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# ***TESIS DOCTORAL***

## ***Essays on Accounting Conservatism, Corporate Social Responsibility, and Corporate Governance***

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DEPARTAMENTO DE ECONOMÍA DE LA EMPRESA**

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de

de

To Maria and Yuchen

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## *Abstract*

This thesis consists of three essays on accounting conservatism, corporate social responsibility, and corporate governance. The first essay examines the influence of accounting conservatism on trade credit, particularly under the background of the recent global financial crisis. The second essay investigates whether suppliers value customer firms' corporate social responsibility activities by exploring the influence of customer firms' social performance on trade credit. The third essay examines how the heterogeneous credit crunch shock that took place during the recent global financial crisis moderated the effectiveness of corporate governance on deterring expropriation by controlling shareholders and improving firm performance.

## ***Introduction***

This thesis addresses three topics: accounting conservatism, corporate social responsibility, and corporate governance. These three topics are closely related both theoretically and empirically. In chapter one, I examine the effect of accounting conservatism on trade credit. In chapter two, I investigate whether suppliers value socially responsible customers. These first two chapters explore research questions from the perspective of supplier-customer relationship. In chapter three, I examine the moderating role of a heterogeneous credit crunch shock on the effectiveness of corporate governance. Both chapter three and chapter one employ the credit crunch shock that took place during the recent global financial crisis as the research background.

In chapter one, “*Accounting conservatism and trade credit*”, I investigate the impact of accounting conservatism on trade credit. In the recent financial crisis, banks and financial institutions became more prudent, and credit supply was significantly reduced. I explore the credit crunch during the crisis to reduce endogeneity concerns. I find that a firm with less conservative financial reporting is more likely to use trade credit during the crisis. Since previous literature finds less conservative firms obtain less debt financing during the crisis, the above finding implies that suppliers are different from financial stakeholders when providing credit. Further analysis shows that suppliers increase trade credit provision to less conservative customer firms because of suppliers’ advantage in acquire customers’ information through intermediate inputs transactions and suppliers’ advantage in liquidating intermediate inputs. Taken together, the results suggest that, compared to financial



stakeholders, suppliers are more tolerant to customer firms' less conservative financial reporting.

In chapter two, "*Do suppliers value socially responsible customers?*" (Coauthored with JUAN M. GARCÍA LARA and JOSEP A. TRIBÓ), we examine suppliers' viewpoints on customer firms' socially responsible activities. We address the above question by exploring the influence of customer firms' social performance on trade credit. We find that socially responsible customers are more likely to receive trade credit from suppliers, implying that suppliers value customer firms' socially responsible activities. We further check the underlying mechanisms by exploring the moderating role of customer industries' consumer perception and suppliers' risk exposure in the customer-supplier relationship. To reduce endogeneity concerns, we employ instrumental variable regressions and propensity score matching. Overall, our findings suggest that, suppliers value socially responsible customers, and they are willing to provide trade credit to the customers with good social performance.

In chapter three, "*Heterogeneous Credit Crunch Shock and the Effectiveness of Corporate Governance*" (coauthored with MARÍA GUTIÉRREZ), we examine how the heterogeneous credit crunch shock during the global financial crisis influences the effectiveness of corporate governance. We theoretically illustrate that, with a firm being exposed to severer adverse shock, the controlling shareholder has higher incentive to expropriate minority shareholders, thus corporate governance plays a more significant role in deterring expropriation and improving firm performance. We test the above hypothesis using the sample of Chinese non-financial firms during the 2008-2009 global financial crisis. The financial crisis induced credit crunch shock to Chinese economy, and the firms that depend

more on external finance were more severely influenced. We find that, when a firm is exposed to severer credit crunch shock, the controlling shareholder's excess voting rights are associated with worse firm performance, and corporate governance are more effective in improving firm performance. Furthermore, the above relation is more pronounced when the controlling shareholder is more sensitive to the adverse shock. Overall, the above findings indicate that severe credit crunch shocks stimulate the effectiveness of corporate governance.

In sum, this thesis contributes to the academic discussions on accounting conservatism, corporate social responsibility, and corporate governance. Chapter one shows the contracting role of accounting conservatism on trade credit provision, chapter two demonstrates the suppliers' viewpoints on customer firms' corporate social responsibility activities, and chapter three presents the moderating role of a heterogeneous credit crunch shock on the effectiveness of corporate governance.

# ***1. Accounting Conservatism and Trade Credit***

## **1.1 Introduction**

Trade credit is an important source of financing, and it provides, especially, short term liquidity (Petersen and Rajan, 1997; Fisman and Love, 2003; Klapper et al., 2012). Rajan and Zingales (1995) report that trade credit accounts for 15% of total assets in U.S. nonfinancial firms, while current debt accounts for just 7.4%. During the credit crunch of 2007-2008 global financial crisis, suppliers actively worked as liquidity providers by offering trade credit to customer firms (Garcia-Appendini and Montoriol-Garriga, 2013). However, the influence of a firm's accounting practice on its use of trade credit is relatively unexplored. It is unclear whether and how suppliers evaluate customer firms' accounting practices when offering trade credit.

In this paper, I investigate the effect of accounting conservatism on trade credit under the background of the 2007-2008 global financial crisis. Specifically, I examine whether a firm with less conservative financial reporting is more likely to use trade credit as an alternative source of financing during the crisis. Conditional conservatism in accounting practices implies more timely recognition of bad news than good news (Basu, 1997).<sup>1</sup> Since conditionally conservative financial reporting provides more downside information, it facilitates efficient debt contracting (Watts, 2003). Previous studies find that a firm with more conservative financial reporting obtains more access to debt financing and with better conditions (Ahmed et al, 2002; Zhang, 2008; Haw et al., 2014; García Lara et al., 2016).

During the 2007-2008 global financial crisis, banks and other debt providers were extremely prudent when providing credit (Campello et al., 2010; Ivashina and Scharfstein, 2010; Iyer et al., 2013). In contrast, the suppliers with high pre-crisis liquidity levels actively provided trade credit to their customer firms during the crisis (Garcia-Appendini and

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<sup>1</sup> The accounting conservatism practice discussed in this study is restricted to conditional conservatism. Throughout the paper, both of the terms conservatism and accounting conservatism refer to conditional conservatism.

Montoriol-Garriga, 2013). Under the credit crunch shock, a firm with less conservative financial reporting is less likely to obtain debt financing, and it is expected to demand for more trade credit as an alternative source of financing.

In contrast, a firm with more conservative financial reporting can obtain more debt financing. Even if suppliers offer trade credit to it, the customer firm can repay earlier and take advantage of the early payment discount (Ng et al., 1999). Furthermore, by using loan or public bond, the firm can reduce tax expenses via the tax shield of debt (Heider and Ljungqvist, 2015; Faulkender and Smith, 2016). Therefore, the more conservative firms have less demand for trade credit.

Why are suppliers willing to offer trade credit to less conservative customer firms? First, suppliers can acquire customer firms' information through intermediate inputs transactions (Biais and Gollier, 1997; Burkart and Ellingsen, 2004). Customer firms' repayment of trade credit also directly transfers information to suppliers (Biais and Gollier, 1997; Burkart and Ellingsen, 2004; Aktas et al., 2012). In this sense, a supplier can still obtain some information about its customer firm even if the customer conducts less conservative financial reporting. Furthermore, intermediate inputs can work as collateral for trade credit, suppliers are exposed to less default risk (Mian and Smith, 1992; Giannetti et al., 2011).

Following Duchin et al. (2010) and Balakrishnan et al. (2016), I employ a Difference-in-Difference (DiD) research design based on the 2007-2008 global financial crisis. The trade credit before and after the onset of the crisis is set to be a function of accounting conservatism. During the crisis, firms are expected to use more trade credit in general, but the less conservative firms are expected to use more trade credit than the more conservative firms.

The sample includes all the U.S. incorporated nonfinancial firms in Compustat, with fiscal quarter ending between July 2006 and June 2008, in which the period from July 2007

to June 2008 is defined as the post-crisis period. I measure a firm's accounting conservatism using the C\_Score developed by Khan and Watts (2009). To mitigate measurement error, I use the three-year average of C\_Score prior to the financial crisis, following García Lara et al. (2016).

Consistent with the predictions, I find that, compared to firms with more conservative financial reporting, the firms with less conservative financial reporting use more trade credit during the crisis. I also test the cross-sectional variations of the main hypothesis based on the analysis of several subsamples. The effect of accounting conservatism on trade credit is more pronounced when suppliers can acquire more information about their customers through intermediate inputs transaction, when customers' inputs are easier to liquidate, or when customers faces more financing frictions.

This study contributes to the literature in several ways: First, I extend the literature on the debt contracting benefits of accounting conservatism. Previous studies find accounting conservatism is associated with various rewards in the debt market, such as higher credit ratings (Ahmed et al., 2002), lower interest rates (Ahmed et al., 2002; Zhang, 2008; Haw et al., 2014), and more access to debt financing (Balakrishnan et al., 2016; García Lara et al., 2016). I show that the less conservative firms are more likely to use trade credit as an alternative source of financing.

Second, this paper complements previous studies on the link between accounting conservatism and supplier-customer relations. Hui et al. (2012) argue that, to evaluate customers' short-term trading obligation and long-term financial viability, suppliers prefer customers that report conservatively. They find that suppliers with more bargaining power demand (and enforce) more conservative financial reporting to their customers. I show that, compared to banks or other debtholders, suppliers are more tolerant to customer firms' less conservative financial reporting. When less conservative customers cannot obtain debt

financing from banks or public bonds, they can still receive trade credit from suppliers.

Third, I add to a growing stream of literature on financial reporting during the global financial crisis. Balakrishnan et al. (2016) examine the effect of accounting conservatism on corporate investment during the financial crisis. They find that firms with less conservative financial reporting experience a sharper decline in investment during the crisis. I explore the credit crunch during the crisis, and examine the influence of accounting conservatism on trade credit. Therefore, it further advances our understanding on the role of financial reporting during the financial crisis.

The remainder of the paper is organized as follows: Section 2 discusses the link between accounting conservatism and trade credit, and proposes empirical predictions. Section 3 describes the sample and the research design. Section 4 presents the main empirical results. Section 5 shows the additional analyses. Section 6 concludes.

## **1.2 Hypotheses development**

In this section, I provide arguments for why less conservative firms are more likely to use trade credit as an alternative source of financing. The trade credit used by a customer firm is jointly determined by the customer firm and its suppliers (Petersen and Rajan, 1997; Klapper et al., 2012). I first provide arguments supporting the idea that the less conservative firms demand more trade credit than the more conservative ones. Then I discuss why suppliers are willing to provide trade credit to these less conservative customers.

### *1.2.1 Conservatism and customers' demand for trade credit*

Previous literature finds that firms with more conservative financial reporting obtain more debt financing and with better conditions (e.g., Ahmed et al., 2002; Zhang, 2008; Haw et al., 2014; Balakrishnan et al., 2016; García Lara et al., 2016). Compared to more conservative firms, less conservative firms are less likely to obtain access to debt financing, and they have to search for alternative financing sources.

Trade credit could be an alternative for these firms to obtain short-term liquidity. Previous literature finds that, when a firm cannot obtain debt financing because of credit rationing or other financing frictions, it tends to use more trade credit (Petersen and Rajan, 1997). In the economies with less developed financial markets or during the financial crisis, trade credit acts as a substitute for bank credit (Fisman and Love, 2003; Love et al., 2007; Garcia-Appendini and Montoriol-Garriga, 2013). Therefore, less conservative firms have more demand for trade credit.

In contrast, more conservative firms can easily obtain debt financing from banks or other debt providers (Ahmed et al, 2002; Zhang, 2008; Haw et al., 2014). Most trade credit contract is accompanied with early payment discount, and, to use trade credit, the more conservative firms need to incur significant opportunity cost. Ng et al. (1999) introduce a classical trade credit agreement, in which a 2% discount is offered if the customer repays within 10 days, while full price is charged for repayment within 30 days. If a customer firm does not repay within 10 days, it will lose the opportunity to get a discount, and the annualized (implicit) interest rate for trade credit is as high as 43.9%.<sup>2</sup> Since more conservative firms can obtain access to debt financing with better conditions, it is a better choice for them to repay earlier to receive early payment discount.

Furthermore, different from the implicit cost of trade credit, the interest expenses of debt financing are deductible from taxable income. Therefore, debt financing are widely used as tax shield (Heider and Ljungqvist, 2015; Faulkender and Smith, 2016). Heider and Ljungqvist (2015) find that firms increase its leverage and issue more debt as a response to tax increase. Since accounting conservatism facilitates efficient debt contracting, more conservative firms can issue debt with better conditions, they are expected to use more debt financing to reduce tax expenses. Consequently, these more conservative firms will have less

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<sup>2</sup> It can be calculated as  $100/(100-2)^{360/(30-10)}-1$ .

demand for trade credit, and they are more likely to repay suppliers before the early payment discounts expire.

Overall, I expect that a customer firm's demand for trade credit is negatively related to its accounting conservatism. A firm with less conservative financial reporting demands more trade credit as financing substitutes, whereas a firm with more conservative financial reporting has less demand for trade credit.

### *1.2.2 Are suppliers willing to provide trade credit to the less conservative customer firms?*

Suppliers have an information advantage over debt holders or banks because they can acquire information through intermediate inputs transactions (Biais and Gollier, 1997; Burkart and Ellingsen, 2004). Biais and Gollier (1997) argue that suppliers can easily evaluate, monitor, and control the credit risk of customers. Burkart and Ellingsen (2004) attribute the information advantage of suppliers to intermediate inputs transactions. Suppliers can observe the credit-worthiness of customers through intermediate inputs transactions, while other debt holders or banks have to incur additional monitoring cost. Therefore, suppliers rely less on conservative financial reporting to evaluate customer firms.

The use of trade credit can also directly transfer customers' information to suppliers. Since trade credit usually has short maturity (Ng et al., 1999; Klapper et al., 2012), the credit-worthiness of a customer can easily be observed by its suppliers once the customer cannot repay trade credit on time. Aktas et al. (2012) even argue that the use of trade credit not only provide information to suppliers, but also reduce the information asymmetry between firms and outside investors. Therefore, trade credit itself is an effective way to acquire information. By offering trade credit to less conservative customers, suppliers can be rewarded with more information.

Furthermore, the intermediate inputs can work as collateral for trade credit, reducing suppliers' exposure to potential default risk. In the case of bankruptcy, suppliers can liquidate



customer firms' intermediate inputs to cover trade credit. It is worth to note that, suppliers have advantage in liquidating intermediate inputs since they have professional expertise on the intermediate inputs market (Mian and Smith, 1992; Giannetti et al., 2011), which further reduces suppliers' exposure to default risk. In contrast, not all the bank loans or public debts are issued with collateral. Even if some of them are tied to collateral, banks or other debt holders have to incur significant costs to liquidate the collateral.

The above arguments indicate that, different from banks or debt holders, suppliers are tolerant to customer firms' less conservative financial reporting. On the one hand, suppliers can acquire customer firms' information through intermediate inputs transaction and trade credit repayment. On the other hand, suppliers have advantages in liquidating intermediate inputs even if customer firms default. Therefore, when customer firms demand for trade credit as an alternative financing source, suppliers are willing to offer trade credit to customer firms, even if the customers conduct less conservative financial reporting.

However, it does not mean that suppliers prefer less conservative customer firms. As documented by Hui et al. (2012), customer firms' conditional conservative financing reporting provides suppliers timely downside information. When a supplier has greater bargaining power, it enforces customer firms to report conservatively.

### *1.2.3 Credit crunch and trade credit during the 2007-2008 global financial crisis*

During the 2007-2008 global financial crisis, credit supply significantly reduce (Brunnermeier, 2009; Campello et al., 2010; Ivashina and Scharfstein, 2010; Iyer et al., 2013). Ivashina and Scharfstein (2010) show the new loans to large borrowers fall by 47% during the crisis. Many firms have to abandon attractive investments because of liquidity shortage (Campello et al., 2010). Credit supply decreases even more for smaller firms or firms with weaker banking relationship, indicating that banks become more prudent during the financial crisis (Iyer et al., 2013).

In contrast to bank credit crunch, trade credit significantly increases during the 2007-2008 global financial crisis. Previous theoretical studies show that suppliers provide more trade credit to customers when the latter experience temporary liquidity shock (Wilner, 2000; Cuñat, 2007). Garcia-Appendini and Montoriol-Garriga (2013) find the suppliers with higher liquidity level offer more trade credit to customer firms during the 2007-2008 global financial crisis. Similar phenomenon also occurs in other financial crises. For instance, Love et al. (2007) examine the financial crises in Mexico and Southeast Asia in 1990s, they also find trade credit significantly increases during these crises.

The credit crunch shock and increase of trade credit during the crisis provides a good setting to identify the effect of accounting conservatism on trade credit. Under the exogenous credit crunch shock, banks and other debt holders care more about firms' credit-worthiness (Iyer et al., 2013). Therefore, the firms with less conservative financial reporting are extremely difficult to obtain debt financing (Balakrishnan et al., 2016). The sudden increase of trade credit during the crisis can be viewed as a function of accounting conservatism. By investigating the influence of accounting conservatism on the change of trade credit before and after the onset of crisis, I can identify the impact of accounting conservatism on trade credit.

#### *1.2.4 Empirical predictions*

The 2007-2008 global financial crisis provides a good opportunity to examine the influence of accounting conservatism on trade credit. Since less conservative firms have difficulties to obtain debt financing, they are more likely to use trade credit as an alternative financing source. In contrast, more conservative firms have less demand for trade credit since they are more likely to obtain debt financing. Summarizing the discussion in the previous subsections, I propose the following main prediction:

***H1. Firms with less conservative financial reporting are more likely to use trade credit***

*during the crisis.*

Suppliers' information acquisition ability can moderate the influence of accounting conservatism on trade credit. Through intermediate inputs transaction, suppliers can acquire some information about customer firms (Biais and Gollier, 1997; Burkart and Ellingsen, 2004). If suppliers can more easily acquire customer firms' information, they will be more willing to offer trade credit to the customers with less conservative financial reporting. Therefore, I put forth the following prediction:

***H2.** When a firm's suppliers can acquire more information through intermediate inputs transaction with customers, the effect of accounting conservatism on trade credit is stronger.*

Furthermore, the inputs liquidation possibility can also moderate the impact of accounting conservatism on trade credit during the crisis. The intermediate inputs can work as collateral for trade credit (Mian and Smith, 1992; Giannetti et al., 2011), and suppliers usually have advantage in liquidating intermediate inputs because of professional expertise. Compared to differentiated inputs, the standardized inputs are easier to liquidate. Therefore, I propose the following prediction:

***H3.** When a firm's intermediate inputs are easier to liquidate, the effect of accounting conservatism on trade credit is stronger.*

The demand for trade credit can also moderate the effect of accounting conservatism on trade credit. Previous studies find the firms with financing frictions are more likely to use trade credit as an alternative financing source (Petersen and Rajan, 1997; Fisman and Love, 2003). When a firm with less conservative financial reporting faces more financing frictions, it is more difficult to obtain low-cost debt financing during the financial crisis. Consequently, the firm will have more demand for trade credit. So I propose the final prediction:

***H4.** When a firm faces more financing frictions, the effect of accounting conservatism on*

*trade credit is stronger.*

### **1.3 Sample and research design**

#### *1.3.1 Data and sample selection*

The sample consists of quarterly observations of U.S. incorporated public firms in Compustat, with fiscal quarter ending between July 2006 and June 2008. Following Duchin et al. (2010), I identify July 2007 as the beginning of global financial crisis, when the U.S. subprime mortgages began to collapse. Since I am mainly interested in the financial crisis's shock to external credit supply (i.e., the credit crunch shock), I identify the first year of the crisis (i.e., July 2007 – June 2008) as the post-crisis period.<sup>3</sup> To implement the Difference-in-Difference (DiD) analysis, I define one year prior to the crisis (i.e., July 2006 - June 2007) as the pre-crisis period.

I exclude the financial firms (SIC 6000-6999) and utilities (SIC 4900-4999), the firms with negative value of sales, assets, or common value of equity. Following Garcia-Appendini and Montoriol-Garriga (2013), I also exclude firms with market capitalization less than \$50 million, as well as firms with book value of asset less than \$10 million. The final sample includes 13281 firm-quarter observations with 1971 unique firms.

#### *1.3.2 Regression specification*

I employ a Difference-in-Difference (DiD) approach to analyze the influence of accounting conservatism on trade credit before and after the onset of 2007-2008 global financial crisis, following Duchin et al. (2010). During the credit crunch shock, trade credit becomes an important alternative source of financing (Garcia-Appendini and Montoriol-Garriga, 2013). The change of trade credit before and after the onset of financial crisis can be written as a function of accounting conservatism.

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<sup>3</sup> As discussed in Duchin et al. (2010), the first year of the financial crisis is mainly a financial phenomenon, and it is characterized as a credit crunch shock. After the bankruptcy of Leman Brothers in 2008, the credit crunch shock is combined with demand side shock. Therefore, the period after the bankruptcy of Leman Brothers is not suitable for our research setting.

