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The Effect of Accounting Conservatism on Corporate Investment during the Global Financial Crisis*

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Abstract

This paper examines the effect of accounting conservatism on firm-level investment during the 2007-2008 global financial crisis. Using a differences-in-differences design, we find that firms with less conservative financial reporting experienced a sharper decline in investment activity following the onset of the crisis compared to firms with more conservative financial reporting. This relation is stronger for firms that were financially constrained, faced greater external financing needs, or had higher information asymmetry. We also find that more conservative firms experienced lower declines in both debt raising activity and stock performance. The evidence suggests that accounting conservatism reduces underinvestment in the presence of information frictions.

JEL Classification: G01; G14; G31; G32; G34; M41

Keywords: Accounting Conservatism; Investment; Information Frictions; Financing Constraints; Crisis

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1. Introduction

A growing literature studies the causes and consequences of the global financial crisis of 2007-2008 (e.g., Campello et al. 2010; Duchin et al. 2010; Ivashina and Scharfstein 2010; Vyas 2011; Huizinga and Laeven 2012). Most of the accounting-related work in this area focuses on financial institutions and seeks to understand whether fair value accounting or accounting discretion contributed to the systematic biases in valuations on bank balance sheets (e.g., Huizinga and Laeven 2012). In this study, we examine the role non-financial firms' financial reporting played in affecting the real economy during the crisis. Prior studies provide evidence that the financial crisis of 2007-2008 represents a relatively exogenous shock to the supply of external finance (at least with respect to any individual firm) that significantly weakened firms' funding abilities (Ivashina and Scharfstein 2010) and caused underinvestment (Campello et al. 2010; Duchin et al. 2010). We build on those studies and predict that conservative financial reporting reduces potential underinvestment in the presence of information frictions and ameliorates the negative impact of the crisis on corporate investment. Focusing on the crisis period allows us to use a conservatism measure immediately prior to the external shock to explain changes in firm investment. Hence we can largely avoid some of the issues regarding the endogeneity of financial reporting and firm investment that can arise in a static analysis.¹

The theory underlying the hypotheses examined in this study is based on standard models of investment with financing frictions (e.g., Jaffee and Russell 1976; Stiglitz and Weiss 1981; Holmstrom and Tirole 1997). This literature suggests that negative shocks to the supply of

¹ Accounting conservatism is a long-run equilibrium response to various institutional factors and firm characteristics. The financial crisis provides us with a "shock" that helps to break this "equilibrium" and as a result, we are able to document the effects of conservative financial reporting on firm investment in this situation. The increase in uncertainty leads to the "unexpected" drying up of liquidity in the banking system and unexpectedly increases conservative financial reporting's relative benefits. Following the same logic, several papers exploit the exogenous nature of financial crises and examine the effect of certain corporate governance characteristics on firm performance during the Asian financial crisis of 1997-1998 (e.g., Johnson et al. 2000; Mitton 2002; Lemmon and Lins 2003; Baek et al. 2004). See Goldstein and Razin (2015) for a thorough discussion of the theoretical literature on financial crises.

external finance, together with a firm's information frictions, can hamper firm-level investment. For example, firms may face capital rationing because of either adverse selection concerns arising from information asymmetry between firms and capital suppliers (e.g., Jaffee and Russell 1976; Stiglitz and Weiss 1981) or moral hazard concerns arising from the private benefits of control (e.g., Holmstrom and Tirole 1997). Suppliers of capital, when hit with a negative shock, may be unwilling to provide financing to firms in the presence of information frictions. As a result, some projects with positive net present values (NPVs) will not be financed.

The above concepts of financial market imperfections provide a theoretical link between firms' financial reporting and the amount/cost of financing they receive and the economic activity in which they are hence able to engage. Armstrong et al. (2010) provide an excellent discussion on informational problems between firms and creditors, and how accounting conservatism can help address them (also see Holthausen and Watts 2001; Watts 2003a). The intuition is as follows. Debt holders of a firm have an asymmetric payoff with respect to net assets. As a result, they are concerned with the lower ends of the earnings and net assets distributions. In assessing a potential loan, lenders require verifiable lower bound measures of the current value of net assets and use those as inputs in the loan decision. Further, they use those lower bound measures to monitor the borrower's ability to pay during the life of the loan. Debt contracts use the lower bound measures of net assets to trigger technical default that allows the loan to be called (Beneish and Press 1993) and to restrict managerial actions that reduce the value of net assets or otherwise reduce the value of the loan. Without such restrictions (i.e., debt covenants based on conservative accounting numbers), companies could not borrow because management's ability to distribute the assets, together with limited liability, make creditors wary of recovering their loans.² Consistent with these arguments, recent studies document that debt

² Watts (1977, p.57) notes that this use of conservative accounting in corporations dates back to the 1620s in the U.K. when the faceless trading of company shares effectively generated limited liability for shareholders. Also see

holders demand conservative financial reporting (e.g., Beatty et al. 2008; Nikolaev 2010; Tan 2013) and reward more conservative borrowers with easier access to finance and a lower cost of debt (e.g., Ahmed et al. 2002; Zhang 2008). Gox and Wagenhofer (2009, 2010) show analytically that conservatism is the optimal accounting policy for a financially constrained firm.

Based on the above contracting explanations for accounting conservatism, we expect accounting conservatism to have played an especially important role in mitigating underinvestment during the financial crisis. The crisis substantially limited a firm's borrowing capacity, thus highlighting the importance of accounting conservatism in strengthening a firm's funding ability. The global financial crisis was characterized by the drying-up of liquidity in the banking system (Ivashina and Scharfstein 2010). Such a "credit crunch" likely makes banks more careful about assessing loans to firms and a stringent assessment of a borrower's financial condition requires *verifiable* accounting numbers (Watts 2003a). As a result, firms that embrace more conservative financial reporting are more likely to obtain funding (via better borrowing terms) from banks or other creditors, especially given the increased costs of external funds and intensified capital rationing in the crisis period.

In addition, the crisis period represents a situation in which most firms were likely to experience underinvestment (Campello et al. 2010; Duchin et al. 2010). During that period, accounting conservatism's role in improving a firm's borrowing capacity directly translated into value creation by mitigating underinvestment. In their survey paper, Armstrong et al. (2010) provide evidence that debt is the dominant source of capital in the United States.³ Hence we would expect the global financial crisis to have had a major impact on corporate investment. Using survey evidence, Campello et al. (2010) find that the corporate sector was indeed

Anderson and Tollison (1983) for a discussion of limited liability for unincorporated joint stock companies in the 1700s.

³ Armstrong et al. (2010, p.212) state, "For example, in 2006, U.S. domiciled corporations raised more than \$2.6 trillion of new external capital. Of that amount, more than 95%, or about \$2.5 trillion, was some form of debt financing (i.e., bonds, syndicated debt, or other types of loans). The remaining 5% was in the form of common and preferred equity. Similar statistics hold for 2005 and 2004."

adversely affected by the shortfall in bank lending during the crisis period, and that firms suffered from severe underinvestment. Duchin et al. (2010) provide corroborating empirical evidence that corporate investment declined significantly following the onset of the crisis, especially for firms with low cash reserves. In sum, the financial crisis made it much harder for firms to borrow and invest. Due to accounting conservatism's role in enhancing borrowing capacity, firms with more conservative financial reporting would have suffered from less underinvestment during the crisis.

We examine the role of accounting conservatism on firm-level investment (capital expenditures) for non-financial firms around the 2007-2008 global financial crisis using a differences-in-differences design. Specifically, we examine whether an ex ante classification of firms by their level of accounting conservatism prior to the credit crisis helps to explain the ex post magnitude of the decline in investment. We proxy for conservatism by *C_Score* (Khan and Watts 2009), the difference between the skewness in cash flows from operations and the skewness in earnings (Givoly and Hayn 2000), asymmetrically timely loss recognition (Basu 1997; Wittenberg-Moerman 2008), and an index that combines the three individual measures. Our base specification regresses firm-level quarterly investment over July 1, 2006 to June 30, 2008 on an indicator variable for whether the quarter in question is after the crisis's onset (i.e., after July 1, 2007), and on the interaction of this indicator variable with the firm's level of accounting conservatism one year prior to the start of the crisis, controlling for firm fixed effects, Tobin's Q, and cash flow.

Consistent with prior literature, we find that firms experienced a decline in their investment when hit by the financial crisis (Campello et al. 2010; Duchin et al. 2010). More importantly, consistent with our prediction, we find that firms with more conservative financial reporting experienced a smaller decline in investment activity following the onset of the financial crisis than did firms with less conservative financial reporting. For example, while the sensitivity

of investment to the crisis is -0.07 for the average firm in our sample, the sensitivity for a firm with a one standard deviation higher value of *C_Score* is only -0.05, a decrease in sensitivity by 29%. We find similar results with each of these measures individually and with the composite index. Together, the results suggest that negative shocks to the supply of external finance hampers firm-level investment and that conservative financial reporting can ameliorate the sensitivity of firms' investment to such negative shocks.

