverage	31,703	0.172	0.176	0.006	0.127	0.280

Panel B: Multivariate Analysis

	Expected Sign			
Intercept	(+/-)	0.667***	0.730***	0.691***
		-11.23	-8.23	-10.09
Information Attributes				
FRQ1_AQ	(+)	0.043***		
		(2.99)		
FRQ2_Relevance	(+)		0.043***	
			(2.70)	
FRQ3_Persistence	(+)			0.027***
				(2.63)
Control Variables				
Age	(-)	-0.173***	-0.187***	-0.176***
		(-8.65)	(-7.09)	(-8.24)
AssetTangibility	(-)	-0.315***	-0.283***	-0.297***
		(-6.58)	(-6.4)	(-6.97)
TobinQ	(+)	0.062***	0.040***	0.048***
		(5.18)	(3.20)	(4.18)
Z_Score	(?)	-0.003***	-0.002	-0.002
		(-4.35)	(-1.36)	(-1.50)
Leverage	(-)	-0.228***	-0.169**	-0.174**
		(-3.13)	(-2.36)	(-2.16)
R-squared		0.052	0.042	0.044
# of Observations		29,362	21,284	24,116
Firm Clusters		3,887	2,769	3,113
Year Clusters		15	15	15

Panel C: Hierarchical Linear Model Approach to Examine the Effect of Information Quality on Financial Constraints Risk

	Expected Sign			
Intercept	(?)	0.010***	0.010***	0.010***
		(56.07)	(48.77)	(51.30)
FC_FAC	(+)	1.290***	1.376***	1.324***
		(38.35)	(33.55)	(34.83)
*FC_FAC*FRQ1_AQ*	(+)	0.270***		
		(3.53)		
*FC_FAC*FRQ2_Relevance*	(+)		0.092***	
			(5.50)	
*FC_FAC*FRQ3_Persistence*	(+)			0.049**
				(2.66)
*FC_FAC*Age*	(-)	-0.378***	-0.385***	-0.379***
		(-38.99)	(-33.65)	(-35.24)
*FC_FAC*Asset_Tangibility*	(-)	-0.718***	-0.635***	-0.665***
		(-24.57)	(-20.40)	(-20.99)
*FC_FAC*Tobin_Q*	(+)	0.114***	0.099***	0.112***
		(19.94)	(15.22)	(17.28)
*FC_FAC*Z_Score*	(?)	-0.003***	-0.004***	-0.004***
		(-4.47)	(-4.40)	(-5.08)
*FC_FAC*Leverage*	(-)	-0.318***	-0.310***	-0.360***
		(-8.21)	(-7.27)	(-8.44)
MKTRF	(+)	0.911***	0.902***	0.907***
		(183.92)	(169.29)	(171.30)
SMB	(+)	0.742***	0.683***	0.711***
		(135.05)	(115.09)	(121.08)
HML	(+)	0.311***	0.335***	0.317***
		(40.16)	(40.52)	(38.43)
UMD	(-)	-0.221***	-0.204***	-0.216***
		(-58.88)	(-50.45)	(-53.90)
# of Observations		1,006,769	736,221	834,658

Table Notes: This table presents the results of the tests that examine the relation between financial reporting quality and financial constraints risk. Panel A reports the summary statistics of the variables used in this study. $\hat{\beta}_{FC}$ is the firm level financial constraints risk and is measured as the slope coefficient in the firm level time-series regressions of excess returns on the Fama and French (1993) three factor model, augmented with the Carhart (1998) momentum factor as well as the Whited and Wu (2006) financial constraints factor. The three financial reporting quality measures used are Accruals Quality (*FRQ1_AQ*), relevance of earnings (*FRQ2_Relevance*) and persistence of earnings (*FRQ3_Persistence*). *Age* is the natural logarithm of the firm's age, *TobinQ* is the firm's Tobin's Q, *AssetTangibility* is the level of tangible assets in the firm, *ZScore* is the Altman's Z-Score measure of bankruptcy and *Leverage* is the leverage of the firm. Panel B reports the results of the regressions of reported earnings quality on financial constraints risk.

$$Model: \hat{\beta}_{FC_{i,t}} = \gamma_0 + \gamma_1 FRQ_{i,t} + \sum_{j=1}^{5} \gamma_{i,t} Controls_{i,t} + \varepsilon_{i,t}$$

The financial reporting quality variables are included as rank variables that take a value one if the firm has low financial reporting quality and zero if the firm has high financial reporting quality. The Huber-White heteroscedasticity-robust t-statistics with standard errors clustered by firm and by year are presented in parenthesis. *, ** and *** indicate significance at 5%, 10% and 1% respectively (two-tailed tests). Panel C adopts a hierarchical linear model to examine the relation between financial reporting quality and financial constraints risk and presents the results of the following model:

$$\begin{aligned} Model: Ret_{it} = {} & \beta_0 + \beta_{mkt} MKTRF_t + \beta_{size} SMB_t + \beta_{btm} HML_t + \beta_{mom} UMD_t + \gamma_1 FC\_FAC_t + \gamma_2 FC\_FAC_t * FRQ_{i,t} + \gamma_3 FC\_FAC_t \\ & * Age_{i,t} + \gamma_4 FC\_FAC_t * Asset\_Tangibility_{i,t} + \gamma_5 FC\_FAC_t * Tobin\_Q_{i,t} + \gamma_6 FC\_FAC_t * Leverage_{i,t} \\ & + \gamma_7 FC\_FAC_t * Z\_Score_{i,t} + \varepsilon_i \end{aligned}$$

The dependent variable is the monthly return for firm *i* in excess of the risk-free rate. *MKTRF*, *SMB* and *HML* are the Fama and French (1993) monthly factors. *UMD* is the Carhart (1998) momentum factor. *FC_FAC* is the Whited and Wu (2006) financial constraints risk factor.

Table 7
Effect of Restatements on Financial Constraints Risk

	Obs	$\hat{\beta}_{FC}$	$\hat{\beta}_{MKT}$	$\hat{\beta}_{SMB}$	$\hat{\beta}_{HML}$	$\hat{\beta}_{UMD}$
All Restatements	5,257	0.017	1.038***	0.833***	0.383***	-0.195***
		(1.55)	(89.82)	(63.64)	(22.53)	(-21.81)
Core Restatements	3,522	-0.035***	1.012***	0.826***	0.471***	-0.190***
		(-2.73)	(79.35)	(56.34)	(24.97)	(-19.18)
Other Restatements	1,735	0.123***	1.092***	0.847***	0.205***	-0.204***
		(5.84)	(46.37)	(32.31)	(6.01)	(-11.28)
Control Group	163,685	0.107***	0.945***	0.768***	0.339***	-0.192***
		(49.56)	(431.79)	(324.96)	(111.88)	(-116.57)
All - Control		-0.090***	0.093***	0.065***	0.044***	-0.003
		(-7.36)	(7.58)	(4.82)	(2.57)	(-0.36)
Core - Control		-0.142***	0.067***	0.058***	0.132***	0.002
		(-9.55)	(4.49)	(3.56)	(6.32)	(0.11)
Other - Control		0.016	0.147***	0.079***	-0.134***	-0.012
		(0.72)	(6.90)	(3.38)	(-4.51)	(-0.79)

Table Notes: The above table presents the change in the financial risk factor loading for firms that announced a restatement. The event period is the first year's monthly factors post-announcement for the firm that made the announcement. Control group refers to all non-event firm-month observations. The t-statistics for the difference in means are presented below in parenthesis. *, ** and *** indicate significance at 5%, 10% and 1% respectively (two-tailed tests).