The regression equation is as follows:

$$TradeCredit_{it} = \alpha_i + \beta_1 Crisis_t + \beta_2 Crisis_t \times Conservatism_i + Controls_{it} + \varepsilon_{it} \quad (1)$$

Where  $TradeCredit_{it}$  refers to firm  $i$ 's use of trade credit at quarter  $t$ .  $Crisis_t$  is an indicator variable for the post-crisis period, which equals one for the post-crisis period (July 2007 – June 2008) and zero for the pre-crisis period (July 2006 – June 2007).  $Conservatism_i$  refers to firm  $i$ 's accounting conservatism, which is measured between 2003 and 2005. The coefficient of interest is  $\beta_2$ , which represents the impact of accounting conservatism on the change of trade credit before and after the onset of global financial crisis.

To mitigate unobserved heterogeneity and omitted variable problem, I include firm fixed effects ( $\alpha_i$ ) to control for the time-invariant variation in trade credit.<sup>4</sup> Since  $Conservatism_i$  is measured only once in the sample period, the level effect of  $Conservatism_i$  is subsumed by the firm fixed effects, and the coefficient of  $Conservatism_i$  cannot be directly observed in the regression results (Balakrishnan et al., 2016).

$Control_{it}$  represents the control variables that may influence a firm's use of trade credit. Following previous literature (e.g., Petersen and Rajan, 1997; Cuñat, 2007; Giannetti et al., 2011; Klapper et al., 2012), I include cash holding, market share, sales growth, and profit margin as control variables. Since size, market to book ratio, and leverage are used to calculate the measure of conservatism, I also include size, market to book ratio, and leverage as control variables. All the control variables are based on the firm-quarter observations between July 2006 and June 2008. Appendix A contains all variable definitions. All the variables are winsorized at the 1% and 99% percentiles to mitigate the influence of outliers.

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<sup>4</sup> The Difference-in-Difference (DiD) approach with firm fixed effects is widely used in prior literature on financial crisis analysis, such as Duchin et al. (2010), Garcia-Appendini and Montoriol-Garriga (2013), and Balakrishnan et al. (2016). Furthermore, it is also used in Economics literature. For instance, Zhang and Zhu (2011) use similar method to analyze the influence of group size on internet users' incentive to contribute, using the block of Chinese Wikipedia as a natural experiment.

The standard errors are clustered at both firm and year-quarter levels using the method of Petersen (2009).

### *1.3.3 Measure of trade credit*

Trade credit is recorded as accounts payable in the balance sheet. In the main tests, I measure a firm's use of trade credit as accounts payable (AP) scaled by purchases, where purchases is calculated as cost of goods sold (COGS) plus change of inventory. The above measure is widely used in previous literature, such as Petersen and Rajan (1997), Garcia-Appendini and Montoriol-Garriga (2013), and Murfin and Njoroge (2015). Previous studies find that trade credit usually has a short maturity: between one and four months (e.g., Ng et al., 1999; Klapper et al., 2012). Therefore, quarterly observations better capture the evolution of trade credit. An alternative measure of trade credit is days payable outstanding (DPO), which capture the average number of days that a company takes to pay its suppliers. However, since it is calculated as AP/Purchase multiply by 90 days, the regression results can be directly derived by multiplying 90 by that of AP/Purchase.

### *1.3.4 Measure of accounting conservatism*

In the main tests, I employ the firm-specific conservatism measure developed by Khan and Watts (2009). Based on the cross-sectional regression specification of Basu (1997), Khan and Watts (2009) define the timeliness of earnings to good news as G\_Score, and the incremental timeliness of bad news as C\_Score. I use C\_Score as the measure of conditional conservatism. A greater value of C\_Score represents a higher degree of conditional conservatism. To mitigate measurement error, I calculate the three year average of C\_Score prior to 2006 (i.e., 2003 – 2005). Following Khan and Watts (2009), I trim the top and bottom 1% of earnings, returns, size, market to book ratio, and leverage, and I also eliminate the firms with price per share less than 1\$.

In section 5.1, I perform robustness test using two additional conservatism measures.

The first one is Basu (1997) timeliness measure, based on firm-specific time-series regression between 1996 and 2005. The second one is the accumulated non-operating accruals between 2003 and 2005, following Givoly and Hayn (2000) and Zhang (2008).

## 1.4 Empirical results

### 1.4.1 Summary statistics

Table 1.1 reports the summary statistics for the main variables of interest. The mean value of trade credit is 0.60, which means on average accounts payable (AP) accounts for 60% of inputs purchase. It implies that trade credit is an important financing tool for short term liquidity. The mean value of days payable outstanding (DPO) is 53.68, indicating the sample firms on average take about two months to pay its suppliers. The mean value of Khan and Watts C\_Score is 0.10, the median value is 0.09, and the standard deviation is 0.08, which is quite similar to the statistics of Khan and Watts (2009).

[Insert Table 1.1 about here]

Table 1.2 shows the Pearson correlation matrix between measures of accounting conservatism and control variables. Since accounting conservatism is measured prior to 2006, and the control variables are based on the firm-quarter observations between July 2006 and June 2008, the correlation coefficients are relatively low. There is not serious concern of multi-collinearity problem. One exception is the correlation between C\_Score, size and leverage. However, since the level effect of conservatism is subsumed by the firm fixed effects, I only need to concern the correlation between the interaction  $Crisis_t \times Conservatism_i$ , size and leverage, which are much lower.<sup>5</sup>

[Insert Table 1.2 about here]

### 1.4.2 Accounting conservatism and trade credit before and after the financial crisis

Table 1.3 reports the influence of accounting conservatism on trade credit before and

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<sup>5</sup> The Pearson correlation between interaction  $Crisis_t \times Conservatism_i$  and size is 0.30, which is much lower than the correlation between  $Conservatism_i$  and size (0.68). The correlation between  $Crisis_t \times Conservatism_i$  and leverage is 0.17, which is also much lower than that between  $Conservatism_i$  and leverage (0.30).

after the onset of global financial crisis. To illustrate the influence of accounting conservatism on trade credit in different periods, I first do a sub-period analysis by separately estimating in pre-crisis and post-crisis period, respectively. As shown in column 1 and 2 of Table 1.3, accounting conservatism does not show significant influence on trade credit in pre-crisis period, whereas accounting conservatism negatively impact use of trade credit in post-crisis period, and the coefficient estimate is statistically significant at the 5% level.

Column 3 introduce the interaction term of accounting conservatism and *crisis* indicator, to compare the different influence of accounting conservatism on trade credit. The coefficient estimate of interaction term is -0.347, which is statistically significant at the 1% level. The negative coefficient implies that, compared to more conservative firms, less conservative firms are more likely to use trade credit during the financial crisis.

Column 4 includes firm fixed effects to reduce unobserved heterogeneity and omitted variables problem, following Duchin et al. (2010). Since accounting conservatism is only measured once prior to the crisis, the level effect of conservatism is subsumed by firm fixed effects. The coefficient estimate of interaction term is similar, which is -0.287 and statistically significant at the 5% level. Column 5 further introduces other controls, and the regression results are qualitatively similar.

The above findings are consistent with the main hypothesis. The negative coefficient of interaction implies that, facing the credit crunch shock during the financial crisis, the less conservative firms are more likely to use trade credit as an alternative financing source. The coefficient estimate -0.255 in column 5 indicates that, with a firm's accounting conservatism (*C\_Score*) decreasing by one standard deviation (0.08), the firm's quarterly accounts payable (AP) increase by 2.04% ( $=0.08*0.255$ ) of total purchase. On annual basis, the firm's accounts payable (AP) increase by 8.16% of total purchase, which is economically significant.

To better interpret the empirical results, I also try alternative regression specifications.



First, I transform the continuous conservatism measure ( $C\_Score$ ) into a dummy variable, which equals one for the more conservative firms, and zero for the less conservative firms. Column 6 of Table 1.3 shows the estimates. The coefficient of interaction between *crisis* indicator and dummy conservatism measure is -0.049, which means the quarterly trade credit of less conservative firms is 4.9% higher than that of more conservative firms. In annual basis, it accounts for 19.6% of inputs purchase values.

Second, I employ days payable outstanding (DPO) as an alternative dependent variable. Since days payable outstanding (DPO) can be calculated as AP/Purchase multiply by 90 days, the regression estimates with DPO as the dependent variable is equivalent to multiplying the estimates in Column 5 of Table 1.3 by 90. Therefore, the coefficient estimate of interaction between *crisis* indicator and *Conservatism* ( $C\_Score$ ) is -22.95 ( $-0.255*90$ ). The above coefficient indicates that, with  $C\_Score$  decreasing by one standard deviation (0.08), the firm takes about two more days ( $0.08*22.95$ ) to pay its suppliers each quarter, and eight more days each year. If I employ dummy  $C\_Score$  as the measure of conservatism, and the coefficient estimate of interaction term is -4.41 ( $-0.049*90$ ), which means the less conservative firms take around 4.5 more days to pay their suppliers each quarter, and 18 days each year.

[Insert Table 1.3 about here]

To verify the regression specification, I do placebo tests using several placebo crisis periods. First, I employ the event of September 11, 2001 as a placebo crisis. Different from the credit supply shock during the global financial crisis, 9/11 event causes significant demand shock (Tong and Wei, 2008). Since credit supply does not significantly decrease after 9/11, accounting conservatism should not influence the change of trade credit before and after the 9/11 event.

I define one year after the 9/11 event (i.e., October 2001 – September 2002) as the placebo post-crisis period, and one year before the 9/11 event (i.e., October 2000 –

September 2001) as the placebo pre-crisis period. Column 1 of Table 1.4 reports the regression results. Although the coefficient estimates of interaction term is negative, but it is not statistically significant.

I also try two other placebo crisis periods. The first placebo crisis is set to the period between July 2006 and June 2007, which is one year before the global financial crisis. The second placebo crisis is set to the period between July 2008 and June 2009, which is one year after the 2007-2008 global financial crisis, and credit supply shock is combined with demand side shock in that period. Column 2 and 3 of Table 1.4 illustrates that accounting conservatism does not have significant impact on the change of trade credit during the two placebo crises. Overall, the above placebo tests indicate that, the credit crunch shock that took place during the 2007-2008 global financial crisis provides a suitable research setting to examine the effect of accounting conservatism on trade credit.

[Insert Table 1.4 about here]

#### *1.4.3 Role of suppliers' information acquisition ability*

Hypothesis 2 predicts that, the effect of accounting conservatism on trade credit during the crisis is stronger when suppliers can acquire more information about customer firms. To test Hypothesis 2, I do subsample analysis based on suppliers' information acquisition ability. The primary measure of suppliers' information acquisition ability is the proportion of intermediate inputs to the total outputs. I measure it at the industry level. If a downstream industry needs more intermediate inputs in the production process, its suppliers can more easily acquire customer's information through intermediate inputs transactions (Biais and Gollier, 1997; Burkart and Ellingsen, 2004).

I calculate the proportion of total intermediate inputs based on the U.S. Bureau of Economic Analysis (BEA) input-output *make* table and *use* table (2002). The BEA *make* table reports the total outputs of each industry, and the BEA *use* table reports each industry's use of

intermediate inputs from its upstream industries. Combining both *make* table and *use* table, I obtain the proportion of intermediate inputs to total outputs for each industry.<sup>6</sup>

As shown in Table 1.1, the mean and median proportion of intermediate inputs is 0.48 and 0.47, respectively. On average, the intermediate inputs account for almost half of total outputs. To better illustrate the proportion of intermediate inputs in each industry, I list the top and bottom ten industries in Appendix B. The top ten industries include wet corn milling, soft drink and ice manufacturing, petroleum refineries etc. All these industries need a large proportion of intermediate inputs. The proportion of intermediate inputs in wet corn milling industry is as high as 0.870. The bottom ten industries include legal services, motion picture and video industries, employment services etc.

I partition the total sample into two subsamples based on the proportion of intermediate inputs to total outputs. If an industry use a higher proportion of intermediate inputs, its suppliers can more acquire more information through intermediate inputs transaction. Therefore, the firms in that industry are more likely to receive trade credit from suppliers during the crisis.

Column 1 and 2 of Table 1.5 reports the regression estimates. As shown in Column 2, the coefficient of interaction *crisis* × *conservatism* is significantly negative when suppliers can more easily acquire customers' information. The coefficient is -0.497, which is higher than the coefficient in Table 1.3. The above result suggests that, when suppliers have superior information advantage, they are more likely offer trade credit to the less conservative firms. Whereas, as shown in Column 1, when suppliers cannot efficiently acquire customers' information, they are less likely to offer trade credit. The coefficient of interaction *crisis* × *conservatism* is not statistically significant, and the magnitude of coefficient estimate is also smaller than that of Column 2.

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<sup>6</sup> The U.S. Bureau of Economic Analysis (BEA) *make* and *use* table are based on the 6-digit BEA input-output industry code (2002). To merge with Compustat firms, I employ the cross walk table between BEA input-output industry code and North American Industry Classification System (NAICS) code.

I further test the difference of coefficient estimates for interaction *crisis* × *conservatism*. The null hypothesis is that the two subsamples have the same coefficient estimates for interaction term, and the alternative hypothesis the coefficient of interaction term in the “low” proportion subsample is smaller than that of “high” proportion subsample. The  $\chi^2$  statistic is 3.55 with the p-value of 0.029. So I can conclude that the influence of accounting conservatism on trade credit is more pronounced when suppliers have higher information acquisition ability.

[Insert Table 1.5 about here]

I also employ the supplier-customer geographical distance as an alternative proxy for suppliers’ information acquisition ability. When a supplier is geographically closer to its customers, it can more easily monitor customers’ credit-worthiness (Dass et al., 2015). The geographical distance between an industry and its supply industries is calculated as the proportion of the industry’s total transportation costs for purchasing intermediate inputs to its total inputs value. A lower proportion of transportation cost indicates closer geographical distance. The data of transportation cost and inputs value are from the BEA input-output *use* table (2002). As shown in Table 1.1, on average transportation costs account for 0.01 of total inputs values.

I partition the sample into two subsamples based on the supplier-customer geographical distance, and the regression estimates are reported in Column 3 and 4 of Table 1.5. When a customer has lower geographical distance with its suppliers, the impact of accounting conservatism on trade credit during the crisis is statistically significant. In contrast, the impact of accounting conservatism is not significant when the geographical distance is higher. However, the  $\chi^2$  statistic is not statistically significant, which could be because transportation costs contain some biases since it could be influenced by the physical properties of

intermediate inputs.<sup>7</sup>

#### 1.4.4 Role of inputs liquidation possibility

According to Hypothesis 3, when a firm's intermediate inputs are easier to liquidate, the firm's suppliers are exposed to less loss if selling on credit, and they are more willing to offer trade credit to less conservative firms. Therefore, the negative impact of accounting conservatism on trade credit should be more pronounced. To test Hypothesis 3, I do subsample analysis based on the liquidation possibility of intermediate inputs.

I measure the liquidation possibility of intermediate inputs at industry level, following Nunn (2007).<sup>8</sup> Compared to differentiated inputs, the standardized goods is easier to liquidate. Rauch (1999) shows that the standardized inputs are usually sold on organized exchanges or reference priced in trade publications. Nunn (2007) further use the Bureau of Economic Analysis (BEA) input-output *use* table (1997) to identify each industry's intermediate inputs. A downstream industry's inputs liquidation possibility is then calculated as the average proportion of standardized inputs. As shown in Table 1.1, the mean value of inputs liquidation possibility is 0.31, indicating the average proportion of standardized inputs for all the industries is around 0.31.

The subsample analysis based on the inputs liquidation possibility is reported in Table 1.6. When an industry's inputs have higher liquidation possibility, the coefficient estimate of interaction *crisis* × *conservatism* is -0.610, which is statistically significant at the 5% level. The results suggest that, when a firm's inputs are easier to liquidate, its suppliers are more likely to take risk and offer trade credit to less conservative customer firms. In contrast, when a firm's inputs are difficult to liquidate, accounting conservatism does not show significant effect on trade credit during the crisis. The  $\chi^2$  statistic is 3.26 with the p-value of 0.035, suggesting the impact of accounting conservatism on trade credit is more pronounced when a firm's

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<sup>7</sup> For instance, when the intermediate inputs have higher weight, size, or volume, they might need more transportation costs even if the geographical distance is not so far away.

<sup>8</sup> Nunn (2007)'s measure has been widely used in prior literature, such as Acemoglu et al. (2009) and Dou et al. (2013).

input is easier to liquidate.

[Insert Table 1.6 about here]

#### 1.4.5 *Role of financing frictions*

According to Hypothesis 4, the influence of accounting conservatism on trade credit is more pronounced when a firm faces more financing frictions. To test Hypothesis 4, I do subsample analysis based on firms' financing frictions. I measure a firm's financing frictions from three different perspectives. First, I use the Kaplan-Zingales index to measure a firm's financial constraints (Kaplan and Zingales, 1997). The Kaplan-Zingales index is calculated at the end of fiscal year 2005, and the coefficients are from Lamont et al. (2001). A higher value of Kaplan-Zingales index represents a higher level of financial constraints.

The second proxy for financing frictions is a firm's access to bank line of credit. The 2007-2008 financial crisis is characterized as bank credit supply shock. If a firm has access to bank line of credit prior to the crisis, it is expected to be exposed to less shock during the crisis. The data from bank line of credit is from Sufi (2009), which is based on the observation between 1996 and 2003. A firm is exposed to less financing frictions if it has access to bank line of credit and its cash flow is above the sample median in every year from 1996 to 2003.

The third proxy for a firm's financing frictions is the suppliers' liquidity. The trade credit that a customer firm receives depends on its suppliers' liquidity level. Garcia-Appendini and Montoriol-Garriga (2013) find the suppliers with high pre-crisis liquidity level offer more trade credit to customer firms during the 2007-2008 financial crisis. Following Garcia-Appendini and Montoriol-Garriga (2013), I measure a firm's pre-crisis liquidity level as the ratio of cash reserve to total assets at the last fiscal quarter before July 2006. An industry's supply industries are identified based on the Bureau of Economic Analysis (BEA) input-output *use* table (2002).

The regression estimates are reported in Table 1.7. When a firm has a higher level of financial constraints or does not have access to bank line of credit, the negative influence of accounting conservatism on trade credit is statistically significant. The  $\chi^2$  statistic for both subsample are 2.13 and 3.48, with the p-values of 0.072 and 0.031, respectively. The above results suggest that, when a less conservative firm is exposed to higher level of financing frictions during the financial crisis, it is more likely to use trade credit as an alternative financing source.

Column 5 and 6 of Table 1.7 report the estimates for the subsamples based on suppliers' liquidity. When a firm's suppliers hold higher level of liquidity prior to the crisis, the firm is more likely to receive trade credit from suppliers. As shown in Column 6, the coefficient estimate of interaction *crisis*×*conservatism* is -0.269, which is statistically significant at the 1% level. In contrast, in Column 5 when suppliers do not hold enough liquidity, the less conservative firms cannot get enough trade credit during the crisis.

[Insert Table 1.7 about here]

## **1.5 Additional analyses**

### *1.5.1 Robustness tests*

I use two alternative measures of accounting conservatism to check the robustness of the main results. The first proxy is Basu (1997) timeliness measure, which is calculated based on firm-specific time-series regressions between 1996 and 2005, with minimum requirement of 7 years of observations. The second one is the accumulated non-operating accruals between 2003 and 2005. Following Givoly and Hayn (2000) and Zhang (2008), I calculate the accumulated non-operating accruals between 2003 and 2005, scaled by the accumulated total assets, and multiply by negative one.

Panel A of Table 1.8 reports the regression estimates based on Basu timeliness measure. In the total sample, the coefficient of interaction *crisis*×*conservatism* is negative, but it is not

statistically significant. I further check the regression results for different subsamples. As shown in Column 2 and 4, when suppliers have higher information acquisition ability or when the firm faces higher financing frictions, the coefficients of interaction  $crisis \times conservatism$  are negative and statistically significant. The above results suggest that, Basu timeliness measure might not be able to provide enough variations to identify the influence of accounting conservatism on trade credit.

Panel B of Table 1.8 demonstrates the regression estimates based on the accumulated non-operating accruals. Accumulated non-operating accruals significantly impact trade credit during the crisis in the total sample. However, in the subsamples when suppliers have higher information acquisition ability, when inputs are easier to liquidate, or when firms face higher financing frictions, I do observe the significantly negative influence of accounting conservatism on trade credit.<sup>9</sup> Since the accumulated non-operating accruals capture not only conditional conservatism but also unconditional conservatism, the measurement noise could result in weaker results.

[Insert Table 1.8 about here]

I also check the robustness by eliminating the wholesale and retailing industry (SIC 5000-5999). Murfin and Njoroge (2015) find the smaller suppliers usually have to provide trade credit to their large retailer, which could weaken the link between accounting conservatism and trade credit. The untabulated results show the main results still hold even if I drop the wholesale and retailing industry.