Next, we show that the magnitude of our findings is greater for firms more likely to suffer from underinvestment (as opposed to overinvestment). Firms that are financially constrained or have greater demand for external finance are more likely to experience underinvestment. We consider three measures of financing constraints: *KZ Index* (Kaplan and Zingales 1997), *Payout Ratio* (Fazzari et al. 1988) and existence of *Lines of Credit* (Sufi 2009), as well as one measure of financing needs: *Cash Reserves* (Duchin et al. 2010). Collectively, consistent with our predictions, we find stronger benefits of conservatism for firms that face relatively greater costs in raising external capital (i.e., financially constrained firms) or that have a relatively greater need to do so (i.e., firms that lack internal financial resources). These results strengthen the interpretation that conservative financial reporting mitigated underinvestment during the crisis. We also find that the role for conservatism is greater in firms with a higher level of information asymmetry, consistent with the notion that conservatism mitigates financing frictions arising from information problems.

We perform a series of additional analyses to strengthen the identification. First, our results continue to hold when we measure accounting conservatism as much as four years prior to the crisis's onset. Second, we repeat our base specifications for a placebo (i.e., nonexistent) crisis. We do not find our results to hold in this case. Third, we repeat our regression for the negative demand shock caused by the events of September 11, 2001. We do not find that our results hold in this case either.

Finally, we demonstrate that our conclusions are consistent with debt issuances and the stock return performance of firms during this period. A key mechanism by which conservatism affects underinvestment is by altering firms' ability to raise debt financing. We find that firms with a higher level of conservatism experienced a lower decline in debt raising ability during the crisis. Stock returns offer a distinct advantage in that stock prices capture the entire extent of all value-relevant declines in economic activity. Consistent with our main conclusions, we find that firms with a higher level of accounting conservatism experienced a lower decline in stock performance. In sum, these findings are consistent with our predictions that conservatism improves borrowing capacity and mitigates underinvestment.

Our study contributes to the literature in mainly two ways. First, we document that accounting conservatism reduces potential underinvestment. Prior research suggests accounting conservatism reduces overinvestment (e.g., Ball 2001; Francis and Martin 2010; Ahmed and Duellman 2011; Bushman et al. 2011). However, several studies point out the possible dysfunctional effects of accounting conservatism in inducing underinvestment in the face of uncertainty. Managers with limited horizons may forgo positive NPV projects that incur costs now but will only generate benefits far in the future (Leuz 2001; Guay and Verrecchia 2006; Lambert 2010). In addition, risk-averse managers may discard high-risk projects even if they have positive net present values (Roychowdhury 2010). Garcia Lara et al. (2016) provide initial evidence that among firms more likely to underinvest, conservatism is positively associated with investment. We complement their paper by empirically isolating the causal effects and by showing that in a setting where firms suffer from funding problems due to an exogenous shock to the credit supply, accounting conservatism reduces underinvestment.

Second, this study advances our understanding of the relation between financial reporting and investment by providing evidence on one underlying mechanism. Prior studies (e.g., Biddle and Hilary 2006; Biddle et al. 2009; Badertscher et al. 2013; Francis and Martin 2010; Goodman

et al. 2014; Shroff 2014; Shroff et al. 2014) provide evidence that financial reporting affects investment efficiency. However, the various channels through which financial reporting affects investment remain unexplored. This study examines a specific prediction about the relation between financial reporting and investment based on the availability of external finance, thereby shedding light on one precise mechanism through which financial reporting and investment are related. Specifically, this study suggests that accounting conservatism affects the sensitivity of firms to fluctuations in the external finance supply and thus has an impact on investment. Two related studies are Jayaraman and Shivakumar (2013) and Balakrishnan et al. (2014). Jayaraman and Shivakumar (2013) provide evidence that conservatism facilitates access to debt financing and they identify the causal effect with an exogenous shock and a difference-in-differences approach. However, they do not provide direct evidence on the investment benefits of conservatism. Balakrishnan et al. (2014) examine how a change in a borrower's balance sheet position affects the borrower's collateral and consequently its ability to raise capital and invest. In contrast, our paper focuses on an exogenous shock to the supply of capital to study the mechanism through which financial reporting affects investment. Our results are consistent with accounting conservatism improving borrowing capacity and mitigating underinvestment.

The remainder of the paper is organized as follows. Section 2 discusses related literature and develops our hypotheses. Section 3 describes our sample and research design. Section 4 presents empirical results, and Section 5 concludes.

2. Literature review and hypothesis development

Financing frictions affect firms' ability to raise capital and alter their investment. The literature on information frictions (Greenwald et al. 1984; Myers and Majluf 1984) argues that firms have an information advantage over providers of capital because they know more about the investment projects they want to undertake than do capital providers. This information friction

manifests itself as adverse selection problems wherein firms tend to seek external capital when their private information suggests that an investment is more likely to fail (Myers 1984). An alternative consequence of information friction is moral hazard, in which managers using external finance have an increased incentive to take a higher level of risk (Jensen and Meckling 1976). As a result of adverse selection and moral hazard, firms suffering from information frictions have limited access to capital or face higher costs in raising funds. Thus, financing frictions increase the cost of external funds and thereby affect firms' investments. In this paper, we examine whether, during the global financial crisis of 2007-2008, accounting conservatism reduced financing frictions and enhanced corporate investment.

2.1. Related literature on accounting conservatism and investment efficiency

Prior studies suggest that conservative financial reporting can enhance investment efficiency by constraining managers' opportunistic behavior in the presence of information frictions (Watts 2003a; LaFond and Roychowdhury 2008; LaFond and Watts 2008). Managers have limited tenure and limited liability. Thus, they have incentives to accelerate the recognition of currently unverifiable future cash flows (Ball 2001; LaFond and Roychowdhury 2008). Recovery of excess compensation payments and reparation for excess investment are difficult when the manager leaves the firm before the cash flows are realized.⁴ Conservative financial reporting constrains managers' ability to exaggerate current net assets and earnings and reduces their potential expropriation. In addition, managers often have incentives to continue operating loss-making projects because abandoning such projects could hurt current earnings (via write-offs) or the manager's private benefits such as the prestige of overseeing a larger firm (Ball 2001; Watts 2003a; Francis and Martin 2010). Asymmetrically timely loss recognition causes economic losses from those poorly performing projects to be quickly

⁴ Smith and Watts (1982) argue that this horizon problem is reduced in incentive plans by deferring compensation to the retirement period.

recognized and reduces managers' incentives to continue operating them. As a result, conservatism enhances investment efficiency by forcing the early termination of loss-making projects. In an international study, Bushman et al. (2011) find supporting evidence that investment responses to declining investment opportunities increase with timely loss recognition, while they find no evidence that timely loss recognition influences the sensitivity of investment to increasing investment opportunities. Relatedly, Mak et al. (2011) extend standard models of accounting conservatism (e.g., Pope and Walker 1999) and adaptation value to the context of the corporate refocusing activities of UK listed companies. They find evidence of increased conservatism (as a result of large realized losses) in the refocusing announcement year and in the year following the announcement.

Further, conservative financial reporting makes managers less likely to invest in negative NPV projects in the first place, since the enforcement of timely loss recognition will reduce their earnings-based compensation (Ball and Shivakumar 2005) and damage their reputation. Consistent with these arguments, Francis and Martin (2010) find that firms with more timely incorporation of economic losses into earnings make more profitable acquisitions. They also find these firms are less likely to make post-acquisition divestitures, but when they do, they act more quickly to divest. Thus, conservatism improves a firm's investment efficiency by reducing potential overinvestment.⁵ However, several studies point out the possible dysfunctional effects of accounting conservatism in inducing underinvestment by promoting overly cautious investment behavior (Leuz 2001; Guay and Verrecchia 2006; Lambert 2010; Roychowdhury 2010; Bushman et al. 2011). Because of limited horizons, managers may forgo long-term investment projects that incur costs now but do not generate benefits until far into the future (Leuz 2001; Guay and Verrecchia 2006; Lambert 2010). In addition, risk-averse

⁵ Relatedly, Louis et al. (2012) show that accounting conservatism mitigates the value destruction associated with an increase in cash holdings.

managers may avoid undertaking high-risk projects even if they have positive net present values (Roychowdhury 2010). We argue that in a setting where firms suffer from funding problems in the presence of information frictions, accounting conservatism can in fact reduce underinvestment.

2.2. *The contracting benefits of accounting conservatism*

Based on the contracting explanations for conservatism (Watts and Zimmerman 1986, 1990; Watts 1993, 2003a, 2003b, 2006; Basu 1997; Ball et al. 2000; Ball 2001; Holthausen and Watts 2001; Ball and Shivakumar 2005, 2006; Armstrong et al. 2010; Kothari et al. 2010; Christensen et al. 2016; Watts and Zuo 2016), we expect accounting conservatism to reduce potential underinvestment by improving borrowing capacity (via better terms of borrowing).