### 1.5.2 *Alternative explanation*

The relative bargaining power could be another possible driver behind the link between accounting conservatism and trade credit. When a less conservative firm has relative more bargaining power compared to its suppliers, it could still receive trade credit even if its

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<sup>9</sup> Another proxy proposed by Givoly and Hayn (2000) is the difference between skewness of earnings and skewness of cash flow. I also try this proxy, but it does not show significant impact on trade credit.



suppliers do not have enough information or liquidation advantage.

To test the above argument, I do subsample analysis based on the industry competition. If a company operates in a less competitive industry, it tends to have more bargaining power, and it is more likely to receive trade credit from its suppliers. Therefore, the negative influence of accounting conservatism on trade credit should be more pronounced.

I employ three measures of industry competition. The first measure is Compustat based Herfindal-Hirschman Index (HHI), which is calculated based on the largest 50 firms in each 4-digit standard industrial classification (SIC) industries in Compustat at the end of 2005. Ali et al. (2009) argue the Compustat based industry competition measure is biased, so I further use the U.S. Census based HHI in 2002 as the second measure of competition.<sup>10</sup> The last measure is the fitted HHI in 2005, which is developed by Hoberg and Phillips (2010) and already used in prior literature, such as Dhaliwal et al. (2014).

The regression results are reported in Table 1.9. As shown in the first two columns, when the Compustat based HHI is used, accounting conservatism significantly impacts trade credit in the “low” competition subsample. In Column 3 and 4, when the Census based HHI is used, there is not significant difference between the “high” and “low” competition subsamples. In the last two columns, when the fitted HHI is used, the coefficient of interaction term in the “low” competition subsample is significant, but the  $\chi^2$  statistic is not significant, with the p-value of 0.355. Overall, although some results suggest bargaining power could play a role in the trade credit provision process, the bargaining power argument needs to be further checked.

[Insert Table 1.9 about here]

## 1.6 Conclusion

In this paper, I investigate the effect of accounting conservatism on trade credit using the

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<sup>10</sup> The U.S. Census based Herfindal-Hirschman Index (HHI) is shared by Sandy Klasa, thanks Sandy for sharing the dataset.

2007-2008 global financial crisis as an external shock to bank credit supply. In this setting, trade credit becomes an importance alternative financing source. The less conservative firms should have more demand for trade credit since they are more difficult to obtain credit from the prudent banks during the crisis. Meanwhile, suppliers can acquire extra information through intermediate inputs transaction, and they can also use intermediate inputs as the collateral for trade credit. Compared to banks or other debt providers, suppliers would be more willing to offer credit to customer firms. Therefore, I predict the less conservative firms are more likely to use trade credit during the crisis.

I employ a Difference-in-Difference (DiD) approach to investigate the impact of accounting conservatism on trade credit during the crisis. A firm's trade credit before and after the crisis can be written as the function of accounting conservatism. I find that, compared to more conservative firms, the firms with less conservative financial reporting use more trade credit during the financial crisis. The above findings indicate that suppliers acquire customers' information through multiple channels. I provide further evidence to support the debt contracting benefits of accounting conservatism, and it also complements the literature on accounting conservatism and supplier-customer relationship.

## Appendix 1.A

### Variable definitions

Variables	Definition
<i>Trade credit</i>	Firms' use of trade credit. It is measured as accounts payable (AP) scaled by purchase, where purchase is calculated as cost of goods sold (COGS) plus change of inventory.
<i>Days payable outstanding (DPO)</i>	Average number of days a company takes to pay its suppliers. It is calculated as accounts payable (AP) divided by purchase, then multiply by 90 days (for one quarter).
<i>Crisis</i>	Indicator variable for the post-crisis period. It equals one for the period between July 2007 and June 2008, and zero for the period between July 2006 and June 2007.
<i>C_Score</i>	Khan and Watts (2009)'s asymmetric timeliness measure of conservatism. To mitigate measurement errors, take the three-year average measure prior to 2006 (i.e., 2003-2005).
<i>C_Score (dummy)</i>	Indicator variable for Khan and Watts (2009)'s asymmetric timeliness measure of conservatism. It equals one if a firm's C_Score is above the sample median, and zero otherwise.
<i>Basu timeliness</i>	Basu (1997)'s asymmetric timeliness measure of conservatism. The measure is calculated based on firm-specific time-series regression between 1996 and 2005, the minimum of seven years of observations for each firm are required.
<i>Accumulated non-operating accruals</i>	The accumulated non-operating accruals between 2003 and 2005, scaled by the accumulated total assets, and multiply by negative one, following Givoly and Hayn (2000) and Zhang (2008).
<i>Cash holding</i>	Cash and short-term investment divided by total assets.
<i>Market share</i>	Firms' market share of sales, which is calculated based on 3-digit Standard Industrial Classification (SIC) code.
<i>Sales growth</i>	Sales growth rate relative to the same quarter of previous year.
<i>Profit margin</i>	Income before extraordinary items divided by sales.
<i>Size</i>	Natural log of market value of equity.
<i>Market to book</i>	Market value of equity divided by the book value of equity.
<i>Leverage</i>	(long term debt + current debt) / market value of equity.
<i>Kaplan-Zingales index</i>	Financial constraints index that is calculated at the end of fiscal year 2005, following Kaplan and Zingales (1997). A higher value of Kaplan-Zingales index represents higher level of financial constraints. The coefficients are from Lamont et al. (2001).
<i>Line of credit</i>	Indicator variable for access to bank line of credit. It equals one if a firm has access to bank line of credit and its cash flow is above the sample median in every year between 1996 and 2003, and zero otherwise. The data of access to bank line of credit is from Sufi (2009).
<i>Suppliers' liquidity</i>	Supply industries' liquidity level prior to the global financial crisis. The liquidity level is measured as the ratio of cash reserve to total assets at the last fiscal quarter ending before July 2006, following Garcia-Appendini and

<i>Proportion of intermediate inputs to total outputs</i>	<p>Montoriol-Garriga (2013). An industry's supply industries are identified based on the 2002 Bureau of Economic Analysis (BEA) Input-Output <i>use</i> table.</p> <p>An industry's proportion of intermediate inputs to total outputs. A higher proportion implies suppliers have more opportunity to acquire customer firms' credit-worthiness information through intermediate inputs transactions. The inputs data is from the 2002 Bureau of Economic Analysis (BEA) Input-Output <i>use</i> table, the output data is from the 2002 BEA <i>make</i> table.</p>
<i>Supplier-customer geographical distance</i>	<p>The geographical distance between an industry and its supply industries. It is proxied by the proportion of an industry's total transportation cost for purchasing intermediate inputs to its total inputs. A lower proportion of transportation cost implies closer geographical distance. The inputs and transportation cost data are from the 2002 BEA Input-Output <i>use</i> table.</p>
<i>Inputs liquidation possibility</i>	<p>The possibility to liquidate intermediate inputs, the data is from Nunn (2007). The standardized input is easier to liquidate. The classification of differentiated goods and standardized goods is from Rauch (1999). Nunn (2007) identify each industry's inputs based on the 1997 BEA Input-Output <i>use</i> table.</p>
<i>Industry competition</i>	<p>An industry's product market competition level prior to the global financial crisis. A lower level of industry competition implies that the firms in that industry have higher bargaining power relative to their suppliers. I use three measures of industry competition. The first one is the Compustat based Herfindal-Hirschman Index (HHI), which is calculated based on largest 50 firms for each 4-digit standard industrial classification (SIC) industries in Compustat at the end 2005. The second measure is the Census based on HHI in 2002, which is from Ali et al. (2009). The third measure is the fitted HHI in 2005, which is from Hoberg and Phillips (2010).</p>

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*Appendix 1.B***Proportion of intermediate inputs to total outputs across industries**

BEA input-output industry code (2002)	BEA input-output industry title (2002)	Proportion of intermediate inputs to total outputs
311221	Wet corn milling	0.870
336120	Heavy duty truck manufacturing	0.865
312110	Soft drink and ice manufacturing	0.854
324110	Petroleum refineries	0.841
336112	Light truck and utility vehicle manufacturing	0.793
325220	Artificial and synthetic fibers and filaments manufacturing	0.790
311700	Seafood product preparation and packaging	0.788
311920	Coffee and tea manufacturing	0.788
325211	Plastics material and resin manufacturing	0.787
325181	Alkalies and chlorine manufacturing	0.773
...	...	...
5419A0	All other miscellaneous professional, scientific, and technical services	0.263
541100	Legal services	0.252
512100	Motion picture and video industries	0.250
541200	Accounting, tax preparation, bookkeeping, and payroll services	0.245
312140	Distilleries	0.230
812300	Dry-cleaning and laundry services	0.213
3122A0	Tobacco product manufacturing	0.195
533000	Lessors of nonfinancial intangible assets	0.187
561300	Employment services	0.166
531000	Real estate	0.154

This table presents the proportion of intermediate inputs to total outputs across different downstream industries. The industry classification is based on 6-digit Bureau of Economic Analysis (BEA) input-output industry code (2002). The first ten rows show the industries with the highest proportion of intermediate inputs to total outputs, and the last ten rows show the industries with the lowest proportion of intermediate inputs to total outputs. The other industries are not tabulated.

**Table 1.1: Summary statistics**

	N	Mean	Std. Dev.	P25	P50	P75
<b>Dependent Variable</b>						
Trade credit	13281	0.60	0.79	0.27	0.42	0.62
Days payable outstanding (DPO)	13281	53.68	70.96	24.35	37.81	56.19
<b>Crisis indicator</b>						
Crisis indicator	13281	0.46	0.50	0	0	1
<b>Conservatism</b>						
C_Score	13281	0.10	0.08	0.04	0.09	0.14
C_Score (dummy)	13281	0.50	0.50	0	0	1
Basu timeliness	12946	0.06	0.86	-0.10	0.02	0.18
Accumulated non-operating accruals	6920	0.03	0.10	0.01	0.02	0.05
<b>Control variables</b>						
Cash holding	13281	0.18	0.21	0.03	0.10	0.28
Market share	13281	0.08	0.16	0.00	0.01	0.08
Sales growth	13281	0.16	0.44	0.01	0.10	0.21
Profit margin	13281	-0.20	2.24	0.01	0.05	0.10
Size	13281	6.88	1.57	5.68	6.74	7.91
Market to book	13281	3.13	3.18	1.63	2.43	3.70
Leverage	13281	0.26	0.60	0.00	0.11	0.30
<b>Moderating factors</b>						
Kaplan-Zingales index	12061	-4.83	14.01	-4.74	-1.11	0.55
Line of credit	12068	0.24	0.43	0	0	1
Suppliers' liquidity	12881	0.11	0.03	0.09	0.10	0.12
Proportion of intermediate inputs to total outputs	12889	0.48	0.14	0.37	0.47	0.59
Supplier-customer geographical distance	12896	0.01	0.02	0.01	0.01	0.02
Inputs liquidation possibility	8559	0.31	0.23	0.19	0.38	0.50
Market competition	13230	0.24	0.19	0.12	0.18	0.27

This table presents the summary statistics for the main variables of interests. The dependent variables and control variables are based on the firm-quarter observations from July 2006 to June 2008. Accounting conservatism and moderating factors are based on the measurement prior to 2006. The post-crisis period is defined as between July 2007 and June 2008, and the pre-crisis period is defined as one year before the crisis (i.e., July 2006 - June 2007). Kaplan-Zingales index and line of credit are firm-level variables, and all the other moderating factors are industry-level variables. Suppliers' liquidity, the proportion of intermediate inputs to total outputs, supplier-customer geographical distance, and input liquidation possibility are based on the 6-digit Bureau of Economic Analysis (BEA) Input-Output industry code (2002). The reported industry market competition in Table 1.1 is calculated based on the Compustat firm at the 4-digit Standard Industrial Classification (SIC) code. The statistics for Census based HHI and fitted HHI are untabulated. All the dependent variables, measures of conservatism, and control variables are winsorized at the 1% and 99% levels. Appendix A contains all variable definitions.

**Table 1.2: Correlation matrix**

	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
C_Score	1.00										
C_Score (dummy)	0.75	1.00									
Basu timeliness	0.05	0.01	1.00								
Accumulated non-operating accruals	0.01	0.04	0.01	1.00							
Cash holding	-0.01	0.05	0.00	0.08	1.00						
Market share	-0.25	-0.20	-0.01	-0.06	-0.25	1.00					
Sales growth	0.05	0.06	0.01	0.05	0.09	-0.06	1.00				
Profit margin	-0.06	-0.07	0.01	-0.03	-0.24	0.06	-0.03	1.00			
Size	-0.68	-0.61	0.00	-0.06	-0.20	0.38	-0.01	0.11	1.00		
Market to book	-0.03	-0.02	-0.01	0.07	0.14	0.02	0.09	-0.06	0.17	1.00	
Leverage	0.30	0.15	-0.01	-0.03	-0.23	0.05	-0.02	0.00	-0.07	-0.14	1.00

This table presents the Pearson correlation matrix of accounting conservatism and control variables. All the variables are winsorized at the 1% and 99% levels. Appendix A contains all variable definitions.

**Table 1.3: Accounting conservatism and trade credit before and after the financial crisis**

	Sub-period		Total period			
	Pre-crisis (1)	Post-crisis (2)	OLS (3)	FE (4)	FE (5)	FE(dummy C_Score) (6)
Crisis			0.029 (1.34)	0.015 (0.76)	0.012 (0.61)	0.012 (0.60)
Conservatism	0.040 (0.39)	-0.343** (-4.76)	0.025 (0.28)			
Crisis × Conservatism			-0.347*** (-3.58)	-0.287** (-2.44)	-0.255** (-2.09)	-0.049** (-2.57)
Cash holding	0.194* (2.95)	0.175*** (9.75)	0.185*** (5.30)	0.144 (1.35)	0.104 (1.11)	0.100 (1.08)
Market share	-0.318*** (-22.56)	-0.343*** (-15.12)	-0.330*** (-24.23)	-0.038 (-0.51)	-0.017 (-0.24)	-0.015 (-0.22)
Sales growth	0.092 (2.07)	0.204** (5.04)	0.142*** (4.09)	-0.042 (-1.16)	-0.036 (-0.97)	-0.036 (-0.96)
Profit margin	-0.009 (-1.47)	-0.004 (-0.76)	-0.007 (-1.63)	0.009 (0.99)	0.012 (1.48)	0.012 (1.48)
Size					-0.022 (-0.68)	-0.022 (-0.68)
Market to book					0.001 (0.43)	0.001 (0.46)
Leverage					-0.033 (-0.99)	-0.034 (-1.00)
Firm fixed effects	No	No	No	Yes	Yes	Yes
Observations	7350	6429	13779	13748	13281	13281
Adjusted R-squared	0.012	0.024	0.016	0.762	0.767	0.767

This table presents the impact of accounting conservatism on trade credit before and after the onset of global financial crisis. The sample period ranges from July 2006 to June 2008. The post-crisis period is defined as the period between July 2007 and June 2008, whereas the period from July 2006 to June 2007 is defined as pre-crisis period. *Crisis* is an indicator variable, which equals one for the post-crisis period, and zero for the pre-crisis period. The dependent variable is trade credit, which is measured as accounts payable scaled by purchase. Conservatism is measured as the C\_Score developed by Khan and Watts (2009), I take the three-year average of C\_Score between 2003 and 2005 to reduce measurement errors. Appendix A contains all variable definitions. Column 1 and 2 correspond to the ordinary least squared (OLS) regression results in pre-crisis and post-crisis period, respectively. Column 3 introduce the interaction term of *Crisis* and conservatism using OLS regression. Column 4-6 use firm fixed effects to reduce unobserved heterogeneity and omitted variables problem, following Duchin et al. (2010). Therefore, the level effect of accounting conservatism is subsumed by the firm fixed effects. In column 6, the dummy transformation of C\_Score is used as the proxy for accounting conservatism. Standard errors are clustered at both firm and year-quarter levels, following Petersen (2009). T-statistics are reported in brackets, \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.



**Table 1.4: Placebo test**

	9/11 demand shock (1)	2006Q3-2007Q2 (2)	2008Q3-2009Q2 (3)
Crisis	-0.002 (-0.16)	0.004 (0.27)	-0.017 (-0.61)
Crisis × Conservatism	-0.108 (-0.61)	0.099 (0.84)	-0.233 (-1.17)
Cash holding	0.142 (1.39)	-0.133 (-1.43)	0.128 (1.18)
Market share	0.116 (1.48)	-0.009 (-0.14)	0.003 (0.04)
Sales growth	-0.041* (-1.70)	-0.017 (-0.62)	-0.050 (-1.64)
Profit margin	0.002 (0.56)	-0.003 (-0.44)	0.004 (0.40)
Size	0.002 (0.12)	-0.004 (-0.14)	-0.031 (-1.32)
Market to book	-0.001 (-0.56)	-0.003 (-1.00)	0.001 (0.45)
Leverage	0.005 (0.57)	-0.005 (-0.28)	0.009 (0.46)
Firm fixed effects	Yes	Yes	Yes
Observations	12308	13972	12534
Adjusted R-squared	0.731	0.768	0.684

This table presents the regression estimates from placebo tests. Column 1 uses the demand shock caused by the event September 11, 2001 as a placebo crisis. The placebo crisis period is set to between October 2001 and September 2002. Column 2 set the placebo crisis as the period between July 2006 and June 2007. Column 3 set the period from July 2008 and June 2009 as the placebo crisis period. The dependent variable is trade credit, which is calculated as accounts payable scaled by purchase. Accounting conservatism is measured with *C\_Score* developed by Khan and Watts (2009), and I take the three-year average of *C\_Score* before the sample period to mitigate measurement errors. The range of sample period includes the placebo crisis period and one year prior to the placebo crisis. *Crisis* is an indicator variable for the placebo crisis period, which equals one for the placebo crisis period, and zero for the year prior to placebo crisis period. Firm fixed effects are included in all the regressions to reduce unobserved heterogeneity and omitted variables problem, following Duchin et al. (2010). Standard errors are clustered at both firm and year-quarter levels, and T-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 1.5: Subsample analysis based on suppliers' information acquisition ability**

	Proportion of intermediate inputs to total outputs		Supplier-customer geographical distance	
	Low	High	High	Low
	(1)	(2)	(3)	(4)
Crisis	-0.007 (-0.25)	0.034* (1.75)	0.000 (0.01)	0.024 (0.99)
Crisis × Conservatism	-0.028 (-0.18)	-0.497** (-2.18)	-0.310 (-1.47)	-0.212* (-1.92)
Cash holding	0.188 (1.33)	-0.054 (-0.79)	-0.078 (-0.95)	0.222 (1.50)
Market share	-0.119 (-1.14)	0.049 (0.56)	0.014 (0.23)	-0.121 (-0.83)
Sales growth	-0.031 (-0.66)	-0.014 (-0.32)	-0.056* (-1.65)	-0.027 (-0.57)
Profit margin	0.011 (1.10)	0.009 (1.02)	0.020* (1.69)	0.009 (1.10)
Size	-0.022 (-0.99)	-0.010 (-0.18)	0.059 (1.59)	-0.075* (-1.80)
Market to book	0.003 (1.58)	-0.002 (-1.01)	-0.004* (-1.91)	0.003 (1.02)
Leverage	-0.007 (-0.90)	-0.071 (-1.01)	0.030** (2.52)	-0.102* (-1.73)
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	6430	6459	6457	6439
Adjusted R-squared	0.721	0.824	0.582	0.805
Difference in coefficient of Crisis × Conservatism		3.55 (0.029)		0.06 (0.594)

This table presents the subsample estimates based on suppliers' information acquisition ability. The dependent variable is trade credit, which is calculated as accounts payable scaled by purchase. Accounting conservatism is measured as the *C\_Score* developed by Khan and Watts (2009). The sample range from July 2006 to June 2008, and the post-crisis period is defined as between July 2007 and June 2008. Appendix A contains all variable definitions. Column 1 and 2 correspond to the subsamples analysis based on the proportion of intermediate inputs to total outputs. A higher proportion of intermediate inputs to total outputs implies suppliers have more opportunity to acquire customer firms' credit-worthiness. Column 3 and 4 correspond to subsamples analysis based on the geographical distance between an industry and its supply industries, which is measured as the proportion of an industry's total transportation cost for purchasing inputs to its total inputs value. A lower proportion of transportation cost implies closer geographical distance between a customer and its suppliers, and suppliers can more easily monitor customer firms. The data of each industry's inputs and transportation costs are collected from the Bureau of Economic Analysis (BEA) input-output *use* table (2002), the industry's outputs are from the BEA *make* table (2002). The industry classification is based on 6-digit BEA input-output industry code (2002). To test the difference in coefficient estimates for the interaction *Crisis* × *Conservatism*, the null hypothesis is that two subsamples have the same coefficient estimate on *Crisis* × *Conservatism*, and the

alternative hypothesis is that the coefficient estimate of *Crisis*×*Conservatism* in the left-hand-side subsample is lower than that of right-hand-side subsample. The  $\chi^2$  statistics and p-values are reported at the bottom of the table. All regressions include firm fixed effects to reduce unobserved heterogeneity and omitted variables problem, following Duchin et al. (2010). Standard errors are clustered at both firm and year-quarter levels, and T-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 1.6: Subsample analysis based on inputs liquidation possibility**

	Inputs liquidation possibility	
	Low (1)	High (2)
Crisis	-0.023 (-1.14)	0.047** (2.01)
Crisis × Conservatism	-0.013 (-0.15)	-0.610** (-2.03)
Cash holding	0.107 (0.74)	0.130 (0.58)
Market share	0.196 (0.90)	0.013 (0.14)
Sales growth	-0.020 (-0.41)	-0.013 (-0.27)
Profit margin	0.016 (1.52)	0.008 (0.97)
Size	-0.025 (-0.76)	0.044 (0.76)
Market to book	0.001 (0.78)	-0.001 (-0.28)
Leverage	0.107 (1.47)	0.006 (0.32)
Firm fixed effects	Yes	Yes
Observations	4275	4284
Adjusted R-squared	0.600	0.805
Difference in coefficient of Crisis × Conservatism		3.26 (0.035)

This table presents the subsample estimates based on the input liquidation possibility. The dependent variable is trade credit, which is calculated as accounts payable scaled by purchase. Accounting conservatism is measured as the *C\_Score* developed by Khan and Watts (2009), and I take three-year average between 2003 and 2005 to mitigate measurement errors. The sample ranges from July 2006 to June 2008, and the post-crisis period is defined as between July 2007 and June 2008. Appendix A contains all variable definitions. The liquidation possibility of an industry's inputs is measured following Nunn (2007). The standardized inputs that are sold on organized exchanges or reference priced in trade publications are more easily to liquidate, while the differentiated inputs are difficult to liquidate. Nunn (2007) identify an industry's inputs based on the BEA input-output *use* table (1999), and classification of differentiated inputs and standardized inputs is from Rauch (1999). To test the difference in coefficient estimate for interaction *Crisis* × *Conservatism*, the null hypothesis is that two subsamples have the same coefficient on *Crisis* × *Conservatism*, and the alternative hypothesis is that the coefficient of *Crisis* × *Conservatism* in the “low” input liquidation possibility subsample is smaller than that of “high” input liquidation possibility subsample. The  $\chi^2$  statistics and p-values are reported at the bottom of the table. All regressions include firm fixed effects to reduce unobserved heterogeneity and omitted variables problem, following Duchin et al. (2010). Standard errors are clustered at both firm and year-quarter levels, and T-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10%

levels, respectively.

**Table 1.7: Subsample analysis based on financing frictions**

	Kaplan-Zingales index		Line of credit		Suppliers' liquidity	
	Low (1)	High (2)	Yes (3)	No (4)	Low (5)	High (6)
Crisis	0.012 (0.71)	0.003 (0.14)	-0.001 (-0.05)	0.013 (0.53)	0.007 (0.29)	0.018 (0.83)
Crisis × Conservatism	0.018 (0.14)	-0.169*** (-2.86)	0.092 (0.93)	-0.277* (-1.74)	-0.234 (-1.29)	-0.269*** (-2.62)
Cash holding	0.264** (2.15)	-0.104 (-0.75)	-0.021 (-0.13)	0.109 (0.84)	0.051 (1.05)	0.130 (0.90)
Market share	-0.130 (-1.56)	-0.134** (-2.11)	-0.027 (-0.53)	-0.047 (-0.47)	-0.009 (-0.14)	-0.066 (-0.41)
Sales growth	-0.025 (-0.34)	-0.050 (-1.42)	-0.026 (-1.06)	-0.060 (-1.60)	-0.023 (-1.17)	-0.040 (-0.85)
Profit margin	0.007 (0.48)	0.015 (1.36)	-0.182* (-1.69)	0.013 (1.37)	0.015 (0.97)	0.011 (1.17)
Size	-0.079*** (-3.06)	0.025 (0.87)	0.009 (0.22)	0.014 (0.52)	-0.039 (-0.69)	-0.009 (-0.28)
Market to book	0.000 (0.45)	0.001 (0.80)	-0.001 (-0.29)	0.001 (0.40)	-0.001 (-0.29)	0.002 (0.60)
Leverage	-0.020 (-0.81)	0.010 (0.74)	0.013 (1.00)	0.008 (0.87)	-0.044 (-0.96)	-0.026 (-0.83)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6032	6029	2940	9128	6455	6426
Adjusted R-squared	0.701	0.804	0.817	0.761	0.716	0.776
Difference in coefficient of Crisis × Conservatism		2.13 (0.072)		3.48 (0.031)		0.00 (0.474)

This table presents the subsample estimates based on firms' financing frictions. The dependent variable is trade credit, which is calculated as accounts payable scaled by purchase. Accounting conservatism is measured as the C\_Score developed by Khan and Watts (2009), and I take three-year average between 2003 and 2005 to mitigate measurement errors. The sample ranges from July 2006 to June 2008, and the post-crisis period is defined as between July 2007 and June 2008. Column 1 and 2 correspond to subsamples analysis based on firms' financial constraints, which is measured as the Kaplan-Zingales index (Kaplan and Zingales, 1997) at the end of fiscal year 2005. A higher value of Kaplan-Zingales index represents the higher level of financial constraints. The coefficients of Kaplan and Zingales index are from Lamont et al. (2001). Column 3 and 4 correspond to subsamples analysis based on firms' access to bank line of credit. A firm is viewed as having access to bank line of credit if it contains bank line of credit and its cash flow is above the sample median in every year between 1996 and 2003. The dataset for firms' access to bank line of credit is from Sufi (2009). If a firm does not have access to bank line of credit, it usually faces more financing frictions. Column 5 and 6 correspond to subsample analysis based on supply industries' liquidity. A supply industry's liquidity is calculated as supply industry's ratio of total cash reserve to total assets at the last fiscal quarter ending before July 2006, following Garcia-Appendini and Montoriol-Garriga (2013). I identify an industry's supply industries based on the BEA input-output *use* table (2002). If a firm's supply industries hold a higher level of liquidity, then it is more likely

to receive trade credit. To test the difference in coefficient estimate on interaction *Crisis*×*Conservatism*, the null hypothesis is that two subsamples have the same coefficient estimate on *Crisis*×*Conservatism*, and the alternative hypothesis is that the coefficient estimate of *Crisis*×*Conservatism* in the left-hand-side subsample is lower than that of right-hand-side subsample. The  $\chi^2$  statistics and p-values are reported at the bottom of the table. All regressions include firm fixed effects to reduce unobserved heterogeneity and omitted variables problem, following Duchin et al. (2010). Standard errors are clustered at both firm and year-quarter levels, and T-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 1.8: Alternative proxies for conditional conservatism**

Panel A: Basu (1997) timeliness measure				
	Total sample	Higher suppliers' information acquisition ability	Higher input liquidation possibility	Higher financing frictions
	(1)	(2)	(3)	(4)
Crisis	-0.005 (-0.34)	0.006 (0.24)	-0.016 (-1.16)	-0.015 (-1.01)
Crisis × Conservatism	-0.009 (-1.44)	-0.024* (-1.80)	-0.011 (-1.53)	-0.017** (-1.99)
Cash holding	0.014 (0.16)	-0.067 (-0.30)	-0.082 (-1.36)	-0.304** (-2.36)
Market share	-0.003 (-0.03)	0.024 (0.20)	0.038 (0.33)	-0.114 (-1.22)
Sales growth	-0.013 (-0.42)	-0.011 (-0.26)	-0.017 (-1.02)	-0.074** (-2.52)
Profit margin	0.009 (1.63)	0.008 (1.26)	0.013*** (3.40)	0.019* (1.76)
Size	-0.043 (-1.00)	0.033 (0.53)	0.005 (0.13)	0.032 (1.06)
Market to book	0.000 (0.13)	-0.002 (-0.39)	-0.002 (-1.40)	-0.002 (-0.74)
Leverage	-0.074 (-1.46)	-0.046* (-1.71)	-0.029 (-0.65)	0.008 (0.65)
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	12946	4265	6263	5786
Adjusted R-squared	0.796	0.781	0.796	0.806
Panel B: Accumulated non-operating accruals				
	Total sample	Higher suppliers' information acquisition ability	Higher input liquidation possibility	Higher financing frictions
	(1)	(2)	(3)	(4)
Crisis	0.003 (0.16)	0.034 (1.45)	0.006 (0.27)	0.002 (0.10)
Crisis × Conservatism	-0.126 (-1.24)	-0.481** (-2.45)	-0.137** (-2.05)	-0.243*** (-3.12)
Cash holding	-0.000 (-0.00)	-0.092 (-0.34)	-0.045 (-0.42)	-0.214 (-0.96)
Market share	-0.010	-0.070	0.018	-0.009



	(-0.12)	(-1.06)	(0.23)	(-0.22)
Sales growth	-0.035	-0.021	-0.049	-0.050
	(-1.56)	(-0.81)	(-1.11)	(-1.46)
Profit margin	0.005	0.002	0.026*	0.011
	(1.15)	(0.24)	(1.76)	(1.35)
Size	-0.062	-0.031	-0.033	-0.017
	(-1.49)	(-1.02)	(-0.50)	(-0.53)
Market to book	0.001	0.001	-0.001	0.002
	(0.43)	(0.27)	(-0.16)	(0.81)
Leverage	-0.155*	-0.014	-0.096	0.002
	(-1.84)	(-0.62)	(-1.13)	(0.16)
Firm fixed effects	Yes	Yes	Yes	Yes
Observations	6920	2322	3336	3133
Adjusted R-squared	0.814	0.880	0.816	0.869

This table presents the regression estimates using the alternative proxies for accounting conservatism. Panel A uses Basu timeliness measure as the proxy for conservatism (Basu, 1997), which is based on the firm-specific time-series regression between 1996 and 2005 (with minimum of 7 years of observations). Panel B uses the accumulated non-operating accruals as the proxy for conservatism (Givoly and Hayn, 2000), which is calculated as the accumulated non-operating accruals between 2003 and 2005, scaled by the accumulated total assets, and multiply by negative one. A higher value of Basu timelines measure or accumulated non-operating accruals represents a higher level of accounting conservatism. The dependent variable is trade credit, which is calculated as accounts payable scaled by purchase. The sample ranges from July 2006 to June 2008, and the post-crisis period is defined as between July 2007 and June 2008. Column 1 use the total sample, Column 2 uses the subsample with higher suppliers' information acquisition ability, which is measured as the proportion of total intermediate inputs to total outputs. Column 3 uses the subsample with higher input liquidation possibility. Column 4 uses the subsample with higher financing frictions, which is measured as the Kaplan-Zingales index. All regressions include firm fixed effects to reduce unobserved heterogeneity and omitted variables problem, following Duchin et al. (2010). Standard errors are clustered at both firm and year-quarter levels, and T-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 1.9: Subsample analysis based on customers' bargaining power**

	Industrial competition (Compustat)		Industrial competition (Census)		Industrial competition (Hoberg&Phillips, 2010)	
	High	Low	High	Low	High	Low
	(1)	(2)	(1)	(2)	(1)	(2)
Crisis	-0.011 (-0.46)	0.036* (1.77)	0.011 (0.53)	0.009 (0.34)	0.013 (0.49)	0.013 (0.75)
Crisis × Conservatism	0.013 (0.14)	-0.540*** (-2.63)	0.032 (0.21)	-0.603 (-1.34)	-0.192 (-1.23)	-0.335* (-1.67)
Cash holding	0.147 (1.16)	0.013 (0.14)	0.071 (0.47)	-0.397** (-2.51)	0.240* (1.75)	-0.161*** (-2.70)
Market share	-0.092 (-0.59)	0.009 (0.12)	0.001 (0.01)	0.058 (0.19)	0.389 (1.02)	0.016 (0.18)
Sales growth	-0.041 (-0.92)	-0.026 (-0.52)	0.061 (1.02)	-0.107*** (-2.80)	-0.036 (-0.72)	-0.042*** (-2.87)
Profit margin	0.012 (1.13)	0.010 (0.78)	-0.009 (-0.82)	0.015 (1.21)	0.013 (1.50)	-0.058 (-1.07)
Size	-0.006 (-0.27)	-0.030 (-0.61)	-0.038 (-1.28)	0.102 (1.41)	-0.089** (-2.33)	0.061 (1.55)
Market to book	0.001 (0.52)	-0.000 (-0.02)	0.001 (0.22)	0.001 (0.22)	0.002 (1.20)	-0.002 (-0.78)
Leverage	0.002 (0.22)	-0.087 (-1.22)	0.006 (0.47)	0.026 (0.54)	-0.117** (-1.98)	0.028** (1.99)
Firm fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	6614	6616	3395	3393	6010	6020
Adjusted R-squared	0.646	0.855	0.690	0.575	0.778	0.680
Difference in coefficient on Crisis × Conservatism		9.09 (0.002)		1.49 (0.111)		0.14 (0.355)

This table presents the subsample estimates based on customers' bargaining power. The bargaining power is measured as customer industry's product market competition level prior to July 2006. A firm that operates in a less competitive industry usually has a higher level of bargaining power. Column 1 and 2 use the Compustat based Herfindal-Hirschman Index (HHI) to measure industry competition, and it is calculated using the largest 50 firms in each 4-digit standard industrial classification (SIC) industries at the end of 2005. Column 3 and 4 use the U.S. census based HHI in 2002, which is from Ali et al. (2009). Column 5 and 6 use the fitted HHI from Hoberg and Phillips (2010). The dependent variable is trade credit, which is calculated as accounts payable scaled by purchase. Accounting conservatism is measured as the C\_Score developed by Khan and Watts (2009), and I take three-year average between 2003 and 2005 to mitigate measurement errors. The sample ranges from July 2006 to June 2008, and the post-crisis period is defined as between July 2007 and June 2008. To test the difference in coefficient estimate for interaction *Crisis*×*Conservatism*, the null hypothesis is that two subsamples have the same coefficient estimate for *Crisis*×*Conservatism*, and the alternative hypothesis is that the coefficient estimate of *Crisis*×*Conservatism* in the "high" competition subsample is smaller than that of "low" competition subsample. The  $\chi^2$  statistics and p-values are reported at the bottom of the table. All regressions include firm fixed effects to reduce unobserved heterogeneity and omitted variables problem, following Duchin

et al. (2010). Standard errors are clustered at both firm and year-quarter levels, and T-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

## ***2. Do Suppliers Value Socially Responsible Customers?***

### **2.1 Introduction**

Corporate social responsibility (CSR) has become an increasingly important part of business operation in recent years. Many firms around the world invest resources into socially responsible activities.<sup>11</sup> Governments, non-governmental organizations, and educational institutions also advocate the importance of CSR.<sup>12</sup> However, the merits of CSR activities are still in debate.

Previous studies mainly address two viewpoints on the merits of CSR activities. Some researchers argue that CSR activities can improve firms' financial performance, referring to the phrase "doing well by doing good" (Bae, Kang, and Wang, 2011; Edmans, 2011; Goss and Roberts, 2011; Deng, Kang, and Low, 2013).<sup>13</sup> In contrast, another stream of studies attribute CSR activities to the outcome of agency conflict and managerial entrenchment (Pagano and Volpin, 2005; Surroca and Tribó, 2008; Cronqvist et al., 2009; Di Giuli and Kostovetsky, 2014), that is, managers could engage in CSR activities at the expense of shareholders' wealth.

It is worth to note that, most prior studies investigate CSR activities from the perspective of shareholders or debt holders. However, non-financial stakeholders could also respond to firms' CSR activities. In this paper, we address one specific non-financial stakeholder, suppliers. We investigate suppliers' response to customer firms' CSR activities by examining

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<sup>11</sup> According to a survey by *The Economist*, corporate social responsibility (CSR) is rising sharply in corporate executives' priorities. For more details, see <http://www.economist.com/node/10491077#sthash.Z1yWMJdj.dpbs>.

<sup>12</sup> For instance, the Global Compact (UNGC) and Industrial Development Organization (UNIDO) of United Nations encourage firms to adopt socially responsible policies. For more details, see <http://www.unglobalcompact.org/> and <http://www.unido.org/>. Many business schools, such as Harvard Business School, also incorporate corporate social responsibility (CSR) into their executive education programs, see <http://www.exed.hbs.edu/programs/csr/Pages/default.aspx>.

<sup>13</sup> For instance, previous studies find that CSR activities have a positive influence on shareholder value (e.g., Jiao, 2010; Edmans, 2011; Deng, Kang, and Low, 2013), financing contracts (e.g., Goss and Roberts, 2011; Kim, Surroca, and Tribó, 2014), and firm risk (e.g., Bae, Kang, and Wang, 2011; Bouslah, Kryzanowski, and M'Zali, 2013).

whether socially responsible customers are more likely to receive trade credit from suppliers.

Trade credit is offered by suppliers accompanied with product market transactions. When a customer firm purchases goods on credit from suppliers, it records accounts payable (AP) in the balance sheet. Trade credit is an important financing substitute other than bank loans and equity financing (Petersen and Rajan, 1997; Burkart and Ellingsen, 2004). Since trade credit usually has short maturity,<sup>14</sup> it is especially helpful for firms to overcome liquidity constraints (Wilner, 2000; Cuñat, 2007; Garcia-Appendini and Montoriol-Garriga, 2013).<sup>15</sup>

We expect that suppliers are more willing to provide trade credit to socially responsible customers because of two reasons: First, CSR activities are highly valued by individual consumers, therefore socially responsible firms are usually rewarded with high revenue growth (Lev, Petrovits, and Radhakrishnan, 2010; Jiao, 2010). By providing trade credit to socially responsible customers, suppliers can build good customer-supplier relationship and capture future business.

Second, socially responsible firms accumulate social capital through CSR activities, which provide “insurance-like” protection and make it less fragile for unexpected external shock (Godfrey, Merrill, and Hansen, 2009).<sup>16</sup> By providing trade credit to socially responsible customers, suppliers are less likely to face significant default risk and cash flow

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<sup>14</sup> The duration of trade credit is between one month and four months. Ng, Smith, and Smith (1999) describe a typical trade credit contract “2-10 net 30”, they interpret it as “the net or full purchase price is due in 30 days, and a 2% discount is obtained if payment occurs within 10 days after the sales”. Klapper, Laeven, and Rajan (2012) summarize 30,000 trade credit contracts from 56 large customers, they find the average duration is two months, and the maximum duration is four months.

<sup>15</sup> In our sample between 2004 and 2010, accounts payable accounts for almost 60% of total purchase, which implies that trade credit is an important financing tool for short-term liquidity. It is worth to note that, trade credit become more important during the liquidity shock. For instance, Garcia-Appendini and Montoriol-Garriga (2013) find cash-rich suppliers provide more trade credit to their customer firms during the 2007-2009 financial crisis.

<sup>16</sup> Furthermore, socially responsible firms care more about the long term interests of stakeholders, consequently these firms usually take less risk in the business operation (Bae, Kang, and wang, 2011; Bouslah, Kryzanowski, and M’Zali, 2013).

losses.

We employ a customer-supplier pairs sample of U.S. firms to test whether socially responsible customers receive more trade credit.<sup>17</sup> The sample ranges from 2004 through 2010. Customers' social performance is proxied by the CSR rating score in the Kinder, Lydenberg, and Domini (KLD) database (now part of MSCI).<sup>18</sup> Customers' trade credit (accounts payable) and other controlling variables are collected from Compustat quarterly industry file.

We find evidence that socially responsible customers are more likely to receive trade credit from suppliers. The above finding still holds after controlling for the characteristics of both suppliers and customers. We also use instrumental variable regression and propensity score matching to address the endogeneity concern, the results are qualitatively similar.

To explore the underlying mechanism, we further test the moderating role of customer industry's consumer perception and supplier's risk exposure, respectively. The results show that, when a socially responsible customer operates in an industry with high level of consumer perception, or when its supplier is exposed to high level of risk in the customer-supplier relationship, the customer is likely to receive more trade credit.

We also investigate customers' trade credit during the 2007-2009 global financial crisis. The results show that, when a socially responsible customer is less financially constrained, it uses less trade credit during the financial crisis. The above finding suggests that, socially responsible customers also provide support to their suppliers when the latter face liquidity

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<sup>17</sup> The customer-supplier pairs sample allows us to control for the characteristics of both suppliers and customers, which alleviate endogeneity concern stemming from omitted variables.

<sup>18</sup> This database has been widely used in previous studies, such as Jiao (2010), Bae, Kang, and Wang (2011), Deng, Kang, and Low (2013), and Di Giuli and Kostovetsky (2014).

shock.

This paper contributes to the ongoing debate on CSR activities. Previous studies investigate CSR activities mainly from the perspective of financial stakeholders (Jiao, 2010; Edmans, 2011; Deng, Kang, and Low, 2013). Our study shows that suppliers, as non-financial stakeholders, also respond to customer firm's CSR activities by offering trade credit. Therefore, socially responsible customers can obtain extra benefits from suppliers, which is consistent with the phrase "doing well by doing good".

Our paper also contributes to the studies on the determinants of trade credit. Previous studies identify several determinants of trade credit, such as credit worthiness, financial constraint, growth opportunity, and market power.<sup>19</sup> Our study shows that firms' social performance is another factor that affects trade credit, which further deepens our understanding on trade credit.