Recent studies provide theoretical and empirical support for debt holders' demand for conservative accounting. Nikolaev (2010) documents that firms with more extensive use of covenants in their public debt contracts exhibit a greater degree of accounting conservatism. Tan (2013) finds that firms' financial reporting becomes more conservative immediately after covenant violations and that this effect persists for at least eight quarters.⁶ Using antitakeover laws passed by several states in the mid-1980s and early 1990s as an exogenous increase in agency conflicts, Jayaraman and Shivakumar (2013) find an increase in asymmetric timeliness of loss recognition after the passage of antitakeover laws for firms with high contracting pressures. Similarly, using a natural experiment setting wherein a Delaware court ruled that the fiduciary duties of the directors of near insolvent Delaware companies extend to creditors, Aier et al. (2014) find that firms subject to the ruling significantly increased their accounting conservatism. Symmetric to these prior findings, Martin and Roychowdhury (2015) document a decline in borrowing firms' reporting conservatism after the initiation of trading in credit default swaps that

⁶ Both creditor and shareholder intervention affect a firm's financial reporting. Ramalingegowda and Yu (2012) suggest that ownership by monitoring institutions leads to more conservative reporting. Cheng et al. (2015) find significant increases in conservatism following hedge fund intervention.

reduces lenders' demand for conservative accounting. Beatty et al. (2008) further document that both reporting conservatism and conservative contract modifications are required to fulfill lenders' demand for conservatism.

In addition, Gox and Wagenhofer (2009) show in an analytical model that conservatism is the optimal accounting policy of a financially constrained firm that pledges assets to raise debt capital for financing a risky project, and that "it maximizes the ex ante probability of obtaining financing" (p.13). Smith (2015) models the role of accounting conservatism in a setting in which a firm seeking financing has private information about a project's expected return and shows that conservatism is useful for projects with relatively high ex ante expected returns. Both Loktionov (2009) and Kravet (2014) document that conservative financial reporting mitigates risk shifting by aiding debt holders in monitoring and disciplining firms' investment decisions. Donovan et al. (2015) provide evidence that the creditors of firms with more conservative accounting prior to default have significantly higher recovery rates. The contracting explanations for conservatism extend to product markets as well. Hui et al. (2012) provide evidence that a firm's long-term suppliers and customers demand conservative financial reporting to reduce potential overinvestment in relationship-specific assets.

Several empirical studies suggest that lenders reward conservative borrowers by charging lower interest rates. For example, Ahmed et al. (2002) find that more conservative borrowers have better credit ratings and a lower cost of debt. Zhang (2008) and Haw et al. (2014) document that lenders offer lower interest rates to more conservative borrowers. Wittenberg-Moerman (2008) shows that timely loss recognition reduces the bid-ask spread in the secondary loan market. Thus, one direct benefit of conservative financial reporting is a lower interest expense. Gormley et al. (2012) find that more timely loss recognition was associated with better access to credit markets following foreign bank entry into India and conclude that lenders value timely loss recognition when making lending decisions. Hence, given a lower cost of debt and better

access to external finance, firms with more conservative financial reporting will be able to invest in more “marginal”⁷ projects that produce positive NPVs; such projects would not be pursued if the cost of debt were higher. Accounting conservatism improves investment efficiency by mitigating potential underinvestment.

Nevertheless, an opposing view exists that conservatism causes users of financial statements, including equity investors and creditors, to make incorrect inferences, presumably because of uncertainty about bias. Using a theoretical model, Gigler et al. (2009, p.791) claim that “conservatism could increase the probability of false alarms, and this by itself would detract from the efficiency of debt contracts.”⁸ These arguments are in line with the FASB’s recent criticism of accounting conservatism (FASAC 2005; FASB 2010).⁹ Despite the FASB’s strong assertions, there is little, if any, empirical evidence to support their claims. In fact, several recent empirical studies contradict their conclusions (e.g., LaFond and Watts 2008; Garcia Lara et al. 2011; Kim et al. 2013; Artiach and Clarkson 2014; Garcia Lara et al. 2014; D’Augusta et al. 2015; Li 2015; Louis and Urcan 2015; Kim and Zhang 2016). On the theory side, Chen et al. (2007) show that accounting conservatism reduces managers’ incentives for earnings management and improves contract efficiency. In a similar vein, Gox and Wagenhofer (2009, 2010) and Gao (2013) provide analytical formalizations of the debt contracting explanation of conservatism and argue that the FASB’s official reason for eliminating conservatism from the conceptual framework is flawed from the contracting perspective.¹⁰ In addition, Dichev et al.

⁷ “Marginal” in the sense that those projects still yield positive, but lower, NPVs than projects already taken.

⁸ However, their model does not take into account managers’ incentives for ex post earnings management. Thus, the model understates the benefits of conservative financial reporting since a key role of conservatism is to constrain managers’ ability to misreport and expropriate (Watts 2003a).

⁹ The Financial Accounting Standards Advisory Council (FASAC) states: “Embracing neutrality is likely to produce information that is more decision-useful to investors and creditors, and rejecting a separate quality of conservatism or prudence, could have major implications” (FASAC 2005, Attachment F). Conservatism (prudence) has now been eliminated from the FASB and IASB’s joint conceptual framework (FASB 2010).

¹⁰ From the information perspective, the FASB’s arguments against conservatism are also flawed (Watts 2003a; LaFond and Watts 2008). Accounting conservatism brings out information that managers are reluctant to provide and allows only verifiable gains to be recognized in financial statements. Verifiable accounting information also

(2013) document that a large majority of CFOs rate conservative accounting highly as an attribute of high quality earnings and that those CFOs also support the idea that the FASB should promulgate conservative accounting policies.

2.3. *The role of accounting conservatism during the financial crisis*

Given its contracting benefits, accounting conservatism played an especially important role during the global financial crisis of 2007-2008. A salient feature of the global financial crisis was a loss of liquidity in the banking system. Ivashina and Scharfstein (2010) show that banks reduced their lending substantially during the crisis; specifically, they find that new loans to large borrowers fell by 47% during the peak period of the financial crisis relative to the prior quarter and by 79% relative to the peak of the credit boom. Beatty and Liao (2011) examine how heterogeneity in accounting practices across banks affects their ability to lend during recession periods. They find that reductions in lending during recessionary relative to expansionary periods are lower for banks with more conservative financial reporting (as measured by less delay in expected loan loss recognition).¹¹ Given the importance of debt as a source of capital in the United States (Armstrong et al. 2010), we expect the sudden shortfall in bank lending to have adversely affected the corporate sector. Duchin et al. (2010) find that corporate investment declined significantly following the onset of the crisis. Using survey data from 1,050 CFOs in the U.S., Europe and Asia, Campello et al. (2010, p.470) find “the inability to borrow externally caused many firms to bypass attractive investment opportunities, with 86% of constrained U.S. CFOs saying their investment in attractive projects was restricted during the credit crisis of 2008.”

serves as a better benchmark for information from alternative sources (e.g., analyst forecasts), allowing investors to compare the predictions from different sources to the numbers that are eventually realized (Watts 2006). Both information in financial statements and information from other sources become more credible under conservative financial reporting.

¹¹ In a related study, Bushman and Williams (2012) examine banks across 27 countries and find that forward-looking provisioning reflecting the timely recognition of expected future loan losses is associated with enhanced risk-taking discipline.

Accounting conservatism can affect firm-level investment by altering the sensitivity of firms' investment to fluctuations in the supply of external finance, especially negative fluctuations. Standard models of investment with financing frictions (e.g., Jaffee and Russell 1976; Stiglitz and Weiss 1981; Holmstrom and Tirole 1997) suggest that negative shocks to the supply of external finance, together with firms' information frictions, can hamper firm-level investment. Firms may face capital rationing because of either adverse selection concerns arising from information asymmetry between firms and capital suppliers (e.g., Jaffee and Russell 1976; Stiglitz and Weiss 1981) or from moral hazard concerns arising from the private benefits of control (e.g., Holmstrom and Tirole 1997). In either case, suppliers of capital, when hit with a negative shock, may be unwilling to provide financing to firms in the presence of information frictions.¹² As a result, some projects with positive NPVs will not be financed. Thus, theory suggests that when the supply of external finance is reduced, firms will receive a lower level of financing and will hence have to reduce their investment. Based on the above discussion on the contracting benefits of accounting conservatism, we expect conservative financial reporting to alter the sensitivity of firms' investment to negative fluctuations in the supply of external finance. However, if accounting conservatism causes risk-averse managers to be overly cautious about undertaking investment projects, especially in a period of high uncertainty, accounting conservatism would have exacerbated the effect of the crisis on underinvestment. We put forth the following hypothesis:

H1: Firms with less conservative financial reporting experienced a sharper decline in investment activity following the onset of the financial crisis compared to firms with more conservative financial reporting.

¹² In other words, there is a "flight to quality" wherein capital providers are willing to provide capital only to those firms that have a lower level of information problems. This tendency caused the cost of financing *per unit* of information asymmetry to increase during the crisis.

A cross-sectional implication of the theory discussed above is that the effect of a negative financing-supply shock will be more pronounced on firms that face relatively greater costs in raising external capital (i.e., financially constrained firms) or that have a relatively greater need to do so (i.e., firms that lack internal financial resources). Accordingly, among firms that face severe financing constraints or high financing needs, those with a lower degree of accounting conservatism will face greater difficulty in obtaining financing and will hence experience a greater decline in investment compared to firms with more conservative financial reporting.