The remainder of our paper proceeds as follows. Section 2 develops the hypotheses. Section 3 introduces the sample, methodology, variables, and summary statistics. Section 4 reports the main regression results. Section 5 tests the underlying mechanisms. Section 6 presents the additional analyses. Section 7 concludes.

## **2.2 Hypotheses development**

We expect that suppliers are more willing to provide trade credit to socially responsible customers. We propose the hypothesis based on two arguments, they are suppliers' incentive to capture future business and their risk management concern, respectively.

### *2.1 Suppliers' incentive to capture future business*

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<sup>19</sup> Petersen and Rajan (1997), Giannetti, Burkart, and Ellingsen (2011), and Klapper, Laeven, and Rajan (2012) provide extensive review of existing theories of trade credit.

Previous studies find socially responsible firms are usually rewarded with high revenue growth and firm value. Using a sample of charitable contributions by U.S. firms, Lev, Petrovits, and Radhakrishnan (2010) find corporate philanthropy is significantly associated with future revenue growth, and they attribute the above finding to the increased customer satisfaction. Using the dataset from KLD database, Jiao (2010) finds socially responsible firms tend to have higher firm value.

A supplier's future performance, to a large extent, depends on the growth of its major customers. Promising customers with high growth rate are the source of future business for suppliers. Petersen and Rajan (1997) even argue that suppliers hold "implicit equity stake" over customers. Therefore, considering the high growth rate associated with CSR activities, suppliers have incentive to build long-term relationship with socially responsible customers.

Offering trade credit can be an effective way for a supplier to build good relationship with its customers (Wilner, 2000). Kim and Shin (2012) argue that trade credit work as the "glue" to tie firms together in the customer-supplier relationship. Taken together, we expect that, suppliers are more willing to provide trade credit to socially responsible customers, as a way to capture future business.

## *2.2 Suppliers' risk management concern*

The major customers not only draw growth opportunity to suppliers, but also make suppliers exposed to potential risk. The unexpected shock to a customer has direct impact on its suppliers (Hertzel et al., 2008; Raddatz, 2010). Hertzel et al. (2008) analyze the transmission of bankruptcy along the customer-supplier relationship. They find that, when a customer declares bankruptcy, its suppliers are also negatively affected.



Trade credit plays an importance role in the transmission of a shock along the customer-supplier relationship. Since a supplier cannot force its customers to repay debt during bankruptcy, the use of trade credit significantly amplify the transmission of a shock along the supply chain (Kiyotaki and Moore, 1997; Raddatz, 2010).

Furthermore, a supplier also has direct incentive to reduce its credit risk when offering trade credit to its customers (Petersen and Rajan, 1997; Klapper, Laeven, and Rajan, 2012).<sup>20</sup> Although, compared to other debt holders, suppliers can evaluate and monitor the credit risk of customers with relatively lower costs (Biais and Gollier, 1997; Petersen and Rajan, 1997; Burkart and Ellingsen, 2004), they are unable to completely eliminate it.

CSR activities can provide firms with “insurance-like” protection over negative events. Godfrey, Merrill, and Hansen (2009) argue that, by engaging in socially responsible activities, a firm can improve its social capital, and send signal to outside stakeholders. Once suffering from negative events, the socially responsible firms would be less penalized by stakeholders.<sup>21</sup> Kim, Li, and Li (2014) also find that a firm’s social performance can mitigate the stock price crash risk, which is consistent with the argument of “insurance-like” protection.

Therefore, by offering more trade credit to socially responsible customers, a supplier can reduce the risk in the customer-supplier relationship. Summarizing the above two arguments, we propose the following hypothesis:

**H1:** *Socially responsible customers are more likely to receive trade credit from*

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<sup>20</sup> Petersen and Rajan (1997) find suppliers provide more trade credit to credit worthy customers. Klapper, Laeven, and Rajan (2012) also find suppliers consider the credit risk of customers when providing trade credit.

<sup>21</sup> Furthermore, socially responsible firms also take less risk. For instance, Bae, Kang, and Wang (2011) find that, firms that credibly commit to satisfy stakeholders’ interests usually maintain lower financial leverage to reduce risk.

*suppliers.*

## **2.3 Research design**

### *2.3.1 Sample*

Our baseline sample (or the whole KLD sample) includes all the non-financial, U.S.-incorporated firms covered by KLD database and Compustat industry quarterly file between 2004 and 2010. We further collect supplier information from Compustat segment file to construct the customer-supplier pairs sample.

KLD database provides extensive rating for firms' social performance based on various information sources, including corporate filings, government data, non-governmental organization data, and media sources. In 1991, it initially covers 650 firms that comprise Standard & Poor's 500 index and KLD 400 social index. Since 2003, it expands to the 3000 largest U.S. public firms. Selecting 2004 as starting point can provide more variation for the social performance across firms.<sup>22</sup>

We collect trade credit and firm characteristics from Compustat industry quarterly file. Trade credit has short maturity (Ng, Smith, and Smith, 1999; Klapper, Laeven, and Rajan, 2012).<sup>23</sup> Therefore, quarterly observations can better capture the evolution of trade credit. Following prior literature, we exclude the firms with negative value of sales or total assets, those total assets are less than 10 Million US dollars, those market value are less than 50 Million US dollars, and those with missing value of accounts payable. The resulting baseline sample consists of 41121 firm-quarter level observations, corresponding to 2502 unique firms.

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<sup>22</sup> We lag the observations in KLD database by one year to ensure suppliers can observe customer firms' social performance. Consequently, the final sample corresponds to the observations in KLD database between 2003 and 2009.

<sup>23</sup> Klapper, Laeven, and Rajan (2012) find the average duration of trade credit are around 60 days, and the maximum duration are 120 days. Ng, Smith, and Smith (1999) also document a typical trade credit contract with 30 days of duration.

Based on the Compustat segment file, we further construct the customer-supplier pairs sample, which enables us to control for suppliers' characteristics. The Statement of Financial Accounting Standard No. 131 requires firms to disclose the major customers whose purchase exceed 10% of the firms' sales revenue.<sup>24</sup> By inverting the Compustat segment file, we can identify a firm's supplier, who reports the firm as a major customer.<sup>25</sup> The resulting customer-supplier pairs sample includes 8825 pair-quarter level observations, corresponding to 1006 customer-supplier pairs and 281 customer firms.

### 2.3.2 Methodology

To test whether socially responsible firms receive more trade credit, our regression specification is written as follows:

$$AP_{it} = \beta_0 + \beta_1 CSR_{it^*-1} + \beta_2 Control_{it} + \alpha_{ind,i} + \alpha_t + \varepsilon_{it}. \quad (1)$$

In equation (1),  $AP_{it}$  refers to the trade credit that firm  $i$  use at the end of quarter  $t$ , which is measured as the accounts payable scaled by purchase (AP/Purchase).<sup>26</sup>  $CSR_{it^*-1}$  refers to firms  $i$ 's social performance, which is lagged one year to ensure supplier can observe customer firms' social performance. If the hypothesis H1 holds, coefficient  $\beta_1$  should be positive.

We also include the controls that could influence trade credit. Previous studies explore the possible determinants of trade credit, they include firms' credit worthiness (Petersen and Rajan, 1997), financial constraint (Cuñat, 2007), growth opportunity (Petersen and Rajan,

<sup>24</sup> Some firms voluntarily disclose some small customers even if these customers' purchase account for less than 10% of the firms' sales revenue. To ensure comparability, we only use the major customers that meet the threshold of 10%.

<sup>25</sup> The reported customers' names in the Compustat segment file are usually abbreviated. Following Fee and Thomas (2004), we use an algorithm and manually check combined method to identify the major customers. First, we find four possible matches between the reported customers and the historical names of Compustat firms. Then, we manually check their name, industry, and business description to choose the most possible match. In some cases, firms report the name of subsidiaries rather than the holding firms. We employ LexisNexis Academic Universe Search to identify whether the reported customers are the wholly subsidiaries of Compustat firms.

<sup>26</sup> Here *purchase* is calculated as cost of goods sold (COGS) plus the change of inventory. To ensure robustness, we also use accounts payable scaled by cost of goods sold (AP/COGS) as an alternative measure.

1997), and market power (Giannetti, Burkart, and Elingsen, 2011; Klapper, Laeven, and Rajan, 2012).

Trade credit usually follows industry practice (Petersen and Rajan, 1997; Ng, Smith, and Smith, 1999), so we include industry fixed effect ( $\alpha_{ind,i}$ ) to control for the time invariant industrial factors. Trade credit also changes over time (Love, Preve, and Sarria-Allende, 2007), so we include quarter fixed effect ( $\alpha_t$ ) to control for the time varying unobservable factors.

Because trade credit is jointly determined by the characteristics of suppliers and customers, omitting characteristics of suppliers could draw endogeneity problem. The customer-supplier pairs sample allows us to further control for the characteristics of suppliers.<sup>27</sup> The resulting regression specification can be written as

$$AP_{it} = \beta_0 + \beta_1 CSR_{it-1} + \beta_2 Control_{it} + \beta_3 Control_{jt} + \alpha_{ind,i} + \alpha_{ind,j} + \alpha_t + \varepsilon_{ijt}, \quad (2)$$

where  $Control_{jt}$  refers to the controls for supplier  $j$  at quarter  $t$ . We also control for supplier  $j$ 's industry fixed effect  $\alpha_{ind,j}$ .

### 2.3.3 Variables

We use the CSR score in KLD database to proxy for firms' social performance. KLD database evaluates firms' social performance based on seven dimensions: community, diversity, corporate governance, employee relations, environmental protection, human rights, and product quality. Each dimension includes a number of indicators, which is assigned either zero or one according to firms' social performance. Following previous literature, we use six

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<sup>27</sup> It is worth to note that, one customer could have several suppliers, but we can only observe one aggregated trade credit variable for each customer firm, it is actually assuming that a customer receives the same proportion of trade credit from all of its suppliers.

dimensions excluding corporate governance to calculate the CSR score.<sup>28</sup>

Since the number of indicators in each dimension varies across years, we follow Bouslah, Kryzanowski, and M'Zali (2013) and Deng, Kang, and Low (2013) to calculate the CSR score as the ratio of strengths values to the number of strengths indicators. We first calculate the CSR score for each dimension, and then add up to obtain the total CSR score.

Our main controlling variables include credit worthiness, financial constraint, growth opportunity, and market power. We introduce the proxies for these controlling variables in detail.

The proxies for credit worthiness include firm size, leverage, asset tangibility, cash holding, profit margin, and the probability of financial distress. We use Altman (1968) Z-score to proxy for the probability of financial distress, the coefficients are based on Mackie-Mason (1990). A higher value of Z-score represents less probability of financial distress.

We use Kaplan and Zingales (1997) index as the proxy for financial constraints. The coefficients are from Lamont, Polk, and Saa-Requejo (2001). Here a higher value of Kaplan-Zingales index represents higher level of financial constraint.

Firms' growth opportunity is proxied by sales growth and Tobin's Q. We calculate firms' sales growth by comparing with the same quarter of last year. A firm's market power is proxied by the firm's market share. We calculate a firm's market share based on 3-digit Standard Industrial Classification (SIC) code.

For asset tangibility, Altman Z-Score, and Kaplan-Zingales index, because quarterly

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<sup>28</sup> Di Giuli and Kostovesky (2014) employ the same method. We also use all the seven dimensions (Deng, Kang, and Low, 2013) and five dimensions excluding human rights (Jiao, 2010) as robustness check, the results are similar.

observations are not available, we replace with annual observations. To avoid distortion of outliers, we winsorize all the dependent variable and control variables at the 1% and 99% level.

#### *2.3.4 Summary statistics*

Table 2.1 presents the summary statistics for the main variables. Panel A reports the statistics for the whole KLD sample firms. The mean value of trade credit (AP/Purchase) for the sample firms is 0.574. The mean CSR score is 0.169. Panel B reports statistics for the customer variables in the customer-supplier pairs sample. The statistics for trade credit are similar to that of whole KLD sample. The average CSR score in the customer-supplier pairs sample is 0.714, which is higher than that of whole KLD sample. This could be because most customers in the customer-supplier pairs sample are big firms, which are more likely to invest in CSR activities.

[Insert Table 2.1 about here]

Suppliers and customers in the pairs sample show significant difference. The customers are usually bigger than their suppliers, they have higher market share and more tangible assets, but the sales growth rate and Tobin's Q of customers are much lower. Furthermore, the Altman Z-score of customers is higher, indicating that customers have less probability of financial distress. It is also interesting to find that customers hold less cash and have higher level of financial constraints.<sup>29</sup>

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<sup>29</sup> We also check the statistical significance of the common variables in the customer-supplier pairs sample, all the T-statistics are significant.

## 2.4 Main results

### 2.4.1 Base results: Customers' social performance and trade credit

We first use the whole KLD sample to examine whether socially responsible customer receive more trade credit. Column 1 of Table 2.2 reports the estimated results of univariate regression, the coefficient estimate of CSR score is 0.156, which is statistically significant at the 1% level. After including more controls in column 2-4, the coefficient estimates of CSR score are similar. The positive coefficient estimates suggest that socially responsible customers receive more trade credit, which is consistent with our hypothesis.

[Insert Table 2.2 about here]

We further check the economic significance of our coefficient estimates. Column 4 of Table 2.2 includes all the controls, and the coefficient estimate of CSR score is 0.141. This coefficient implies that one standard deviation increase of CSR score (0.296, see table 2.1) raises the quarterly accounts payable by 4.17% ( $=0.141 \times 0.296$ ). On annual basis, it raises accounts payable by 16.68%, which is economically significant.<sup>30</sup>

The coefficients of control variables are consistent with our predictions. Firm size, asset tangibility, cash holding, and profit margin have positive coefficients, indicating that credit worthy firms receive more trade credit. The coefficient of Kaplan-Zingales index is negative. Since a higher value of Kaplan-Zingales index represents higher level of financial constraint, the above finding is also consistent with the credit worthiness argument.

However, the coefficient of leverage is positive, and the coefficient of Altman Z-score is

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<sup>30</sup> We also compare the economic significance of CSR score with that of control variables. Among all the controls, only Altman Z-score has higher economic significance than CSR score. The change of accounts payable corresponding to one standard deviation increase of size, leverage, asset tangibility, cash holding, market share, sales growth rate, profit margin, Tobin's Q, Altman Z-score, and Kaplan-Zingales index are 3.57%, 0.51%, 3.93%, 3.28%, 2.56%, 0.88%, 1.33%, 1.71%, 7.83%, and 3.04%, respectively. The above results suggest that, compared to other controls, firms' social performance has more significant influence.

negative, which is different from our predictions. Since higher Altman Z-score represents lower probability of financial distress, the above finding suggest that suppliers are likely to offer trade credit to temporarily financially distressed customers, which is consistent with the findings of Wilner (2000) and Love, Preve, and Sarria-Allende (2007).

The coefficients of Tobin's Q are positive, indicating suppliers are willing to provide trade credit to customer with growth opportunity. The coefficients of firm market share are negative, meaning that the customers with higher market share use less trade credit. This could be because the customers with higher market power usually have enough cash to pay for the purchase from suppliers.

#### *2.4.2 Customers' social performance and trade credit controlling for suppliers' characteristics*

Without supplier controls, our regression specifications is subject to omitted variables concerns, which make it difficult to draw correct statistical inference. Employing the customer-supplier pairs sample, we can further control for suppliers' characteristics.

Table 2.3 reports the estimated results. Column 1 is a univariate regression based on the customer-supplier pairs sample, the coefficient estimate of customers' CSR score is 0.099. Column 2 includes customer controls, the coefficient estimate of customers' CSR score is 0.156, which is statistically significant. The above findings are similar to that of the whole KLD sample, and it suggests that the customer-supplier pairs sample is not subject to serious sample selection problem.

[Insert Table 2.3 about here]

In column 3, we further add supplier controls, and the estimated results are very robust. The coefficient estimate of customers' CSR score is 0.146, which is statistically significant at



the 1% level. This coefficient implies that, one standard deviation increase of CSR score (0.643, see table 2.1) in the customer-supplier pairs sample raises the quarterly accounts payable by 9.39% ( $=0.146*0.643$ ). On annual basis, it raises accounts payable by 37.56%, which is double of economic effect in the whole KLD sample.

## **2.5 Mechanisms**

In section 2, we propose the main hypothesis based on two arguments: suppliers' incentive to capture future business and suppliers' risk management concern, respectively. These two arguments actually imply two different mechanisms. In this section, we will discuss their empirical implications and test the underlying mechanisms.

### *2.5.1 Suppliers' incentive to capture future business*

Since consumers perceive and value firms' CSR activities, socially responsible firms usually achieve higher sales growth (Lev, Petrovits, and Radhakrishnan, 2010; Servaes and Tamayo, 2013). Therefore, when a socially responsible customer firm operates in an industry with high level of consumer perception, it would be highly rewarded by its consumers and suppliers. Consequently, we predict it would receive more trade credit from suppliers. To empirically test the above prediction, we introduce the interaction of customer firms' CSR and consumer perception. If our prediction holds, we would observe a positive coefficient of the interaction term.

We use two proxies for consumer perception. The first proxy is an indicator variable for individual consumer predominant industry, which takes the value of one if a firm operates in an individual consumer predominant industry, and zero otherwise. Compared to industry buyers, individual consumers are more sensitive to firms' CSR activities and social image

(Lev, Petrovits, and Radhakrishnan, 2010). We follow Sharpe (1982) to classify the individual consumer predominant industry.

The second proxy for consumer perception is an indicator variable that takes the value of one if the firm's advertising intensity is above the sample median, and zero otherwise. If an industry has a higher level of consumer perception, it tends to invest more on advertisement (Fisman, Heal, and Nair, 2006; Servaes and Tamayo, 2013). We first calculate the firm-level advertising intensity as the scaled advertising expenses by sales revenue, and then calculate the industry median advertising intensity.

Table 2.4 reports the estimated results.<sup>31</sup> The first two columns use the indicator of individual consumer predominant industry as the proxy for consumer perception, the last two columns use advertising intensity as proxy. All the coefficient estimates of interaction terms are significantly positive, which is consistent with our prediction. The above findings suggest that suppliers' incentive to capture future business is an underlying mechanism, through which customer firms' social performance influence trade credit.

[Insert Table 2.4 about here]

### 2.5.2 Suppliers' risk management concern

The second argument is based on suppliers' risk management concern. To reduce credit risk and potential cash flow losses, suppliers provide more trade credit to socially responsible customers. It is natural to predict that, when a supplier is exposed to higher level of risk in the customer-supplier relationship, it values more its customers' social performance. To test the above prediction, we introduce the interaction of customer firms' social performance and

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<sup>31</sup> Because our proxies for *consumer perception* are industry-level variables, we exclude customers' industry fixed effects from all specifications to avoid potential multi-collinearity problem.

suppliers' risk exposure in the customer-supplier relationship. If the prediction holds, the coefficient estimates of interaction term should be positive.

We use two proxies for suppliers' risk exposure in the customer-supplier relationship. The first proxy is customer firms' industry competition level. If a customer operates in a highly competitive industry, it is more likely to face unexpected bankruptcy risk. The industry competition level is measured as the Herfindal-Hirschman index (HHI) calculated based on Compustat firms in the 4-digit SIC code. To ensure robustness, we also use the census-based HHI in Ali, Klasa, and Yeung (2009), the results are qualitatively similar.

The second proxy is customer importance in the customer-supplier relationship. In the customer-supplier pairs sample, a customer's importance for its supplier is measured as the supplier's sales proportion to this customer. Higher sales proportion implies the supplier depends more on the customer. In the whole KLD sample, a customer's importance is proxied by whether the customer is reported as a major customer in the Compustat segment file. If a customer is reported as a major customer in the correspondent period, this customer can be viewed as an important customer for its suppliers.

Table 2.5 reports the estimated results. The first two columns use customers' industry competition as proxy. The last two columns use customer importance as proxy. The coefficient estimates of interaction terms in all the four columns are significantly positive. The results mean that, when suppliers are exposed to high level of risk in the customer-supplier relationship, the customers' social performance has more pronounced influence on trade credit. The above findings suggest that, suppliers' risk management concern is another underlying mechanism for the relationship between customers' social

performance and trade credit.

[Insert Table 2.5 about here]

## **2.6 Additional analyses**

### *2.6.1 Endogeneity issue*

Our main regression might be subject to reverse causality concern and omitted variables bias, which draw potential endogeneity issue. First, the customers that receive trade credit could have more resources to invest in CSR activities, resulting in reverse causality concern. Second, some unobservable characteristics that are related to firms' social performance might be omitted in our regression, which could make our coefficient estimates biased.

In this section, we adopt instrumental variable regression (or two-stage least square regression) and propensity score matching to alleviate the endogeneity concerns. We choose two instrumental variables for firms' social performance.

The first instrumental variable is firms' external political environment. Di Giuli and Kostovetsky (2014) find that, the U.S. firms that are more influenced by the Democratic Party are more likely to engage in CSR activities. Following Di Giuli and Kostovetsky (2014), we define a firm's external political environment as the proportion of votes received by the Democratic candidate for president in election 2012 (i.e., Barack Obama) in the state where the firm is headquartered.

The second instrumental variable is the industry median social performance. This instrumental variable is already used in previous studies (e.g., El Ghoul et al., 2011). To obtain more variation of observations, we calculate the industry median CSR score based on the whole KLD sample rather than the customer-supplier pairs sample.

The results for instrumental variable regression are reported in Table 2.6. The regression results are qualitatively similar to that of our main regressions. The coefficients of instrumented social performance are a little bigger, but they are still statistically significant at the 1% level. The above findings suggest that our main regression results are not subject to serious endogeneity concern.

[Insert Table 2.6 about here]

We also use propensity score matching (PSM) to alleviate the endogeneity problem. We first partition the sample into high CSR group and low CSR group based on the sample median CSR score. Then, we calculate the predicted propensity score, and identify the matched firm in the high CSR group for each firm in the low CSR group.

Table 2.7 reports the results. In the whole KLD sample, the average trade credit of high CSR group is 0.597, while that of low CSR group is 0.562, and the difference 0.035 is statistically significant with the P-value of 0.054. The results based on the customer-supplier pairs sample are also similar. The above findings suggest that, compared to low CSR group, the high CSR group receives more trade credit.

[Insert Table 2.7 about here]

### *2.6.2 The influence of social performance during the 2007-2009 financial crisis*

In this sub-section, we investigate whether socially responsible customers use more trade credit during the financial crisis. Following Duchin, Ozbas, and Sensoy (2010), we analyze using the difference-in-difference (DID) approach. The variable of interest is the interaction of customers' social performance and crisis indicator. The sample ranges from the third quarter of 2005 to the second quarter of 2008. The crisis period is defined as the period

from the third quarter of 2007 to the second quarter of 2008. Firms' social performance is measured at the end of year 2005.<sup>32</sup>

Panel A of Table 2.8 reports the estimated results for the total sample. The coefficients of interaction terms are significantly negative in all specifications, which imply that socially responsible customers use less trade credit during the financial crisis.

[Insert Table 2.8 about here]

To further explore the underlying rationale, we partition the whole KLD sample into two sub-samples based on firms' financial constraint.<sup>33</sup> We use four proxies for financial constraint, including Kaplan-Zingales index (Kaplan and Zingales, 1997), Whited-Wu index (Whited and Wu, 2006), Size-Age index (Hadlock and Pierce, 2010), and bank line of credit (Sufi, 2009). The results show that, when a socially responsible customer is *less* financially constrained (Panel B), it uses significantly less trade credit. However, when it is *more* financially constrained (Panel C), its trade credit doesn't show significant changes during the financial crisis.

### 2.6.3 Results for different CSR dimensions and industries

The CSR score is calculated based on six dimensions of CSR rating in the KLD database. In this section, we regress over each CSR dimension to compare their relative importance. The estimated results are reported in Panel A of Table 2.9. Among the six dimensions, five dimensions including *community*, *diversity*, *environmental protection*, *human rights*, and *product quality* have significant influence on trade credit. However, the coefficient estimate

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<sup>32</sup> Firm fixed effects are included in the specifications for the whole KLD sample, pair fixed effects are included in the specifications for the customer-supplier pairs sample.

<sup>33</sup> The difference-in-difference approach requires balanced panel observations. As a result, our sample observations are significantly reduced. Therefore, in the sub-sample regressions of Panel B and Panel C, we only use the whole KLD sample rather than the customer-supplier pairs sample.

of *employee relationship* is not statistically significant, although it is positive.

We also examine the influence of firms' social performance in different industries. Based on the Fama-French five industries classification, we partition the whole KLD sample into five sub-samples.<sup>34</sup> Firms' social performance show significant influence on trade credit in the industry *consumer goods (Cnsmr)*, *manufacturing (Manuf)*, *high technology (HiTec)*, and *health care (Hlth)*. However, the coefficient estimate in the *other* industry is negative.

[Insert Table 2.9 about here]

## 2.7 Conclusion

Firms' corporate social responsibility (CSR) has drawn lots of attention from both academia and practitioners in recent years. However, the merits of firms' CSR activities are still in debate. We contribute to prior studies by examining whether socially responsible customers are more likely to receive trade credit from suppliers.

Based on a customer-supplier pairs sample, we find that socially responsible customers receive more trade credit. This relationship is more pronounced when a customer operates in an industry with high level of consumer perception, or when its supplier is exposed to high level of risk in the customer-supplier relationship. The above findings indicate that suppliers are willing to provide trade credit to socially responsible customers, either to capture future business or to reduce risk.

Our findings suggest that suppliers value socially responsible customers. By engaging in CSR activities, firms can obtain extra benefit from suppliers, which is consistent with the phrase "doing well by doing good". Furthermore, our study also shows that firms' social

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<sup>34</sup> The Fama-French five industry classification is collected from the data library of Kenneth R. French. For detailed information, see [http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data\\_Library/det\\_5\\_ind\\_port.html](http://mba.tuck.dartmouth.edu/pages/faculty/ken.french/Data_Library/det_5_ind_port.html).

performance is an important determinant of trade credit, which complements previous studies on trade credit.



**Appendix A. Correlation matrix the main independent variables in the whole KLD sample**

	(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)	(i)	(j)	(k)
CSR (a)	1										
Size (b)	0.51	1									
Leverage (c)	0.02	0.30	1								
Asset tangibility (d)	0.04	0.25	0.26	1							
Cash holding (e)	-0.08	-0.46	-0.34	-0.35	1						
Market share (f)	0.20	0.37	0.08	-0.01	-0.24	1					
Sales growth (g)	-0.06	-0.11	-0.01	-0.03	0.17	-0.07	1				
Profit margin (h)	0.05	0.14	-0.05	0.04	-0.26	0.06	-0.05	1			
Tobin's Q (i)	0.00	-0.30	-0.19	-0.18	0.44	-0.10	0.20	-0.11	1		
Altman Z-score (j)	0.06	0.17	-0.20	0.01	-0.33	0.20	-0.20	0.30	-0.12	1	
Kaplan-Zingales index (k)	0.01	0.17	0.17	0.28	-0.31	0.04	-0.04	-0.01	-0.24	-0.03	1

**Table 2.1: Summary statistics**

This table presents the summary statistics for the main variables. Panel A reports the statistics for the whole KLD sample, which is based on the firm-quarter level observations from 2004 to 2010. Panel B and Panel C report statistics for the customer-supplier pairs sample, which is based on the pair-quarter level observations from 2004 to 2010. Panel B and Panel C correspond to the statistics for customer variables and supplier variables, respectively.

	No. of observations	Mean	Median	Std. dev.
<i>Panel A: The whole KLD sample</i>				
Trade credit	41121	0.574	0.419	0.702
CSR	41121	0.169	0.000	0.296
Size	41121	6.914	6.739	1.552
Leverage	41121	0.207	0.179	0.206
Asset tangibility	41121	0.297	0.227	0.237
Cash holding	41121	0.194	0.108	0.212
Market share	41121	0.063	0.011	0.125
Sales growth	41121	0.172	0.093	0.589
Profit margin	41121	-0.264	0.052	2.678
Tobin's Q	41121	2.100	1.676	1.316
Altman Z-score	41121	1.563	1.788	2.010
Kaplan-Zingales index	41121	-4.834	-0.874	15.216
<i>Panel B: Customer variables in the customer-supplier pairs sample</i>				
Trade credit	8825	0.681	0.485	0.588
CSR	8825	0.714	0.518	0.643
Size	8825	9.795	10.120	1.163
Leverage	8825	0.186	0.168	0.125
Asset tangibility	8825	0.297	0.197	0.226
Cash holding	8825	0.118	0.075	0.125
Market share	8825	0.221	0.171	0.189
Sales growth	8825	0.111	0.080	0.304
Profit margin	8825	0.056	0.051	0.280
Tobin's Q	8825	1.929	1.703	0.911
Altman Z-score	8825	2.560	2.425	1.466
Kaplan-Zingales index	8825	-3.235	-1.726	6.251
<i>Panel C: Supplier variables in the customer-supplier pairs sample</i>				
Size	8825	6.261	6.028	1.654
Leverage	8825	0.186	0.135	0.203
Asset tangibility	8825	0.236	0.161	0.222
Cash holding	8825	0.263	0.198	0.239
Market share	8825	0.034	0.002	0.094
Sales growth	8825	0.231	0.102	0.745
Profit margin	8825	-0.331	0.040	2.521
Tobin's Q	8825	2.186	1.736	1.412

Altman Z-score	8825	0.926	1.465	2.585
Kaplan-Zingales index	8825	-5.865	-1.211	17.103

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**Table 2.2: Customers' social performance and trade credit**

This table presents the estimated results from regression of customer firms' trade credit on social performance. The regressions are based on the whole KLD sample between 2004 and 2010. The dependent variable is trade credit, which is measured as accounts payable scaled by purchase (AP/Purchase). Firms' social performance is proxied by the CSR score calculated based on the KLD database. Column 1 is a univariate regression, column 2 adds firm size, leverage, asset tangibility, cash holding, sales growth, and profit margin as controls, column 3 includes Tobin's Q, and column 4 further includes Altman Z-score and Kaplan-Zingales index. All specifications include 2-digit SIC industry fixed effects and quarter fixed effects. Standard errors are clustered at quarter level, and t-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Independent variables	(1)	(2)	(3)	(4)
CSR	0.156*** (14.24)	0.158*** (14.59)	0.151*** (14.53)	0.141*** (14.23)
Size		0.013*** (6.00)	0.015*** (7.12)	0.023*** (9.96)
Leverage		0.124*** (6.17)	0.123*** (6.00)	0.025 (1.25)
Asset tangibility		0.142*** (6.29)	0.140*** (6.19)	0.166*** (7.44)
Cash holding		0.307*** (11.03)	0.282*** (9.83)	0.155*** (5.05)
Market share		-0.194*** (-11.28)	-0.203*** (-11.76)	-0.205*** (-11.43)
Sales growth		0.003 (0.29)	0.000 (0.02)	-0.015 (-1.35)
Profit margin		0.001 (0.54)	0.001 (0.51)	0.005** (2.22)
Tobin's Q			0.012*** (4.19)	0.013*** (4.78)
Altman Z-score				-0.039*** (-19.01)
Kaplan-Zingales index				-0.002*** (-4.78)
Industry fixed effects	Yes	Yes	Yes	Yes
Quarter fixed effects	Yes	Yes	Yes	Yes
Constant	0.325*** (8.18)	0.111** (2.51)	0.0799* (1.81)	0.118** (2.70)
Observations	41121	41121	41121	41121
Adjusted R-squared	0.176	0.182	0.183	0.190

**Table 2.3: Customers' social performance and trade credit controlling for suppliers' characteristics**

This table presents the estimated results from regression of customer firms' trade credit on social performance after controlling for suppliers' characteristics. The regressions are based on the customer-supplier pairs sample between 2004 and 2010. The dependent variable is customer firms' trade credit scaled by purchase (AP/Purchase). Customer firms' social performance is proxied by the CSR score in the KLD database. Column 1 is a univariate regression, column 2 includes customer controls, and column 3 further adds supplier controls. All specifications in column 1 and 2 include customers' industry fixed effects and quarter fixed effects, column 3 further include suppliers' industry fixed effects. Standard errors are clustered at quarter level, and t-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Independent variables	(1)	(2)	(3)
Customers' CSR	0.099*** (5.07)	0.156*** (4.53)	0.146*** (4.24)
Customer variables			
Size		0.045*** (2.88)	0.042** (2.75)
Leverage		-0.232* (-1.84)	-0.165 (-1.28)
Asset tangibility		0.834*** (6.42)	0.889*** (6.55)
Cash holding		0.592** (2.34)	0.524** (2.12)
Market share		-0.926*** (-14.71)	-0.944*** (-15.24)
Sales growth		-0.052 (-1.05)	-0.045 (-0.89)
Profit margin		0.118*** (3.28)	0.120*** (3.41)
Tobin's Q		-0.036*** (-3.50)	-0.034*** (-3.49)
Altman Z-score		-0.101*** (-7.13)	-0.105*** (-7.12)
Kaplan-Zingales index		-0.007*** (-3.08)	-0.007*** (-3.05)
Supplier variables			
Size			0.015*** (5.00)
Leverage			-0.046 (-1.50)
Asset tangibility			0.080** (2.59)
Cash holding			0.038

			(1.32)
Market share			0.039
			(0.94)
Sales growth			-0.023***
			(-3.73)
Profit margin			0.002
			(0.63)
Tobin's Q			-0.007*
			(-1.77)
Altman Z-score			0.000
			(0.16)
Kaplan-Zingales index			-0.000
			(-0.03)
Customers' industry fixed effects	Yes	Yes	Yes
Suppliers' industry fixed effects	No	No	Yes
Quarter fixed effects	Yes	Yes	Yes
Constant	1.064***	0.0530	0.189
	(11.12)	(0.49)	(1.21)
Observations	8825	8825	8825
Adjusted R-squared	0.258	0.317	0.338

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**Table 2.4: The moderating role of customer industry' consumer perception**

This table presents the estimated results for the moderating role of customer industry' consumer perception. The dependent variable is customers' trade credit scaled by purchase (AP/Purchase). Customers' social performance is proxied by the CSR score in the KLD database. The variable of interest is the interaction of customers' social performance and customer industry's consumer perception. We use two proxies for consumer perception: (A) indicator of individual consumer predominant industry, and (B) advertising intensity, which correspond to column 1-2 and 3-4, respectively. The sample runs from 2004 through 2010, column 1 and 3 are based on the whole KLD sample, while column 2 and 4 are based on the customer-supplier pairs sample. Because customer industry's consumer perception is an industry-level variable, we exclude customers' industry fixed effects from all specifications. Column 1 and 3 include quarter fixed effects, column 2 and 4 further add suppliers' industry fixed effects. Standard errors are clustered at quarter level, and t-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Independent variables	Proxies for consumer perception			
	(A) Indicator of consumer industry		(B) Advertising intensity	
	(1)	(2)	(3)	(4)
Customers' CSR	0.017 (1.11)	0.031 (1.07)	-0.061*** (-4.15)	-0.057*** (-3.10)
Customer industry's consumer perception	-0.112*** (-14.61)	-0.122*** (-4.37)	-0.047*** (-4.28)	-0.070*** (-3.88)
Customers' CSR × Customer industry's consumer perception	0.167*** (8.07)	0.205*** (4.52)	0.251*** (13.62)	0.237*** (6.88)
Customer variables				
Size	0.035*** (17.74)	0.023* (1.81)	0.044*** (21.55)	0.043*** (3.18)
Leverage	-0.109*** (-6.52)	0.005 (0.05)	-0.173*** (-11.54)	-0.101 (-0.86)
Asset tangibility	0.383*** (14.73)	0.439*** (7.00)	0.489*** (14.68)	0.464*** (7.13)
Cash holding	0.086*** (2.95)	0.006 (0.03)	0.081** (2.73)	0.211 (1.10)
Market share	-0.359*** (-28.13)	-0.769*** (-12.45)	-0.453*** (-31.84)	-0.805*** (-11.99)
Sales growth	0.018 (1.38)	-0.027 (-0.52)	0.016 (1.16)	-0.026 (-0.48)
Profit margin	0.003 (1.42)	0.097*** (3.19)	0.012*** (5.92)	0.104*** (3.36)
Tobin's Q	0.017*** (5.54)	-0.057*** (-4.87)	0.013*** (3.97)	-0.064*** (-4.80)
Altman Z-score	-0.050***	-0.094***	-0.058***	-0.096***

	(-24.44)	(-11.27)	(-28.10)	(-11.57)
Kaplan-Zingales index	-0.002***	-0.009***	-0.003***	-0.008***
	(-6.15)	(-4.60)	(-6.70)	(-4.23)
Supplier variables				
Size		0.023***		0.024***
		(5.85)		(5.99)
Leverage		-0.087**		-0.068**
		(-2.37)		(-2.06)
Asset tangibility		0.036		0.113**
		(0.84)		(2.16)
Cash holding		0.009		0.019
		(0.32)		(0.63)
Market share		-0.019		-0.045
		(-0.40)		(-0.94)
Sales growth		-0.025***		-0.025***
		(-3.53)		(-3.87)
Profit margin		0.004		0.004
		(1.01)		(1.12)
Tobin's Q		-0.003		-0.002
		(-0.73)		(-0.38)
Altman Z-score		-0.005		-0.005
		(-1.58)		(-1.56)
Kaplan-Zingales index		-0.000**		-0.000**
		(-2.35)		(-2.30)
Customers' industry fixed effects	No	No	No	No
Suppliers' industry fixed effects	No	Yes	No	Yes
Quarter fixed effects	Yes	Yes	Yes	Yes
Constant	0.255***	0.588***	0.188***	0.587***
	(14.34)	(4.06)	(9.99)	(3.79)
Observations	41121	8825	37577	8453
Adjusted R-squared	0.055	0.242	0.059	0.262



**Table 2.5: The moderating role of suppliers' risk exposure**

This table presents the estimated results for the moderating role of suppliers' risk exposure. The dependent variable is customers' trade credit scaled by purchase (AP/Purchase). Customers' social performance is proxied by the CSR score in the KLD database. The variable of interest is the interaction of customers' social performance and suppliers' risk exposure. We use two proxies for suppliers' risk exposure: (A) customers' industry competition, and (B) customer importance. The sample runs from 2004 through 2010, column 1 and 3 are based on the whole KLD sample, column 2 and 4 use the customer-supplier pairs sample. Because customers' industry competition is an industry-level variable, we exclude customers' industry fixed effects from the specifications in column 1 and 2. Column 1 only includes quarter fixed effects, column 2 adds suppliers' industry fixed effects, column 3 includes both quarter fixed effects and customers' industry fixed effects, while column 4 further includes suppliers' industry fixed effects. Standard errors are clustered at quarter level, and t-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

Independent variables	Proxies for suppliers' risk exposure			
	(A) Customers' industry competition		(B) Customer importance	
	(1)	(2)	(3)	(4)
Customers' CSR	0.062*** (6.40)	0.040 (1.37)	0.121*** (9.20)	0.116*** (3.43)
Suppliers' risk exposure	-0.038* (-1.78)	-0.070*** (-4.19)	0.050*** (6.84)	-0.028** (-2.45)
Customers' CSR × Suppliers' risk exposure	0.037*** (2.86)	0.054*** (2.81)	0.025* (1.90)	0.052*** (3.94)
Customer variables				
Size	0.040*** (16.87)	0.032** (2.32)	0.017*** (7.50)	0.043*** (2.82)
Leverage	-0.141*** (-8.34)	0.010 (0.09)	0.033 (1.64)	-0.155 (-1.20)
Asset tangibility	0.403*** (14.89)	0.490*** (7.09)	0.165*** (7.36)	0.893*** (6.54)
Cash holding	0.095** (2.69)	-0.022 (-0.14)	0.149*** (4.77)	0.536** (2.17)
Market share	-0.433*** (-18.59)	-0.787*** (-12.01)	-0.205*** (-11.24)	-0.937*** (-15.08)
Sales growth	0.015 (1.20)	-0.033 (-0.62)	-0.015 (-1.36)	-0.045 (-0.90)
Profit margin	0.005** (2.29)	0.111*** (3.47)	0.005** (2.24)	0.119*** (3.40)
Tobin's Q	0.016*** (5.36)	-0.049*** (-4.00)	0.012*** (4.53)	-0.034*** (-3.51)
Altman Z-score	-0.053*** (-26.89)	-0.102*** (-12.27)	-0.038*** (-18.98)	-0.105*** (-7.12)

Kaplan-Zingales index	-0.002***	-0.011***	-0.002***	-0.007***
	(-6.39)	(-4.76)	(-4.79)	(-3.07)
Supplier variables				
Size		0.023***		0.015***
		(5.74)		(4.99)
Leverage		-0.082**		-0.043
		(-2.15)		(-1.43)
Asset tangibility		0.077*		0.074**
		(1.73)		(2.35)
Cash holding		0.032		0.036
		(1.11)		(1.29)
Market share		0.003		0.045
		(0.07)		(1.09)
Sales growth		-0.023***		-0.023***
		(-3.44)		(-3.71)
Profit margin		0.004		0.002
		(1.05)		(0.59)
Tobin's Q		-0.003		-0.008*
		(-0.60)		(-1.86)
Altman Z-score		-0.005		0.000
		(-1.70)		(0.11)
Kaplan-Zingales index		-0.000*		-0.000
		(-1.75)		(-0.09)
Customers' industry fixed effects	No	No	Yes	Yes
Suppliers' industry fixed effects	No	Yes	No	Yes
Quarter fixed effects	Yes	Yes	Yes	Yes
Constant	0.198***	0.490***	0.163***	0.191
	(11.67)	(3.32)	(3.58)	(1.23)
Observations	41121	8825	41121	8825
Adjusted R-squared	0.051	0.236	0.191	0.338