H2: The effect of conservative financial reporting on investment during the financial crisis was stronger for firms that were financially constrained or that faced greater external financing needs.

It is important to note that the above cross-sectional prediction, H2, helps empirically disentangle whether an observed reduction in financing to the real economy is due to a negative supply shock or a negative demand shock. Specifically, the theory predicts a differential effect of accounting conservatism on firms with greater financing constraints/needs vis-à-vis firms with smaller financing constraints/needs only if the reduction in financing is due to a supply shock. In contrast, if the reduction in financing is due to a negative demand shock, then there is no role for firms' financial reporting; in that case, the theory predicts no differences in the responses of constrained and unconstrained firms (or of firms with high financing needs and those with low financing needs). Moreover, this hypothesis helps provide conclusive evidence on the role of conservatism in underinvestment because it is likely that firms that are financially constrained or that have high external financing needs are not able to fund all positive NPV projects, i.e., they suffer from underinvestment problems.

A second cross-sectional implication of the theory discussed above is that the effect of a negative financing-supply shock will be more pronounced on firms with a higher level of

information asymmetry. To the extent that the agency problems generated by information asymmetry result in financing frictions and that conservatism resolves such problems, we expect accounting conservatism to play a more important role for firms with a higher level of information asymmetry. Following this logic, LaFond and Watts (2008) and Kim et al. (2013) argue that the role of accounting conservatism becomes more important when there is higher information asymmetry. Accordingly, among firms with a higher level of information asymmetry, those with a lower degree of accounting conservatism will face greater difficulty in obtaining financing and will hence experience a greater decline in investment than will firms with more conservative financial reporting.

H3: The effect of conservative financial reporting on investment during the financial crisis was stronger for firms with higher information asymmetry.

3. Sample and research design

3.1. Period of the crisis

Our analysis focuses on the recent subprime mortgage credit crisis that began in mid-2007, when the United States started experiencing an acute credit crunch; by all accounts, it was the severest financial crisis since the Great Depression. The crisis's beginning can be traced to the summer of 2007 with the meltdown of subprime mortgages and their related securitized products. In the months that followed, banks' subprime losses hampered their ability to extend loans, thereby exporting the subprime crisis to the corporate sector. Subsequently, the financial turmoil spread to a variety of other asset markets, causing a sharp reduction in lending activity that disrupted real economic activity.¹³ The extent and timing of the credit crunch can be determined by observing the three-month LIBOR-OIS spread. The LIBOR-OIS spread is the

¹³ See Brunnermeier (2009) for a detailed account of the 2007–2008 financial crisis.

difference between the risky London Interbank Offered Rate (LIBOR) and an overnight indexed swap (OIS) rate and it measures the likelihood that the borrowing bank will default. In times of uncertainty, banks charge higher interest for unsecured loans, which increases the LIBOR rate. Consequently, the LIBOR-OIS spread widens in times of crisis. While the spread fluctuates over time, it usually remained around 10 basis points – at least, until 2007. The LIBOR-OIS spread jumped to over 50 basis points in early August 2007, indicating the start of the credit crunch.¹⁴ Historically, this episode was one of the tightest in terms of credit availability and was accompanied by a significant decline in real economic activity. Thus, it poses a very powerful setting for testing the predictions of this study.

We conservatively locate the beginning of the financial crisis as July 1, 2007 (Duchin et al. 2010).¹⁵ Since we are interested in examining the effects of an exogenous shock to the supply of external finance on firm-level investment, we make inferences based on the first year of the crisis (July 1, 2007 to June 30, 2008), which was the mainly financial phase.¹⁶

3.2. *Data*

The sample consists of quarterly data on publicly traded non-financial firms available on Compustat. The sample includes two periods: a pre-crisis period (July 1, 2006 to June 30, 2007) and a post-crisis period (July 1, 2007 to June 30, 2008). This balanced approach averages out any seasonal patterns in the data (e.g., Shin and Kim 2002; Duchin et al. 2010). We exclude financial firms and utilities, firms with market capitalization of less than \$50 million as of the end of the last fiscal quarter that ended before July 1, 2006 (or, if missing, as of the end of 2005), and firms

¹⁴ In the week of July 16, 2007, Bear Stearns disclosed that two of its subprime hedge funds invested in thinly traded CDOs (Collateralized Debt Obligations) had lost nearly all their value. On August 1, 2007, investors in the two funds took actions against Bear Stearns and its directors and managers. At this time, markets began showing considerable uncertainty about the solvency of banks. Starting in March 2008, the Federal Reserve began undertaking measures to increase lending activities in the credit markets. However, the LIBOR-OIS spreads continued to remain high post-March 2008, indicating the continuation of the credit crunch. It did not fall below 20 basis points until late August 2009.

¹⁵ Our inferences are virtually unchanged when we define the beginning of the financial crisis as August 1, 2007.

¹⁶ Our results are robust when we extend the sample to a later point in time (e.g., March 31, 2009 or June 30, 2009).

that experienced a quarterly asset or sales growth greater than 100% at some point during the sample period. The final sample consists of 23,120 quarterly observations for 3,154 firms with at least one conservatism measure. All variables are winsorized at the 1st and 99th percentiles to mitigate the influence of extreme values. In addition, *Tobin's Q* is bounded above at 10, following the alternative measure of Baker et al. (2003).

3.3. *Measures of conservatism*

In our tests, we use three proxies for conservatism and a composite index. A larger value for a proxy indicates a greater degree of conservatism. Our first measure, *C_Score*, was developed by Khan and Watts (2009) and has been used in several recent studies, including Beatty and Liao (2011), Beatty et al. (2012), Ettredge et al. (2012), Tan (2013), Kim et al. (2013), André et al. (2015) and Garcia Lara et al. (2016). Following Khan and Watts (2009), we estimate *C_Score* for each firm-year using a cross-sectional approach based on size, leverage, and market-to-book ratio.

Our second measure of conservatism, *Skewness*, is the difference between the skewness in cash flows from operations and the skewness in earnings before extraordinary items over the previous 20 quarters (Givoly and Hayn 2000; Beatty et al. 2008). When bad news requires a lower verification standard, it is usually capitalized into earnings earlier, generating a large reduction in earnings and thus a negatively skewed earnings series. The advantage of this measure is that it does not rely on stock returns being a good proxy for economic gains or losses.

The third measure, *Basu*, is the Basu coefficient based on the industry model. Following Wittenberg-Moerman (2008), we employ an industry-level estimation of asymmetrically timely loss recognition using the Basu (1997) methodology at the three-digit SIC level. An advantage of this measure is that, because it is measured at the industry level, there is less concern about endogeneity. This industry-level measure of conservatism is then assigned to each firm in a given industry.

We note that, while we use several proxies for conservatism, none of them are perfect and they vary in terms of relative strength and measurement error. Both *C_Score* and *Basu* are built on Basu's (1997) asymmetric timeliness measure, the usefulness of which has been hotly debated in the literature.¹⁷ *Skewness* is driven not only by conditional conservatism, but also by unconditional conservatism (which does not facilitate access to financing and reduce under-investment problems).¹⁸ Thus, we also create a composite index, *C_Index*, which is constructed as an average of the standardized values of *C_Score*, *Skewness*, and *Basu*. *C_Index* is positively correlated with all three individual conservatism measures and its correlation coefficient ranges from 0.570 with *C_Score* to 0.574 with *Skewness*.

3.4. Regression specification

In this section, we describe the research design used in the paper. In order to test the above hypotheses, we employ a differences-in-differences approach in which we compare the investment behavior of firms before and after the onset of the crisis as a function of the levels of conservatism. Specifically, we examine whether an ex ante classification of firms by their level of conservatism prior to the credit crisis helps to explain the ex post magnitude of the decline in investment when faced with a sudden negative credit shock. We adopt a differences-in-differences design similar to the regression specification in Duchin et al. (2010). The basic research design entails estimating the following equation:

$$Investment_{i,t} = \alpha_i + \beta_1 After_{i,t} + \beta_2 After_{i,t} \times Consv_i + \gamma X_{i,t} + \varepsilon_{i,t}, \quad (1)$$

where $Investment_{i,t}$ refers to the investment of firm i in quarter t , measured as capital expenditures divided by total assets (in percentage points).¹⁹ α_i represents firm fixed effects.

¹⁷ See, for example, Dietrich et al. (2007), Givoly et al. (2007), Roychowdhury and Watts (2007), Patatoukas and Thomas (2011, 2015), Ball et al. (2013a, 2013b), Lawrence et al. (2013), Roychowdhury and Martin (2013), Collins et al. (2014), Cano-Rodríguez and Núñez-Nickel (2015), and Banker et al. (2016).

¹⁸ See Qiang (2007) and Garcia Lara et al. (2009b) for detailed discussions on the economic determinants of conditional and unconditional conservatism.

¹⁹ In untabulated tests, we use the sum of capital expenditures and R&D expenses to measure investment; our conclusions remain unchanged.