**Table 2.6: Customers' social performance and trade credit: instrumental variable regression**

This table presents the estimated results from instrumental variable regression (or two-stage least square regression). Panel A shows the coefficient estimates on the second stage regression. The dependent variable is customers' trade credit (AP/Purchase), the variable of interest is customers' instrumented CSR. Panel B shows the estimated results for the first stage regression, where we regress customers' CSR on the instrumental variables and control variables. The instrumental variables for customers' CSR include firms' external political environment and industry median CSR in the 4-digit SIC code. A firm's external political environment is defined as the proportion of votes received by the Democratic candidate for president in election 2012 (i.e., Barack Obama) in the state where the firm is headquartered, following *Di Giuli and Kostovetsky (2014)*. The industry median CSR is calculated based on the whole KLD sample. Column 1 is based on the whole KLD sample, customers' industry fixed effects and quarter fixed effects are included. Column 2 is based on the customer-supplier pairs sample, so suppliers' industry fixed effects are further added. The sample runs from 2004 through 2010. Standard errors are clustered at quarter level, and t-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

<i>Panel A: Instrumental variable regression</i>		
	Whole KLD sample	Customer-supplier pairs sample
Independent variables	(1)	(2)
Customers' CSR (Instrumented)	0.268*** (13.51)	0.214*** (3.45)
Customer variables		
Size	0.019*** (3.31)	0.013 (0.63)
Leverage	-0.027 (-1.45)	-0.076 (-0.43)
Asset tangibility	0.141*** (5.67)	0.862*** (5.57)
Cash holding	0.075** (2.05)	0.634** (2.39)
Market share	-0.312*** (-10.60)	-1.009*** (-13.28)
Sales growth	-0.003 (-0.22)	-0.071 (-0.94)
Profit margin	0.004 (1.23)	0.068 (1.24)
Tobin's Q	0.010*** (3.58)	-0.014 (-0.83)
Altman Z-score	-0.049*** (-17.34)	-0.107*** (-7.63)
Kaplan-Zingales index	-0.001*** (-4.59)	-0.007*** (-2.86)

Supplier variables		
Size		0.020*** (7.42)
Leverage		-0.088*** (-2.91)
Asset tangibility		0.089*** (2.81)
Cash holding		0.085** (2.32)
Market share		0.047 (1.07)
Sales growth		-0.023*** (-4.87)
Profit margin		-0.003 (-1.00)
Tobin's Q		-0.007 (-1.52)
Altman Z-score		-0.007*** (-3.60)
Kaplan-Zingales index		0.000 (0.57)
Customers' industry fixed effects	Yes	Yes
Suppliers' industry fixed effects	No	Yes
Quarter fixed effects	Yes	Yes
Constant	0.119** (2.24)	0.109 (0.70)
Observations	32162	8024
Adjusted R-squared	0.195	0.361
Weak identification test (F-statistics)	304.566	190.068
Hansen' J statistics (p-value)	0.490	0.116

*Panel B: First stage regression*

	Whole KLD sample	Customer-supplier pairs sample
Instrument variables	(1)	(2)
Political environment	0.077*** (3.07)	2.112*** (18.59)
Industry median CSR	0.720*** (81.99)	0.972*** (38.97)
Controls	Yes	Yes
Adjusted R-squared	0.481	0.743

**Table 2.7: Customers' social performance and trade credit: propensity score matching**

This table presents the estimated results based on propensity score matching. Panel A is based on the whole KLD sample, while panel B is based on the customer-supplier pairs sample. The outcome variable is customers' trade credit (AP/Purchase). The treatment variable is customers' social performance, which is proxied by the CSR score in the KLD database. To facilitate matching, we partition the sample into two sub-samples based on the median CSR score.

	Trade credit	Difference	Z-statistics (P-value)
<i>Panel A: Results for the whole KLD sample</i>			
High CSR	0.597		
Low CSR	0.562	0.035	1.93 (0.054)
<i>Panel B: Results for the customer-supplier pairs sample</i>			
High CSR	0.755		
Low CSR	0.649	0.105	3.92 (0.023)

**Table 2.8: Customers' social performance and trade credit during the global financial crisis**

This table presents the estimated results from regressing customers' trade credit on social performance during the global financial crisis. We estimate the regression based on the difference-in-difference (DID) approach. The sample ranges from 2005Q3 to 2008Q2. The dependent variable is customers' trade credit (AP/Purchase). The variable of interest is the interaction of customers' social performance and crisis indicator. The crisis indicator equals one for the quarters between 2007Q3 and 2008Q2, and zero otherwise. Customers' social performance is proxied by the CSR score in the KLD database, and it is measured at the end of year 2005. Panel A shows the estimated results for the whole KLD sample (column 1-2) and the customer-supplier pairs sample (column 3-4). In panel B and panel C, we further partition the whole KLD sample into *less* financially constrained firms and *more* financial constrained firms based on the median financial constraint. Panel B shows the estimated results for the *less* financially constrained firms, and panel C shows the results for *more* financially constrained firms. Because there are not enough balanced panel observations for the difference-in-difference (DID) analysis in the customer-supplier pairs sample, we do not further partition the pairs sample into sub-samples. We use four proxies for financial constraint, they are Kaplan-Zingales index (Kaplan and Zingales, 1997), Whited-Wu index (Whited and Wu, 2006), Size-Age index (Hadlock and Pierce, 2010), and bank line of credit (Sufi, 2009). The Kaplan-Zingales index, Whited-Wu index, and Size-Age index are measured at the end of year 2005. Bank line of credit is calculated based on the observations between 1996 and 2003, and the dataset is collected by Sufi (2009). All specifications for the whole KLD sample include firm fixed effects, and the specifications for the customer-supplier pairs sample include customer-supplier pair fixed effects. Z-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

<i>Panel A: Customers' social performance and trade credit during the global financial crisis</i>				
	Whole KLD sample		Customer-supplier pairs sample	
	(1)	(2)	(3)	(4)
Crisis	0.009 (1.36)	-0.004 (-0.58)	0.023** (2.28)	0.012 (0.45)
Crisis × Customers' CSR	-0.056*** (-3.20)	-0.054*** (-3.14)	-0.136*** (-6.97)	-0.165*** (-3.79)
Customer variables	No	Yes	No	Yes
Supplier variables	No	No	No	Yes
Firm fixed effects	Yes	Yes	No	No
Customer-supplier pair fixed effects	No	No	Yes	Yes
Constant	0.581*** (194.75)	0.317*** (2.80)	0.754*** (277.78)	-2.374 (-1.40)
Observations	17865	17315	1980	1731
Adjusted R-squared	0.787	0.796	0.882	0.889
<i>Panel B: Results for the less financially constrained firms in the whole KLD sample</i>				
	Kaplan-Zingales	Whited-Wu	Size-Age	Line of Credit
	(1)	(2)	(3)	(4)
Crisis	-0.018** (-2.02)	-0.005 (-0.51)	-0.018** (-2.01)	-0.009 (-1.01)

Crisis × Customers' CSR	-0.032*	-0.065***	-0.055***	-0.049**
	(-1.66)	(-3.72)	(-3.12)	(-2.50)
Customer variables	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Constant	0.245*	-0.065	-0.784***	-0.259
	(1.72)	(-0.33)	(-4.02)	(-1.55)
Observations	8167	8588	8679	10508
Adjusted R-squared	0.741	0.796	0.808	0.810

*Panel C: Results for the **more** financially constrained firms in the whole KLD sample*

	Kaplan-Zingales	Whited-Wu	Size-Age	Line of Credit
	(1)	(2)	(3)	(4)
Crisis	0.024**	-0.007	0.004	-0.011
	(2.22)	(-0.68)	(0.36)	(-0.67)
Crisis × Customers' CSR	-0.040	-0.012	-0.031	-0.060
	(-1.09)	(-0.21)	(-0.61)	(-1.26)
Customer variables	Yes	Yes	Yes	Yes
Firm fixed effects	Yes	Yes	Yes	Yes
Constant	0.838***	0.486***	0.795***	0.895***
	(4.68)	(3.59)	(5.84)	(3.95)
Observations	8055	8631	8585	3729
Adjusted R-squared	0.832	0.796	0.789	0.762

**Table 2.9: Results for different CSR dimensions and industries**

This table presents the estimated results from regressing customers' trade credit on social performance for different CSR dimensions and industries. All specifications are based on the whole KLD sample, which ranges from 2004 to 2010. The dependent variable is customers' trade credit (AP/Purchase). Customers' social performance is proxied by the CSR score in the KLD database. Panel A shows the results for each CSR dimension. We introduce six dimensions of CSR, including *community*, *diversity*, *employee relations*, *environmental protection*, *human rights*, and *product quality*. Panel B shows the results for different industries. Based on the Fama-French five industries classification, we partition the sample into five sub-samples, corresponding to *consumer goods (Cnsmr)*, *manufacturing (Manuf)*, *high technology (HiTec)*, *healthcare (Hlth)*, and *other*. Standard errors are clustered at quarter level, and t-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

*Panel A: CSR dimensions*

	CSR dimensions					
	Community (1)	Diversity (2)	Employee (3)	Environment (4)	Human rights (5)	Product (6)
CSR	0.585*** (15.32)	0.320*** (14.85)	0.041 (1.57)	0.273*** (15.37)	0.585*** (5.94)	0.200*** (5.39)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Observation	41121	41121	41121	41121	41121	41121
Adjusted R-Squared	0.190	0.190	0.188	0.189	0.188	0.188

*Panel B: Different industries*

	Fama-French five industries				
	Consumer goods (1)	Manufacturing (2)	High technology (3)	Healthcare (4)	Other (5)
CSR	0.065*** (3.63)	0.124*** (5.34)	0.190*** (11.06)	0.338*** (10.19)	-0.131*** (-6.87)
Controls	Yes	Yes	Yes	Yes	Yes
Observation	8822	11333	10661	5407	4898
Adjusted R-Squared	0.185	0.339	0.047	0.079	0.163



### ***3. Heterogeneous Credit Crunch Shock and the Effectiveness of Corporate Governance***

#### **3.1 Introduction**

The effectiveness of corporate governance has attracted lots of attention from both academics and practitioners, especially after the recent global financial crisis. Considering the endogeneity property of corporate governance mechanisms (Hermalin and Weisbach, 2003; Wintoki et al., 2012), prior literature analyzes the effectiveness of corporate governance based on external shocks, such as economic crises. The empirical findings are mixed in this issue. Although some studies confirm the effectiveness of corporate governance (e.g., Mitton, 2002; Lemmon and Lins, 2003; Baek et al., 2004; Bae et al., 2012), Beltratti and Stulz (2012) and Erkens (2012) find different results.

We explore this topic by examining how the heterogeneous adverse shock during the crisis influences the effectiveness of corporate governance. Following Johnson et al. (2000a) and Bae et al. (2012), we theoretically illustrate the role of corporate governance in deterring controlling shareholders' expropriation. The logic of the theoretical model is as follows: The adverse shock stimulates controlling shareholders' incentive to expropriate minority shareholders, thus the shareholder-protecting corporate governance mechanisms play a role in deterring expropriation and improving firm performances. We further show that in a firm being exposed to severer adverse shock, the controlling shareholder expropriates more, and the effectiveness of corporate governance becomes more significant.

We test the above hypotheses using the non-financial publicly listed firms in China during the 2008-2009 global financial crisis. We use the Chinese sample for several reasons:

First, China has low level of investor protection, and corporate governance mechanisms are important in protecting the interests of small investors (Berkman et al., 2010; Jiang et al., 2010). Second, most firms in China show concentrated ownership, the main principal-agency problem is the conflict between controlling shareholders and minority shareholders (Claessens et al., 2000; Young et al., 2008; Jiang et al., 2010), which is consistent with our theoretical model setting.<sup>35</sup> Third, as the largest emerging market China experienced significantly adverse shock during the 2008-2009 global financial crisis (Liu, 2009; Liang, 2010; Overholt, 2010). Since the crisis stems from the United States, and it is an external shock to Chinese economy, endogeneity concerns of using this shock are mitigated.

One feature of the recent global financial crisis is debt market freeze and credit crunch (Ryan, 2008; Tong and Wei, 2008; Brunnermeier, 2009; Iyer et al., 2013), which makes firms lose many valuable investment opportunities (Campello et al., 2010; Cingano et al., 2016). Chinese firms were exposed to significant credit crunch shock during the recent financial crisis. The loan growth rate in China showed apparent shock between May 2008 and February 2009. The long-term loan growth rate was 23% in May 2008, and it decreased to 17% in November 2008. The short-term loan growth rate decreased from 14% to 7%. Since Chinese firms rely more on bank loans than equity market for financing (Allen et al., 2012), the influence of credit crunch shock in China is even aggregated. We find that firms depending more on external finance are more fragile for the credit crunch shock, which indicates that Chinese firms were heterogeneously exposed to the credit crunch shock.

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<sup>35</sup> In developed economics, legal protection for investors is relatively better. The main principal-agency problem is the conflict between dispersed owners and professional managers, as described by Jensen and Meckling (1976). However, in emerging economics, firms' ownership is concentrated, and the main principal-agency problem is the conflict between controlling shareholders and minority shareholders (Young et al., 2008).

We first investigate the effectiveness of corporate governance during the financial crisis. The corporate governance mechanisms we examine include block shareholding, board independence, and whether the firm is audited by the big four accounting companies. We also include controlling shareholders' excess voting rights, which are viewed as the motivating factor for controlling shareholders' expropriation (La Porta et al., 1999; Claessens et al., 2000; Claessens et al., 2002). We find that, controlling shareholders' excess voting rights are negatively associated with firm performance during the crisis, but the above relation does not hold either before or after the crisis. Surprisingly, shareholder-protecting corporate governance mechanisms are not significantly associated with firm performance during the crisis.

To resolve the above doubt, we further investigate the moderating role of heterogeneous credit crunch shock on the effectiveness of corporate governance. We construct the interaction between heterogeneous credit crunch shock and corporate governance mechanism. Since firms depending more on external finance are more fragile for the credit crunch shock, we use firms' external finance dependence as the proxy for heterogeneous credit crunch shock. The higher external finance dependence represents severer credit crunch shock. We find that, when a firm depends more on external finance, corporate governance mechanisms are more effective in deterring expropriation and improving firm performance.

The above finding implies that the effectiveness of corporate governance depends on the severity of credit crunch shock. Corporate governance becomes more effective in deterring expropriation when a firm is exposed to severer credit crunch shock. Since some Chinese firms were not severely influenced by the credit crunch shock, the effectiveness of corporate

governance could not be significant in these firms, even during the crisis. Therefore, it can explain why we do not observe significant results in the initial level regression.

Furthermore, the above finding is more pronounced when controlling shareholders hold higher cash flow rights. Since the controlling shareholders with higher cash flow rights are more sensitive to the adverse shock, they have higher expropriation incentives, and hence corporate governance is more likely to play a role in these firms. It further supports the moderating role of heterogeneous credit crunch shock. In sum, the above results imply that, corporate governance deters expropriation only if a firm is exposed to severe adverse shock.

Our study contributes to the literature on the effectiveness of corporate governance. Prior studies (e.g., Mitton, 2002; Bae et al., 2012; Beltratti and Stulz, 2012; Erkens et al., 2012) do not reach an agreement on the role of corporate governance in protecting shareholder interests. This paper shows that heterogeneous adverse shock could be an important moderating factor. With a firm being exposed to severer adverse shock, corporate governance mechanisms become more effective in deterring expropriation and improving firm performance. In this sense, it provides a possible explanation for the mixed findings in the prior literature.

Second, this paper deepens our understanding on the credit crunch shock during the recent global financial crisis. Previous studies document the impact of credit crunch on corporate financing and investment decision (e.g., Brunnermeier, 2009; Campello et al., 2010; Duchin et al., 2010; Cingano et al., 2016). However, few studies try to investigate its influence on corporate governance issues. In this paper, we analyze how the credit crunch shock affects controlling shareholders' expropriation incentives and corporate governance

effectiveness. Our results show that the credit crunch shock that took place during the global financial crisis has significant influence on the principal-agency conflict inside the companies.

Third, most previous studies on global financial crisis focus on the U.S. market (e.g., Tong and Wei, 2008; Duchin et al., 2010) or the European countries (Iyer et al., 2013; Cingano et al., 2016). Chinese economy also suffered from apparent shock during the global financial crisis, but few studies investigate the situation of Chinese firms during the crisis. This paper complements previous studies by analyzing the impact of global financial crisis on Chinese economy, and its influence on corporate governance issues. Furthermore, the global financial crisis can be viewed as an external shock to Chinese economy, thus it reduces the endogeneity concern.

The remainder of our paper proceeds as follows. In section 2, we theoretically illustrate controlling shareholders' expropriation incentives during an adverse external shock. We further show how the heterogeneous adverse shock moderates the effectiveness of corporate governance. Section 3 describes the dataset and research design. Section 4 reports the empirical results. We conclude in section 5.

### **3.2 Theoretical model**

In countries with poor investor protection, firms are typically controlled by controlling shareholders via pyramid ownership structure (La Porta et al., 1999; Claessens et al., 2002). Following Johnson et al. (2000a), La Porta et al. (2002), and Bae et al. (2012), we theoretically analyze the corporate governance problem based on the conflict between controlling shareholders and minority shareholders. Inspired by Claessens et al. (2000) and

Claessens et al. (2002), we introduce the separation of controlling shareholders' voting rights and cash flow rights as the motivating factor for expropriation. We also extend prior theoretical works by exploring the moderating role of heterogeneous adverse shock on controlling shareholders' expropriation and the effectiveness of corporate governance.

### 3.2.1 Model setting

A controlling shareholder's expropriation is driven by its utility maximization process. Following Johnson et al. (2000a), La Porta et al. (2002), and Bae et al. (2012), we assume the controlling shareholder's utility comes from two sources: expropriation benefit and investment return from the company. If the controlling shareholder expropriates more resources from the company, less capital is left in the company for future investment. To maximize its utility, the controlling shareholder needs to choose the optimal level of expropriation.

Following Bae et al. (2012), we define  $\omega_{init}$  as the initial capital stock, and  $\omega$  as the feasible capital stock. Accordingly,  $\delta = \omega_{init} - \omega$  is the resource that the controlling shareholder steals from the company (i.e., expropriation). Previous studies document the wide existence of expropriation, especially in emerging markets (e.g., Johnson et al., 2000b; Young et al., 2008; Jiang et al., 2010), so here we assume the controlling shareholder's expropriation  $\delta$  is greater than zero.

Expropriation is usually accompanied with cost. Following Johnson et al. (2000a) and La Porta et al. (2002), we describe the expropriation cost as a quadratic function of expropriation, that is

$$\frac{\delta^2}{2\kappa \cdot \lambda\rho} = \frac{(\omega_{init} - \omega)^2}{2\kappa \cdot \lambda\rho}. \quad (1)$$

With expropriation being severer, the expropriation cost increases more quickly. Here  $\kappa$  denotes the corporate governance mechanisms. A smaller  $\kappa$  represents better corporate governance mechanisms, and it increases the expropriation cost.

Expropriation cost is also determined by the controlling shareholder's voting rights. When a controlling shareholder has higher voting rights, it can expropriate resources with lower cost. We use  $\rho$  to represent the controlling shareholder's cash flow rights, and  $\lambda$  to represent the disparity between voting rights and cash flow rights (i.e., control-ownership disparity). Accordingly,  $\lambda\rho$  represents controlling shareholders' voting rights. Controlling shareholders usually control the listed firms via pyramid ownership structure (Claessens et al., 2000, 2002), and the voting rights are equal or greater than the cash flow rights, thus we assume  $\lambda \geq 1$ .

Previous studies attribute controlling shareholders' expropriation to the disparity between voting right and cash flow rights (i.e., control-ownership disparity) (Claessens et al., 2000, 2002). Through controlling shareholders' voting rights  $\lambda\rho$ , we directly introduce the control-ownership disparity into the theoretical model. To our best knowledge, this is the first paper that theoretically incorporates the control-ownership disparity. It provides new insights into the expropriation behavior of controlling shareholders.

The controlling shareholder's utility also comes from the investment return of the company. We specify the production function as  $\pi I$ , where  $I$  represents the investment, and  $\pi$  represents the payoff rate. We assume the investment project is profitable, that is  $\pi > 1$ . Firms are difficult to raise new capital during the credit crunch, so it is reasonable to restrict the investment  $I$  to the feasible capital stock  $\omega$ , that is  $I \leq \omega$ . Since the controlling

shareholder's cash flow rights are  $\rho$ , the end-of-period equity value that belongs to the controlling shareholder is  $\rho[\omega + (\pi I - I)]$ .

To simplify analysis, we assume the controlling shareholder is risk neutral. The controlling shareholder's utility maximization problem can be described as

$$\text{Max}_{I, \omega} \left\{ \rho[\omega + (\pi I - I)] + \left[ (\omega_{init} - \omega) - \frac{(\omega_{init} - \omega)^2}{2\kappa \cdot \lambda \rho} \right] \right\}, \quad (2)$$

subject to  $\omega \leq \omega_{init}$  and  $I \leq \omega$ .

The controlling shareholder needs to choose the optimal feasible capital stock  $\omega^*$  and the optimal investment  $I^*$  to maximize its utility. Since the initial capital stock  $\omega_{init}$  is given at the beginning of the period, choosing the optimal feasible capital stock  $\omega^*$  is equivalent to choosing the optimal expropriation  $\delta^*$  (i.e.,  $\omega_{init} - \omega^*$ ).