$After_{i,t}$ is an indicator variable equal to one for fiscal quarters with an end date after July 1, 2007, the approximate beginning of the credit crisis. $Consv_i$ is a measure of accounting conservatism (C_Score_i , $Skewness_i$, $Basu_i$, and C_Index_i) in the last fiscal year ending before July 1, 2006. Note that the firm fixed effects subsume the level effect of conservatism (because conservatism is measured only once per firm over the sample period, i.e., as of the last fiscal year end before July 1, 2006). $X_{i,t}$ represents the control variables used – *Tobin's Q* and *Cash Flow*. We cluster standard errors using a two-dimensional cluster at the firm and year-quarter levels, which addresses both firm-specific and cross-sectional dependence (Petersen 2009; Gow et al. 2010). In the above regression, β_1 captures the impact of the crisis on investment. We expect this coefficient to be negative, suggesting that the tightened supply of external finance following the onset of the crisis hurt investment. Our coefficient of interest is β_2 . This coefficient captures the moderating effect of conservatism. A positive coefficient suggests that conservatism mitigates the negative impact of the crisis on investment. Accordingly, we predict that this coefficient will be positive.

The above framework is similar to an instrumental-variables approach in which the two identifying assumptions are: (1) instrument relevance, i.e., year-before accounting conservatism is a good indicator of future conservatism;²⁰ and (2) instrument exogeneity, i.e., year-before conservatism is not positively correlated with unobserved within-firm *changes* in investment opportunities (i.e., unobserved firm-specific demand shocks) following the onset of the crisis. The first assumption is consistent with the notion that a firm's conservatism level is relatively stable over time (e.g., Beatty et al. 2008; Zhang 2008; Francis and Martin 2010; Kim et al. 2013). The governance mechanisms in place and the potential reputation costs ensure that firms have incentives to commit to conservative accounting practices over the long term (e.g., Ahmed

²⁰ Our prediction holds as long as the *cross-sectional variation* of accounting conservatism remains relatively stable; that is, more conservative firms remain relatively more conservative and less conservative firms remain relatively less conservative.

and Duellman 2007; Garcia Lara et al. 2009a; Ramalingegowda and Yu 2012).²¹

We conduct several additional sets of tests to address concerns related to identification, which we discuss below. First, we employ firm-level measures of financing constraints and cash reserves as additional and distinct sources of identification. Second, we use firm-level measures of information asymmetry as an additional source of identification. Third, we demonstrate that our results continue to hold when we measure accounting conservatism as much as four years prior to the onset of the crisis. In addition, we find that we do not obtain similar results for a placebo (i.e., nonexistent) crisis, or following the negative demand shock to the economy caused by the events of September 11, 2001. Finally, we demonstrate that our conclusions are consistent with firms' debt issuances and stock return performance.

4. Empirical results

4.1. Summary statistics

Table 1 provides summary statistics for the sample. The average quarterly capital expenditure (*Investment*) is 1.65% of firm assets. The average cash flow as a fraction of firm assets (*Cash Flow*) is 2.40% and the average *Tobin's Q* is 1.84. We next turn to our proxies for accounting conservatism. Although we use standardized values of these variables in our tests, we report raw values in Table 1 in order to enable a comparison with prior research. The mean value of *C_Score* is 0.12, comparable to that reported in Khan and Watts (2009). The mean values are 0.78 for *Skewness* and 0.14 for *Basu*, which are generally consistent with prior studies such as Givoly and Hayn (2000), Kim et al. (2013) and Balakrishnan et al. (2014).

²¹ Kim et al. (2013) provide evidence that more conservative firms at the time of an SEO announcement continue to be more conservative afterwards. We conduct a similar analysis around the onset of the financial crisis and find consistent evidence that more conservative firms remained so after it (untabulated).

4.2. *Accounting conservatism and investment before and after the onset of the crisis*

Table 2 presents the results of our tests of Hypothesis 1. A key result in the first column is the negative and significant coefficient on *After*. This result suggests that when hit by the financial crisis, firms experienced a decline in their investment. Specifically, the estimated coefficient of -0.12 suggests that investment declined by 7.3 percentage points for an average firm (relative to an unconditional mean of 1.65% of assets per quarter). We observe a similar negative and significant coefficient on *After* in column 2 after controlling for variations in investment opportunities. These results are consistent with those reported in Duchin et al. (2010).

The next four columns provide evidence consistent with Hypothesis 1. The variable of interest is the interaction between *After* and the proxies for conservatism (*Consv*). The coefficients on the interaction between *After* and the conservatism proxies (*Consv*) are positive and significant. To facilitate interpretation, all conservatism proxies are standardized to have a mean of zero and a standard deviation of one. This way the coefficient on the interaction between conservatism and *After* can be interpreted as the change in sensitivity when conservatism increases by one standard deviation. For example, the coefficient on the interaction term when using *C_Score* is 0.02. Thus, while the sensitivity of investment to the crisis for the average firm in our sample (based on *C_Score*) is -0.07 (this number equals the coefficient on *After* in column 3), the sensitivity for a firm with a one standard deviation higher value of *C_Score* is only -0.05 ($=-0.07+0.02$), a decrease in sensitivity of 29%. The specifications in the remaining columns use alternative measures of conservatism (*Basu*, *Skewness* and our composite measure of conservatism, *C_Index*), and yield quite similar results.²²

²² In untabulated tests, we interact *After* with the pre-crisis size, leverage, and market-to-book ratio and include these three interaction terms as additional controls. Our inferences are unchanged. We also re-run our regressions controlling for management quality (proxied by pre-crisis return on assets) and various governance features; our inferences remain unchanged. It is possible that accounting conservatism and other forms of corporate governance mechanisms work together in a system that enhances firm investment. Nevertheless, our evidence suggests that accounting conservatism plays a unique role in enhancing firm investment that is not subsumed by other mechanisms.

Overall the results in Table 2 are consistent with our first hypothesis that firms with less conservative financial reporting experienced a sharper decline in investment activity following the onset of the financial crisis than did firms with more conservative financial reporting. In other words, investment was more sensitive to a negative shock to the credit markets for firms with aggressive (as opposed to conservative) financial reporting.

4.3. *Role of financing constraints and financing needs*

We next consider how the role of conservatism during the crisis varies in the cross-section of firms by financing constraints and financing needs, and provide evidence on Hypothesis 2. Standard models of investment with financing frictions suggest that fluctuations in the supply of external finance will have a more pronounced effect on firms that face relatively greater costs in raising external capital (i.e., financially constrained firms) or that have a relatively greater need to do so (i.e., firms that lack internal financial resources). We expect that the effect of conservative financial reporting on investment during the financial crisis was stronger for firms that were financially constrained or had limited cash reserves. We consider three measures of financing constraints: *KZ Index* (Kaplan and Zingales 1997), *Payout Ratio* (Fazzari et al. 1988), and the existence of *Lines of Credit* (Sufi 2009), as well as one measure of financing needs: *Cash Reserves* (Duchin et al. 2010).

Table 3 presents estimates from panel regressions run separately for subsamples of firms formed on the basis of financing constraints (columns 1 to 6) and financing needs (columns 7 to 8). The odd (even) columns include subsamples of firms with smaller (greater) financing constraints or financing needs. For parsimony, in this and all subsequent regressions, we only report the results when we use *C_Index* as the measure of conservatism. Our inferences are unchanged when we use the individual measures of conservatism. We first look at *KZ Index* and

Payout Ratio. *KZ Index* is constructed following Lamont et al. (2001),²³ and *Payout Ratio* is constructed as the sum of cash dividends and repurchases divided by income before extraordinary items. We measure these two variables one year prior to the crisis's onset. The bottom (top) tercile of *KZ Index* (*Payout Ratio*) is classified as the unconstrained group, while the top (bottom) tercile of *KZ Index* (*Payout Ratio*) is classified as the constrained group.²⁴ From columns 1 through 4 of Table 3, we find that in general, investment declined for both the unconstrained and constrained firms following the onset of the crisis. More importantly, we find that the interaction term between *After* and the conservatism proxy is greater for financially constrained firms and that this difference is statistically significant (diff. in coef. = 0.09, and *t*-stat = 2.00 for *KZ Index*; and diff. in coef. = 0.08, and *t*-stat = 1.89 for *Payout Ratio*).²⁵

We next classify firms based on whether or not they had access to bank lines of credit. Sufi (2009) provides evidence that a lack of access to a line of credit is a more statistically powerful measure of financing constraints than the traditional measures used in the literature. Studies argue that firms that had lines of credit during the crisis heavily drew down these facilities (e.g., Ivashina and Scharfstein 2010). As a result, we expect our results to be stronger in the group of firms that had no lines of credit. We obtain information about lines of credit from Amir Sufi and classify firms into two groups following Sufi's (2009) methodology. Specifically, a firm is considered financially unconstrained if it (1) had access to a line of credit in every year from 1996 to 2003, and (2) maintained cash flow above the median in every year from 1996 to

²³ *KZ Index* is constructed as $-1.002[(ib + dp)/lagged\ ppent] + 0.283[(at + prcc_f \times csho - ceq - txd) / at] + 3.139[(dltt + dlc) / (dltt + dlc + seq)] - 39.368[(dvc + dvp) / lagged\ ppent] - 1.315[che / lagged\ ppent]$, where all variables in italics are Compustat data items.

²⁴ We use the full sample to calculate each firm's tercile ranking. Thus, when we intersect this ranking with our conservatism measures, it results in different numbers of observations across the two groups.

²⁵ In column 2, the sum of the coefficient on *After* and that on *After* × *C_Index* is positive but not statistically different from zero.

2003.²⁶ A firm that does not satisfy either part of the definition is considered constrained. Sufi (2009) argues that given theoretical research emphasizing the importance of bank lines of credit in reducing potential financing constraints and providing liquidity, this categorization is a natural extension of Almeida et al. (2004). *Lines of Credit* is a dummy variable that equals one if a firm is considered financially unconstrained based on this categorization. As the summary statistics in Table 1 show, 26% of our sample firms are classified as financially unconstrained based on *Lines of Credit*. Columns 5 and 6 of Table 3 present estimates from panel regressions run separately for subsamples of firms formed on the basis of *Lines of Credit*. Consistent with our expectations, we observe that our results are stronger for the subsample of firms that had no access to lines of credit (diff. in coef. = 0.03, and t -stat = 1.30).

Finally, we consider a firm's external financing needs based on the amount of cash reserves it has. *Cash Reserves* is cash and short-term investments divided by total assets, measured one year prior to the onset of the crisis. The top (bottom) tercile of *Cash Reserves* is classified as the high (low) group. Duchin et al. (2010) examine the role of cash reserves during the crisis and document that firms with a higher level of cash reserves experienced lower declines in the level of investment. Columns 7 and 8 confirm this finding. More interesting, we find that conservatism plays a greater role in the subsample of firms with a lower level of cash reserves (diff. in coef. = 0.03, and t -stat = 1.29), further underscoring the importance of conservatism in lowering cost of capital and easing access to external finance.

Collectively, consistent with Hypothesis 2, the findings in Table 3 suggest that we find a stronger effect of conservatism for firms that face relatively greater costs in raising external capital (i.e., financially constrained firms) or that have a relatively greater need to do so (i.e., firms that lack internal financial resources). These results provide further evidence of the crisis

²⁶ Given the high costs of data collection, we rely on the dataset provided by Amir Sufi, which spans from 1996 to 2003. We view 1996-2003 as a reasonable pre-crisis period to measure a firm's financing constraints prior to the onset of the crisis.

having had a causal supply effect on corporate investment and the ameliorating role of conservatism in this setting.²⁷

4.4. *Role of information asymmetry*

We next turn to the test of Hypothesis 3. Prior studies argue that the role of accounting conservatism becomes more important when there is higher information asymmetry (LaFond and Watts 2008; Kim et al. 2013). Accordingly, we expect that among firms with a high level of information asymmetry, those with a lower degree of accounting conservatism will face greater difficulty obtaining financing and will hence experience a greater decline in investment compared to firms with more conservative financial reporting. In order to test this, we divide our sample into three groups based on the level of information asymmetry; we then compare the bottom and top terciles. Following prior literature (e.g., Brennan and Subramanyam 1996; Madhavan et al. 1997), we employ the adverse selection component of the bid-ask spread to measure information asymmetry. This variable measures the extent to which prices are affected by unexpected order flow and is increasing in information asymmetry.

Table 4 presents the test of Hypothesis 3 that the effect of conservative financial reporting on investment during the financial crisis was stronger for firms with higher information asymmetry. Consistent with our predictions, we find that the role for conservatism is greater in firms that had a higher level of information asymmetry and that this difference is statistically significant (diff. in coef. = 0.16, and t -stat = 3.21).²⁸

²⁷ In untabulated tests, we use an alternative specification by including *After*×*KZ Index*, *After*×*Payout Ratio*, *After*×*Lines of Credit*, and *After*×*Cash Reserves* as additional controls in Equation (1). The coefficient on *After*×*C_Index* remains positive and statistically significant.

²⁸ In untabulated tests, we use an alternative specification by including *After*×*Information Asymmetry* as an additional control in Equation (1). The coefficient on *After*×*C_Index* remains positive and statistically significant.

4.5. Additional tests

4.5.1. Identification tests

Table 5 presents several analyses that address potential concerns with our regression specification. First, there may be some concern that the year-before conservatism measure may reflect anticipation of the crisis and may consequently confound the interpretation of our results. To address this concern, we repeat our analyses while employing accounting conservatism that is measured at the end of the last fiscal year ending before July 1, 2003 and then examine the firm-level quarterly investment for two years [-1, +1] around July 1, 2007. The results presented in column 1 of Table 5 suggest that our conclusions still hold.

A related concern is that our identification around the credit crisis is spurious due to time varying heterogeneity not captured by our control variables. Accordingly, we repeat our base specifications for a placebo (i.e., nonexistent) crisis. In this case, we measure conservatism one year prior to the artificial crisis date. Column 2 reports the placebo regression explaining firm-level quarterly investment for two years [-1, +1] around a placebo crisis occurring on July 1 of 2004. We do not find that our results hold in this case. We also repeat the analysis for other placebo crises (e.g., those occurring on July 1 of 2005 or 2006). For none of these placebo crises do we observe a significantly negative coefficient on *After*.

Another possible concern is that our results may reflect susceptibility to a demand shock, rather than a credit supply shock. To address this concern, we repeat our regression for the negative demand shock caused by the events of September 11, 2001. Tong and Wei (2008) argue that 9/11 had a significant demand-side effect on the economy.²⁹ Column 3 of Table 5 shows the results. Investment declined significantly after 9/11, consistent with an important negative demand shock, but unlike our main results, year-before conservatism was not related to post-9/11

²⁹ The International Monetary Fund, in its special December 2001 issue of the World Economic Outlook, asserted “the main impact [of the 9/11 shock] is likely to depend primarily on the fall in demand generated by the loss in [consumer] confidence about the economy.”

investment. This finding rules out the demand shock argument as an alternative explanation in our setting.

Collectively, the results in Table 6 suggest that it is unlikely that our main results are either endogenously driven by some spurious or mechanical factor or mainly reflect demand-side, rather than supply-side, effects.

4.5.2. *Debt issuance*

Table 6 examines the effect of conservatism on the sensitivity of a firm's debt issuance activity to the crisis. A key mechanism by which conservatism affects underinvestment is through altering firms' ability to raise debt. Specifically, in the presence of information frictions, suppliers of debt rationally anticipate these information frictions and ration capital ex ante (Myers and Majluf 1984) and/or increase financing costs (Lambert et al. 2007). This reduced financing leads to a reduction in investment, as documented above. Specifically, given that managers are better informed (relative to investors) about a firm's prospects, capital is rationed, and when firms have less financing capacity (due to a crisis), they are less able to raise capital and consequently invest less. Firms with a higher level of conservatism experience a lower level of information frictions and are thus able to raise a higher level of debt. To shed light on this mechanism, we examine the amount of debt issued by a firm (*Debt Issuance*), measured as the issuance of long-term debt minus the reduction in long-term debt divided by total assets. This definition follows prior finance literature (e.g., Shyam-Sunder and Myers 1999; Frank and Goyal 2003). We control for *Tobin's Q*, *Cash Flow*, *Size*, and *Leverage*.

Table 6 presents the findings for the full sample as well as the subsamples based on financing constraints and financing needs. We first note that across the board, *After* has a negative sign. This suggests that after the onset of the credit crisis, firms on average found it harder to raise debt capital. In column 1, we find that the interaction term between *After* and the conservatism measure is positive and significant in the full sample, suggesting that firms with a

higher level of conservatism experienced a lower decline in their debt raising ability. In columns 2 to 9, the even (odd) columns include subsamples of firms with smaller (greater) financing constraints or financing needs. Findings in columns 2 through 9 suggest that this result is stronger amongst the group of financially constrained firms and firms with greater external financing needs. Overall, these findings are consistent with our predictions that conservatism improves borrowing capacity and provides evidence on a specific mechanism through which conservatism mitigates underinvestment.

4.5.3. *Tests using stock returns*

Two concerns about using measures of real investment are that there could be measurement errors and that the measures do not capture all investment or investment opportunities that firms might have forgone. While the differences-in-differences research design and the control variables mitigate this concern, we next use stock returns as an additional proxy to examine the decline in economic activity. Stock returns offer a distinct advantage in that stock prices capture the entire extent of all value-relevant declines in economic activity. We re-examine our base regression specification but use stock returns instead of investment. Moreover, we examine the firm-level quarterly stock returns for the quarters immediately before and after the onset of the credit crisis. In an efficient market, we expect all the stock market reaction to be concentrated around the crisis date (i.e., an event study). Following Daniel and Titman (1997), we control for *Beta*, which measures the correlation of the firm's stock returns with the overall market; *Size*, as measured by the market value of equity; and *MTB*, which is the firm's market-to-book. We also control for *Momentum*, measured as the growth in the firm's stock price over the last year, excluding the last month (Carhart 1997).

Table 7 presents the results using all measures of conservatism except *C_Score*.³⁰ Accordingly, the *C_Index* in this test is the average of the standardized values of *Skewness* and *Basu* only. First, we find that *After* is significantly negative across all specifications. This result suggests an overall decline in stock performance at the onset of the crisis. Next, we find that the interaction between *After* and the conservatism measures is positive and significant. Once again, consistent with our main conclusions, this finding suggests that firms with a higher level of accounting conservatism experienced lower declines in stock performance during the crisis.

5. Conclusion

Whether and how financial reporting affects the real economy is an area that has seen a great deal of recent academic work. We contribute to this literature by providing evidence on the role of financial reporting in affecting corporate investment in the financial crisis. Specifically, we use the recent credit crisis as an exogenous shock to credit supply and employ a differences-in-differences research design to examine the effect of accounting conservatism on corporate investment. The global financial crisis was characterized by a loss of liquidity in the banking system (Ivashina and Scharfstein 2010), highlighting the importance of a firm's funding ability. The sudden shortfall of bank lending adversely affected the corporate sector and caused severe underinvestment (Campello et al. 2010; Duchin et al. 2010). Given these two features of the crisis, we expect accounting conservatism to have played an especially important role.

Consistent with our predictions, we find that firms with less conservative financial reporting experienced a sharper decline in investment activity after the crisis's onset than did firms with more conservative financial reporting. In addition, we find that the effect of conservative financial reporting on investment was stronger for firms that were financially constrained or had greater external financing needs. We also find that the effect of conservative

³⁰ We do not use *C_Score* in this test because its three inputs (i.e., leverage, size, and market to book) are common proxies for risk factors that directly affect stock returns.

financial reporting on investment was stronger when there was higher information asymmetry. To address potential endogeneity concerns, we measure firms' conservatism levels as much as four years prior to the crisis, and confirm that similar results do not follow a placebo crisis. Nor did similar results follow the negative demand shock caused by 9/11. We also provide corroborating evidence that firms with a higher level of conservatism were able to raise a higher level of debt after the onset of the crisis and this effect is stronger for firms that faced relatively greater costs to raise capital or had a relatively greater need to do so. Lastly, we use stock returns as an additional proxy to examine the decline in economic activity and find that firms with a higher level of conservatism experienced lower declines in stock performance after the onset of the crisis. Taken together, our evidence suggests that accounting conservatism reduces potential underinvestment in the presence of information frictions and that non-financial firms' financial reporting affected the real economy in the financial crisis.

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Table 1: Summary statistics

	Obs.	Mean	SD	Q1	Median	Q3
Firm-year-quarter-level variables						
<i>Investment</i>	23,120	1.65	2.12	0.42	0.91	1.96
<i>After</i>	23,120	0.48	0.50	0	0	1
<i>Tobin's Q</i>	23,120	1.84	1.02	1.24	1.58	2.13
<i>Cash Flow</i>	22,497	2.40	4.55	1.29	3.00	4.60
Firm-level variables (raw values)						
<i>C_Score</i>	2,391	0.12	0.07	0.08	0.13	0.17
<i>Skewness</i>	2,498	0.78	1.80	-0.30	0.63	1.94
<i>Basu</i>	2,235	0.14	0.14	0.03	0.13	0.22
<i>C_Index</i>	1,465	0.04	0.57	-0.36	0.07	0.43
<i>KZ Index</i>	3,095	-0.28	1.34	-0.69	-0.19	0.38
<i>Payout Ratio</i>	2,495	0.23	0.31	0.00	0.07	0.35
<i>Lines of Credit</i>	2,035	0.26	0.44	0	0	1
<i>Cash Reserves</i>	3,152	0.20	0.22	0.03	0.11	0.30
<i>Information Asymmetry</i>	2,343	0.04	0.05	0.01	0.02	0.05

This table reports the summary statistics for the main sample of firm-year-quarter observations from July 1, 2006 to June 30, 2008. *Investment* is capital expenditures divided by total assets in percentage points. *After* is an indicator variable equal to one for fiscal quarters with an end date after July 1, 2007, the approximate beginning of the credit crisis. *Tobin's Q* is the ratio of the market value of assets to the book value of assets following Kaplan and Zingales (1997), and is bounded above at ten. *Cash Flow* is operating income before depreciation and amortization divided by total assets expressed as a percentage. *C_Score* is the conservatism score estimated following Khan and Watts (2009) in the last fiscal year ending before July 1, 2006. *Skewness* is the difference between the skewness of cash flows from operations and the skewness of earnings over the previous 20 quarters, measured in the last fiscal year ending before July 1, 2006. *Basu* is the three-digit-SIC industry-year Basu measure as in Wittenberg-Moerman (2008) in the last fiscal year ending before July 1, 2006. *C_Index* is the average of standardized values of *C_Score*, *Skewness* and *Basu*. *KZ Index* is constructed following Lamont et al. (2001) and measured in the last fiscal year ending before July 1, 2006. *Payout Ratio* is measured as the sum of cash dividends and repurchases divided by income before extraordinary items in the last fiscal year ending before July 1, 2006. *Lines of Credit* is a dummy variable that equals one if a firm is considered financially unconstrained based on its access to lines of credit as in Sufi (2009). *Cash Reserves* is cash and short-term investments divided by total assets in the last fiscal year ending before July 1, 2006. *Information Asymmetry* is measured as the adverse selection component of the bid-ask spread in percentage points in the last fiscal year-end month before July 1, 2006, estimated following Madhavan et al. (1997).

Table 2: Accounting conservatism and investment before and after the onset of the credit crisis

	Dependent variable: <i>Investment</i>					
	(1)	(2)	(3)	(4)	(5)	(6)
<i>Consv</i> =			<i>C_Score</i>	<i>Skewness</i>	<i>Basu</i>	<i>C_Index</i>
<i>After</i>	-0.12*** (-8.32)	-0.12*** (-8.59)	-0.07*** (-5.53)	-0.07*** (-4.42)	-0.14*** (-6.26)	-0.07*** (-5.74)
<i>After</i> × <i>Consv</i>			0.02*** (2.63)	0.05*** (2.72)	0.06*** (4.14)	0.05*** (2.93)
<i>Tobin's Q</i>		0.04*** (5.40)	0.04*** (2.82)	0.04*** (2.79)	0.04*** (5.60)	0.04*** (3.18)
<i>Cash Flow</i>		-0.02*** (-5.33)	-0.01 (-0.67)	-0.01** (-2.20)	-0.02*** (-5.74)	-0.01 (-0.38)
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	23,120	22,497	17,146	17,996	15,793	10,483
R ²	0.761	0.762	0.766	0.760	0.777	0.794

This table presents estimates from panel regressions explaining firm-level quarterly investment for quarters with an end date between July 1, 2006 and June 30, 2008. All variables are defined in Table 1. *Consv* is a measure of accounting conservatism (*C_Score* in column 3, *Skewness* in column 4, *Basu* in column 5, and *C_Index* in column 6) in the last fiscal year ending before July 1, 2006. To facilitate interpretation, all conservatism proxies are standardized to have a mean of zero and a standard deviation of one. All regressions include firm fixed effects. Note that the firm fixed effects subsume the level effect of conservatism (because conservatism is measured only once per firm over the sample period, i.e., as of the last fiscal year end before July 1, 2006). The *t*-statistics, presented in parentheses below the coefficients, are corrected for heteroskedasticity and cross-sectional and time-series correlations using a two-way cluster at the firm and year-quarter levels. ***, **, and * denote significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively.

Table 3: Subsample analysis based on financing constraints and financing needs

	Dependent variable: <i>Investment</i>							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
	<i>KZ Index</i>		<i>Payout Ratio</i>		<i>Lines of Credit</i>		<i>Cash Reserves</i>	
	Low	High	High	Low	Yes	No	High	Low
<i>After</i>	-0.06*** (-3.98)	-0.09*** (-5.51)	-0.05** (-2.25)	-0.07** (-1.98)	-0.11 (-1.46)	-0.07** (-2.32)	0.00 (0.05)	-0.17*** (-6.95)
<i>After</i> × <i>C_Index</i>	0.05* (1.92)	0.15*** (3.96)	-0.00 (-0.03)	0.08** (2.44)	0.03 (1.33)	0.06*** (5.72)	0.02 (1.07)	0.05*** (5.01)
Diff. in coef. on <i>After</i> × <i>C_Index</i>	0.09** (2.00)		0.08** (1.89)		0.03* (1.30)		0.03* (1.29)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	3,975	2,898	2,880	3,219	1,894	6,345	4,718	2,484
R ²	0.709	0.824	0.737	0.803	0.808	0.797	0.647	0.853

This table presents estimates from panel regressions explaining firm-level quarterly investment for quarters with an end date from July 1, 2006 to June 30, 2008. All variables are defined in Table 1. The regressions are estimated separately for subsamples of firms formed on the basis of financing constraints (columns 1 to 6) and financing needs (columns 7 to 8). The odd (even) columns include subsamples of firms with smaller (greater) financing constraints or financing needs. To facilitate interpretation, *C_Index* is standardized to have a mean of zero and a standard deviation of one. Control variables include *Tobin's Q* and *Cash Flow*. All regressions include firm fixed effects. Note that the firm fixed effects subsume the level effect of conservatism (because conservatism is measured only once per firm over the sample period, i.e., as of the last fiscal year end before July 1, 2006). The *t*-statistics, presented in parentheses below the coefficients, are corrected for heteroskedasticity and cross-sectional and time-series correlations using a two-way cluster at the firm and year-quarter levels. In the regressions, ***, **, and * denote significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively. In the tests of the difference in coefficients on *After*×*Consv* across partitions, ***, **, and * denote significance at the 1%, 5%, and 10% levels for one-tailed tests, respectively.

Table 4: Subsample analysis based on information asymmetry

	Dependent variable: <i>Investment</i>	
	(1)	(2)
	<i>Information Asymmetry</i>	
	Low	High
<i>After</i>	-0.10*** (-3.58)	-0.11*** (-3.82)
<i>After</i> × <i>C_Index</i>	-0.03 (-1.08)	0.13*** (3.10)
Diff. in coef. on <i>After</i> × <i>C_Index</i>		0.16*** (3.21)
Controls	Yes	Yes
Firm FE	Yes	Yes
Obs.	2,927	3,008
R ²	0.868	0.691

This table presents estimates from panel regressions explaining firm-level quarterly investment for quarters with an end date from July 1, 2006 to June 30, 2008. All variables are defined in Table 1. The regressions are estimated separately for subsamples of firms formed on the basis of information asymmetry. To facilitate interpretation, *C_Index* is standardized to have a mean of zero and a standard deviation of one. Control variables include *Tobin's Q* and *Cash Flow*. All regressions include firm fixed effects. Note that the firm fixed effects subsume the level effect of conservatism (because conservatism is measured only once per firm over the sample period, i.e., as of the last fiscal year end before July 1, 2006). The *t*-statistics, presented in parentheses below the coefficients, are corrected for heteroskedasticity and cross-sectional and time-series correlations using a two-way cluster at the firm and year-quarter levels. In the regressions, ***, **, and * denote significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively. In the tests of the difference in coefficients on *After*×*Consv* across partitions, ***, **, and * denote significance at the 1%, 5%, and 10% levels for one-tailed tests, respectively.

Table 5: Accounting conservatism four years prior, placebo regression, and 9/11 negative demand shock

	Dependent variable: <i>Investment</i>		
	(1)	(2)	(3)
	<i>C_Index</i> 2003	Placebo	9/11 Demand
<i>After</i>	-0.08*** (-6.84)	0.11*** (6.69)	-0.45*** (-11.61)
<i>After</i> × <i>C_Index</i>	0.04** (2.07)	-0.01 (-0.88)	-0.00 (-0.27)
Controls	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes
Obs.	10,119	10,838	11,983
R ²	0.799	0.782	0.665

This table presents several specifications for validation purposes. All variables are defined in Table 1. In column 1, accounting conservatism is measured at the end of the last fiscal year ending before July 1, 2003 to explain firm-level quarterly investment for two years [-1, +1] around July 1, 2007, the approximate beginning of the credit crisis. Column 2 reports a placebo regression explaining firm-level quarterly investment for two years [-1, +1] around a placebo crisis occurring on July 1 of 2004. In this placebo regression, *After* is an indicator variable equal to one for fiscal quarters with an end date after the placebo crisis, and *C_Index* is measured at the end of the last fiscal year ending one year before the placebo crisis. Column 3 reports a similar regression explaining firm-level quarterly investment for two years [-1, +1] around September 11, 2001, the events of which led to a negative demand shock. To facilitate interpretation, *C_Index* is standardized to have a mean of zero and a standard deviation of one. Control variables include *Tobin's Q* and *Cash Flow*. All regressions include firm fixed effects. Note that the firm fixed effects subsume the level effect of conservatism (because conservatism is measured only once per firm over the sample period, i.e., as of the last fiscal year end before July 1, 2006). The *t*-statistics, presented in parentheses below the coefficients, are corrected for heteroskedasticity and cross-sectional and time-series correlations using a two-way cluster at the firm and year-quarter levels. ***, **, and * denote significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively.

Table 6: Accounting conservatism and debt issuance before and after the onset of the credit crisis

	Dependent variable: <i>Debt Issuance</i>								
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
	Full Sample	<i>KZ Index</i>		<i>Payout Ratio</i>		<i>Lines of Credit</i>		<i>Cash Reserves</i>	
	Low	High	High	Low	Yes	No	High	Low	
<i>After</i>	-0.34*** (-6.72)	-0.21*** (-3.15)	-0.38*** (-4.46)	-0.37*** (-5.84)	-0.41*** (-3.11)	-0.46*** (-6.31)	-0.28*** (-3.20)	-0.19** (-2.57)	-0.82*** (-9.14)
<i>After</i> × <i>Consv</i>	0.10** (2.24)	-0.03 (-0.44)	0.46*** (2.79)	-0.14 (-1.12)	0.47*** (3.37)	0.06 (0.34)	0.13*** (2.65)	-0.08 (-0.75)	0.41** (2.04)
Diff. in coef. on <i>After</i> × <i>Consv</i>		0.48*** (2.76)		0.61*** (3.26)		0.07 (0.42)		0.48** (2.16)	
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Obs.	10,683	4,029	2,945	2,850	3,377	1,869	6,110	4,529	2,402
R ²	0.205	0.203	0.212	0.211	0.230	0.225	0.206	0.187	0.239

This table presents estimates from panel regressions explaining firm-level quarterly debt issuance for quarters with an end date from July 1, 2006 to June 30, 2008. *Debt Issuance* is measured as the issuance of long-term debt minus the reduction in long-term debt divided by total assets. Control variables include *Tobin's Q*, *Cash Flow*, *Size*, and *Leverage*. *Size* is the natural logarithm of the firm's market value of equity. *Leverage* is equal to the book value of short-term and long-term debt scaled by the book value of total assets. All other variables are defined in Table 1. The regressions are estimated for the full sample (column 1) and separately for subsamples of firms formed on the basis of financing constraints (columns 2 to 7) and financing needs (columns 8 to 9). In columns 2 to 9, the even (odd) columns include subsamples of firms with smaller (greater) financing constraints or financing needs. To facilitate interpretation, *C_Index* is standardized to have a mean of zero and a standard deviation of one. All regressions include firm fixed effects. Note that the firm fixed effects subsume the level effect of conservatism (because conservatism is measured only once per firm over the sample period, i.e., as of the last fiscal year end before July 1, 2006). The *t*-statistics, presented in parentheses below the coefficients, are corrected for heteroskedasticity and cross-sectional and time-series correlations using a two-way cluster at the firm and year-quarter levels. In the regressions, ***, **, and * denote significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively. In the tests of the difference in coefficients on *After*×*Consv* across partitions, ***, **, and * denote significance at the 1%, 5%, and 10% levels for one-tailed tests, respectively.

Table 7: Accounting conservatism and stock returns before and after the onset of the credit crisis

	Dependent variable: <i>Return</i>				
	(1)	(2)	(3)	(4)	(5)
<i>Consv</i> =			<i>Skewness</i>	<i>Basu</i>	<i>C_Index</i>
<i>After</i>	-7.77*** (-20.52)	-8.72*** (-13.68)	-8.57*** (-13.54)	-7.81*** (-11.95)	-7.50*** (-11.44)
<i>After</i> × <i>Consv</i>			0.54** (2.03)	0.78*** (2.81)	0.77*** (2.65)
Controls	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes
Obs.	7,473	6,432	6,229	4,211	4,008
R ²	0.450	0.489	0.534	0.536	0.535

This table presents estimates from panel regressions explaining firm-level quarterly stock returns for quarters immediately before and after the onset of the credit crisis. *Return* is quarterly stock returns in percentage points. *Consv* is a measure of accounting conservatism (*Skewness* in column 3, *Basu* in column 4, and *C_Index* in column 5) in the last fiscal year ending before July 1, 2006. *C_Index* is the average of standardized values of *Skewness* and *Basu*. To facilitate interpretation, all conservatism proxies are standardized to have a mean of zero and a standard deviation of one. Control variables include *Beta*, *Size*, *MTB*, and *Momentum*. *Beta* measures the correlation of the firm's stock returns with the overall market and is measured from a firm-specific rolling time-series Carhart four-factor regression using 48 months of data. *Size* as measured by the market value of equity. *MTB* is the market-to-book ratio calculated as the ratio of the market value of equity to the book value of equity. *Momentum* is the growth in the firm's stock price over the last year, excluding the last month. All regressions include firm fixed effects. Note that the firm fixed effects subsume the level effect of conservatism (because conservatism is measured only once per firm over the sample period, i.e., as of the last fiscal year end before July 1, 2006). The *t*-statistics, presented in parentheses below the coefficients, are corrected for heteroskedasticity and cross-sectional and time-series correlations using a two-way cluster at the firm and year-quarter levels. ***, **, and * denote significance at the 1%, 5%, and 10% levels for two-tailed tests, respectively.