### 3.2.2 Model solution

We solve the controlling shareholder's utility maximization problem through two steps. We first obtain the optimal investment  $I^*$  for a given level of expropriation. After incorporating the optimal investment  $I^*$ , we further obtain the controlling shareholder's optimal expropriation  $\delta^*$ .

For a given level of expropriation, the controlling shareholder can maximize the end-of-period equity value by solving

$$\text{Max}_I \{ \rho[\omega + (\pi I - I)] \}, \quad (3)$$

Subject to  $I \leq \omega$ .

Solving the above equation, we obtain the optimal investment  $I^* = \omega$ . It implies that the controlling shareholder invests all the feasible capital to maximize the firm's end-of-period equity value.



After incorporating the optimal investment  $I^*$ , the controlling shareholder's utility maximization problem can be simplified as follows

$$Max_{\omega} \left\{ \rho\pi\omega + \left[ (\omega_{init} - \omega) - \frac{(\omega_{init} - \omega)^2}{2\kappa \cdot \lambda\rho} \right] \right\}, \quad (4)$$

subject to  $\omega \leq \omega_{init}$ .

Solving the above maximization problem, we obtain the optimal feasible capital stock

$$\omega^* = \omega_{init} + (\rho\pi - 1)\kappa \cdot \lambda\rho. \quad (5)$$

Accordingly, we can obtain the controlling shareholder's optimal expropriation

$$\delta^* = \omega_{init} - \omega^* = -(\rho\pi - 1)\kappa \cdot \lambda\rho. \quad (6)$$

Investment return  $\pi$  is relatively smaller during the crisis, so we follow Bae et al. (2012) to assume  $\pi$  is less than  $\frac{1}{\rho}$ , then  $\rho\pi - 1 < 0$ .<sup>36</sup> This assumption ensures that we can obtain the

inner solution to the above maximization problem.

It is worth to note that, the controlling shareholder's expropriation ultimately reflects on the stock return. Given the optimal feasible capital stock  $\omega^*$ , the firm's end-of-period equity value is  $\pi\omega^* = \pi\omega_{init} - \pi\delta^*$ . The stock return within the period can be described as the function of optimal expropriation  $\delta^*$ , that is

$$r = \frac{\pi\omega^* - \omega_{init}}{\omega_{init}} = \pi - 1 - \frac{\pi\delta^*}{\omega_{init}}. \quad (7)$$

With the controlling shareholder conducting more expropriation, less resource will be left for future investment, and the firm will have lower stock return. Therefore, we can detect the controlling shareholder's expropriation by comparing stock return.

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<sup>36</sup> We also verify this assumption using the real dataset. The global financial crisis had severe impact on Chinese economy, and the average Return on Assets (ROA) of Chinese non-financial firms is only 0.0254 in 2008, that is  $\pi=1.0254$ . All our sample firms could meet the requirement of  $\rho\pi - 1 < 0$ .

### 3.2.3 Comparative statics analysis

In this section, we examine the effectiveness of corporate governance through comparative statics analysis. Because expropriation ultimately reflects on stock return, the effectiveness of corporate governance on deterring expropriation can be detected by analyzing the influence of corporate governance on stock return. Since the investment return  $\pi$  represents the extent of external shock (Liu et al., 2009), we further investigate the moderating role of heterogeneous adverse shock. The impact of the controlling shareholder's cash flow rights is also discussed.

To analyze the influence of corporate governance on stock return, we take the first order derivative of stock return  $r$  with respect to the control-ownership disparity  $\lambda$  and corporate governance  $\kappa$ , respectively. That is

$$\frac{\partial r}{\partial \lambda} = \frac{\pi}{\omega_{mit}} \cdot \left( -\frac{\partial \delta^*}{\partial \lambda} \right) = \frac{\pi(\rho\pi - 1)\kappa\rho}{\omega_{mit}}, \quad (8)$$

$$\frac{\partial r}{\partial \kappa} = \frac{\pi}{\omega_{mit}} \cdot \left( -\frac{\partial \delta^*}{\partial \kappa} \right) = \frac{\pi(\rho\pi - 1)\lambda\rho}{\omega_{mit}}. \quad (9)$$

The direction of the above derivative equations is ultimately determined by the derivative of expropriation (i.e.,  $\partial \delta^* / \partial \lambda$  and  $\partial \delta^* / \partial \kappa$ ). When better corporate governance mechanism  $\kappa$  deters expropriation (i.e.,  $\partial \delta^* / \partial \kappa > 0$ ), it increases stock return (i.e.,  $\partial r / \partial \kappa < 0$ ). Similarly, when the control-ownership disparity  $\lambda$  stimulates expropriation (i.e.,  $\partial \delta^* / \partial \lambda > 0$ ), it decreases stock return (i.e.,  $\partial r / \partial \lambda < 0$ ). Therefore, we can investigate the effectiveness of corporate governance based on stock return.

The direction of equation (8) and (9) is determined by  $\rho\pi - 1$ . Considering the assumption  $\pi < 1 / \rho$  during the adverse shock, we have  $\rho\pi - 1 < 0$ , thus both of equation (8)

and (9) are negative. It implies that the control-ownership disparity  $\lambda$  is negatively associated with stock return during the adverse shock. In contrast, shareholder protecting corporate governance mechanism  $\kappa$  is positively associated with stock return.

However, the above predictions do not necessarily hold during boom or normal state. When the economic situation is good, the investment return  $\pi$  tends to be high, and the condition  $\pi < 1/\rho$  does not necessarily hold. In this situation, the controlling shareholder has less expropriation incentive, and it would choose to leave the resource inside the company to increase its equity value. Therefore, the control-ownership disparity and corporate governance are not expected to show significant influence on stock return during boom or normal state.

The recent global financial crisis caused severe adverse shock to Chinese economy. Summarizing the above discussions, we propose the following testable hypothesis:

**H1.** *During the global financial crisis, the control-ownership disparity is negatively associated with stock return, and the shareholder protecting corporate governance is positively associated with stock return. However, the above relation does not hold before or after the crisis.*

As discussed above, the adverse shock plays a key role in stimulating expropriation and initiating the effectiveness of corporate governance. During an adverse macro shock, different firms could be exposed to different level of shock. In the following section, we further investigate how the effectiveness of corporate governance is moderated by the heterogeneous external shock. Since the investment return  $\pi$  reflects the extent of external shock, we investigate the moderating role of heterogeneous adverse shock by taking the second order

partial derivative of equation (8) and (9) with respect to the investment return  $\pi$ , that is

$$\frac{\partial^2 r}{\partial \lambda \partial \pi} = -\frac{1}{\omega_{mit}} \cdot \frac{\partial \delta^*}{\partial \lambda} - \frac{\pi}{\omega_{mit}} \cdot \frac{\partial^2 \delta^*}{\partial \lambda \partial \pi}, \quad (10)$$

$$\frac{\partial^2 r}{\partial \kappa \partial \pi} = -\frac{1}{\omega_{mit}} \cdot \frac{\partial \delta^*}{\partial \kappa} - \frac{\pi}{\omega_{mit}} \cdot \frac{\partial^2 \delta^*}{\partial \kappa \partial \pi}. \quad (11)$$

The above derivative equations can be described as the function of the controlling shareholder's expropriation  $\delta^*$ . Specially, equation (10) consists of two components: the first order derivative  $-\omega_{mit}^{-1} \cdot (\partial \delta^* / \partial \lambda)$  and the second order derivative  $-(\pi / \omega_{mit}) \cdot (\partial^2 \delta^* / \partial \lambda \partial \pi)$ . Since  $\partial \delta^* / \partial \lambda > 0$ , the first order derivative factor  $-\omega_{mit}^{-1} \cdot (\partial \delta^* / \partial \lambda)$  is negative. The second order derivative factor  $-(\pi / \omega_{mit}) \cdot (\partial^2 \delta^* / \partial \lambda \partial \pi)$  can be written as  $(\pi / \omega_{mit}) \cdot \kappa \rho^2$ , which is positive. Thus, the direction of equation (10) is determined by the relative magnitude of the first order derivative factor and the second order derivative factor. Similarly, the direction of equation (11) is also determined by the first order derivative factor and second order derivative factor of expropriation  $\delta^*$ .

The controlling shareholder's cash flow rights  $\rho$  have significant influence on the direction of equation (10) and (11). When a controlling shareholder has higher cash flow rights, its end-of-period equity value  $\rho \pi \omega^*$  is more sensitive to the external shock. Therefore, it has a higher incentive to expropriate resource from the company. Accordingly, the second order derivatives of expropriation,  $\partial^2 \delta^* / \partial \lambda \partial \pi$  and  $\partial^2 \delta^* / \partial \kappa \partial \pi$ , take lower values, and the equation (10) and (11) are more likely to be positive.<sup>37</sup>

The positive equation (10) and (11) imply that, the effectiveness of corporate

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<sup>37</sup> The second order derivative  $\partial^2 \delta^* / \partial \lambda \partial \pi$  can be derived as  $-\kappa \rho^2$ , which is monotonically decreasing with respect to the controlling shareholder's cash flow rights  $\rho$ . With the cash flow rights  $\rho$  increasing, the value of  $\partial^2 \delta^* / \partial \lambda \partial \pi$  decreases, and the second order derivative factor  $-(\pi / \omega_{mit}) \cdot (\partial^2 \delta^* / \partial \lambda \partial \pi)$  increases. Accordingly, equation (10) is more likely to be positive. Similarly, equation (11) is also more likely to be positive when the cash flow rights  $\rho$  increase.

governance enhances with the severity of adverse shock. When a firm is exposed to severer adverse shock, its controlling shareholder has a higher incentive to expropriate resource, and the shareholder protecting corporate governance mechanism is more likely to play a role in deterring expropriation. Since expropriation ultimately reflects on stock return, with a firm being exposed to severer adverse shock, the control-ownership disparity is more likely to be negatively associated with stock return, and corporate governance is more effective in improving firm performance.

To more clearly demonstrate the role of cash flow rights, we further derive equation (10) and (11) as follows:

$$\frac{\partial^2 r}{\partial \lambda \partial \pi} = \frac{(2\rho\pi - 1)\kappa\rho}{\omega_{mit}}, \quad (12)$$

$$\frac{\partial^2 r}{\partial \kappa \partial \pi} = \frac{(2\rho\pi - 1)\lambda\rho}{\omega_{mit}}. \quad (13)$$

Suppose a controlling shareholder's cash flow rights  $\rho$  are greater than or equal to 50%, we have  $2\rho \geq 1$  (or  $1/2\rho \leq 1$ ). Given that the investment project is profitable (i.e.,  $\pi > 1$ ), we can obtain  $\pi > 1 \geq 1/2\rho$ , and hence  $2\rho\pi - 1 > 0$  and the equation (12) and (13) are positive. It is worth to note that, although in the above analyses we set the cash flow rights of 50% as the threshold, the exact threshold point could vary with model settings. In general, with the controlling shareholder having higher cash flow rights, the adverse shock is more likely to stimulate the effectiveness of corporate governance. Accordingly, the impact of heterogeneous adverse shock on the effectiveness of corporate governance is more pronounced.

During the 2008-2009 global financial crisis, different firms are heterogeneously

exposed to the credit crunch shock. Summarizing the above discussions, we propose the following hypothesis:

**H2.** *With a firm being exposed to severer credit crunch shock, the control-ownership disparity is more negatively associated with stock return, and the shareholder protecting corporate governance is more effective in improving stock return. Furthermore, the above relation is more pronounced when a controlling shareholder has higher cash flow rights.*

### **3.3 Sample and research design**

#### *3.3.1 Data*

We test the hypotheses using the Chinese non-financial public firms during the 2008-2009 global financial crisis. We use the Chinese sample for two main reasons: First, our theoretical model is based on the conflict between controlling shareholders and minority shareholders, which is typical in developing countries (Claessens et al., 2000; Claessens et al., 2002; Young, 2008; Jiang et al., 2010).<sup>38</sup> In developed countries, the main corporate governance issue is the conflict between dispersed shareholders and management team.

As the biggest developing country, China lacks legal protection for small investors, and most firms show concentrated ownership. Following La Porta et al. (1999), we calculate the ownership concentration of the biggest ten Chinese non-financial public firms in 2007. The average total shareholdings of the top three shareholders are as high as 74%, which is even greater than the biggest shareholdings shown in La Porta et al. (1999) (which is 67% in Greek

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<sup>38</sup> Claessens et al. (2000) and Claessens et al. (2002) use the sample from Asian developing countries to examine the disparity between controlling shareholders' voting rights and cash flow rights. Previous studies on corporate governance effectiveness (e.g., Mitton, 2002; Lemmon and Lins, 2003; Baek et al., 2004; Bae et al., 2012) also use the sample from developing countries.

firms).<sup>39</sup> Thus, the concentrated ownership and the conflict between controlling shareholders and minority shareholders in China are in line with our theoretical model setting.

Second, the credit crunch shock that took place during the 2008-2009 global financial crisis showed significant impact on Chinese economy. Furthermore, since the global financial crisis stems from the U.S., it can be viewed as an external shock to Chinese economy. One feature of the recent global financial crisis is credit crunch (Ryan, 2008; Tong and Wei, 2008; Brunnermeier, 2009; Iyer et al., 2013). Due to financial institutions' risk transfer and network effect, the credit crunch shock diffused around the world (Brunnermeier, 2009; Iyer et al., 2013; Cingano et al., 2016). Campello et al. (2010) find that the credit crunch during the recent financial crisis has stronger impact on Asia and Europe than the U.S.. It could be because the Asian and European firms depends more on bank loans than the U.S. firms (Dell'Araccia et al., 2008). China financial system is denominated by the banking sector, whereas the bond market and equity market are limited and ineffective (Allen et al., 2012). Therefore, Chinese economy is more likely to be negatively impacted during the global financial crisis.

[Insert Figure 3.1 about here]

As demonstrated in Figure 3.2, Chinese economy experienced apparent shock between May 2008 and February 2009. Several macroeconomic indicators including industrial production growth rate, export growth rate, and consumer confidence index showed apparent decrease since May 2008. In Figure 3.1, the short-term and long-term loan growth rate also significantly decreased since May 2008. Considering the stable growth of Chinese economy

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<sup>39</sup> We also calculate the ownership concentration in all the Chinese non-financial public firms. The average shareholdings of the top three shareholders are 49%.

before 2008, the sudden collapse between May 2008 and February 2009 can be attributed to the external shock caused by the global financial crisis.

Several previous studies based on the U.S. market (e.g., Ryan, 2008; Erkens et al., 2012) set early 2007 as the starting point of the financial crisis. Since we are mainly interested in the period when the crisis had real effect on Chinese economy, and it takes time for the financial crisis to diffuse into other developing countries, it is reasonable to set May 2008 as the starting point of crisis in China.

[Insert Figure 3.2 about here]

We also check the impact of the global financial crisis on Chinese economy based on the stock market, following Tong and Wei (2008). Figure 3.3 reports the *China Shanghai & Shenzhen 300 Stock Index (HS300)*, and three other stock market indices from the U.S., U.K., and Japan. To facilitate illustration, we standardize the indices value in May 2008 to 100. As shown in Figure 3.3, the four indices show high integration between 2007 and 2009. In May 2008, all the three indices from the U.S., U.K., and Japan began to decrease significantly. Although *HS300* also experienced decrease before May 2008, it could be due to the burst of bubble, because China stock market experienced a great bull market between May 2007 and October 2007. So we define the period between May 2008 and February 2009 as the crisis period in China.

[Insert Figure 3.3 about here]

It is worth to note that, China government announced a dramatic economic stimulus package in November 2008 (Liang, 2010; Overholt, 2010). One important plan is to invest four trillion RMB (about 586 billion U.S. dollars) in infrastructure and social welfare by the



end of 2010. Meanwhile, the monetary policy shifted from “tight” to “moderately loose”. Banks’ reserve requirement and benchmark interest rates were reduced several times around the end of 2008.<sup>40</sup> As a response, bank loans (as shown in Figure 3.1) and the stock market (as shown in Figure 3.3) began to increase around November 2008. Considering the intervention of the economic stimulus plan, we set November 2008 as the alternative ending point of crisis period in China.

### 3.3.2 *Sample selection*

The sample consists of the non-financial firms that publicly listed in *Shanghai Stock Exchange* and *Shenzhen Stock Exchange* at the end of December 2007. The data is from the *RESSET* Financial Research Database, which is one of the biggest databases in China.<sup>41</sup> Since our theoretical model is based on the conflict between controlling shareholders and minority shareholders, we need to ensure a controlling shareholder has enough control on the listed firm. Following La Porta et al. (1999), Claessens et al. (2000), and Claessens et al. (2002), we exclude the firms where the controlling shareholders’ voting rights are less than 10%.<sup>42</sup> We also exclude the firms that report abnormal transactions during the crisis period. These abnormal transactions include Special Treatment (ST) and Particular Transfer (PT). We further exclude the firms that change their industry code between 2007 and 2010.<sup>43</sup> The final sample includes 625 firms’ observations.

### 3.3.3 *Research specification*

Hypothesis H1 predicts that corporate governance is positively associated with crisis

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<sup>40</sup> The U.S. and U.K. government also announced similar policies around the same time (Erkens et al., 2012).

<sup>41</sup> For more information about the *RESSET* Financial Research Database, please see <http://www2.resset.cn/en/>.

<sup>42</sup> Among the 694 firms, controlling shareholders have the voting rights of less than 10% in 42 firms.

<sup>43</sup> Here a firm is viewed as changing its industry code if its 3-digit industry code changes.

period stock return. As we discussed in the theoretical section, controlling shareholders' expropriation ultimately reflects on stock return. Using stock return as the dependent variable, we actually test the effectiveness of corporate governance in deterring expropriation. The external shock during the financial crisis provides a quasi-experiment, through which we can examine whether the *ex ante* corporate governance mechanisms prior to crisis explain the *ex post* magnitude of stock price decline during the crisis. This method is also used in prior studies such as Mitton (2002), Baek et al. (2004), and Bae et al. (2012).

The regression specification is as follows:

$$R_{i,t} = \alpha + B \cdot CG_{i,t-1} + Z \cdot X_{i,t-1} + \alpha_{ind} + \varepsilon_{i,t}, \quad (14)$$

where  $R_{i,t}$  denotes the stock return during the financial crisis. The crisis period we define ranges from May 1<sup>st</sup>, 2008 to February 28<sup>th</sup>, 2009, which covers 197 trading days. We first calculate the daily abnormal return based on long run event study. The Fama-French three factors model is employed to adjust the systematic risk (Fama and French, 1993). To facilitate interpreting the regression coefficients, we use annualized abnormal return as the dependent variable.

The independent variables are based on the observations at the end of fiscal year 2007.  $CG_{i,t-1}$  denotes the control-ownership disparity and corporate governance prior to the crisis.  $X_{i,t-1}$  represents the control variables, which include size, market to book ratio, leverage, and the proportion of intangible assets.  $\alpha_{ind}$  denotes the industry fixed effects, which is based on the 2-digit industry classification of *China Securities Regulatory Commission (CSRC)*. To adjust for possible dependence in the residuals for the firms from the same industry, we use clustered standard errors at industry level following Froot (1989) and Kothari and Warner

(1997). Appendix A shows the detailed description of all variables.

Hypothesis H1 also predicts that corporate governance is not significantly associated with stock return before or after the crisis. To be parallel with crisis period, the pre-crisis period is defined as between May 2007 and February 2008, and the post-crisis period is defined as between May 2009 and February 2010. We calculate the stock return for pre-crisis and post-crisis period, respectively. Accordingly, the independent variables for the pre-crisis regression are measured at the end of fiscal year 2006, and the independent variables for the post-crisis regression are measured at the end of fiscal year 2008.

Hypothesis H2 predicts that corporate governance is more effective when a firm is exposed to severer credit crunch shock. We test this prediction using the following regression equation:

$$R_{i,t} = \alpha + B_1 \cdot CG_{i,t-1} + B_2 \cdot Shock_i + B_3 \cdot CG_{i,t-1} \cdot Shock_i + Z \cdot X_{i,t-1} + \alpha_{ind} + \varepsilon_{i,t}, \quad (15)$$

where  $Shock_i$  measures the extent of credit crunch shock that a firm is exposed to. A greater value of  $Shock_i$  represents the severer credit crunch shock during the crisis. Our coefficient of interest is  $B_3$ , which captures the moderating role of heterogeneous credit crunch shock. A positive  $B_3$  suggests that the effectiveness of corporate governance increases with the severity of credit crunch shock.

Hypothesis H2 also predicts that the moderating role of heterogeneous credit crunch shock is more pronounced when a controlling shareholder has higher cash flow rights. We test this prediction by partitioning the total sample into subsamples based on controlling shareholders' cash flow rights. If H2 holds, we should observe more significant  $B_3$  in the subsample with higher cash flow rights. We use four different threshold points of cash flow

rights to partition the total sample, and they are the cash flow rights of 50%, 45%, 35%, and 25%, respectively.

We use a firm's dependence on external finance to proxy for its exposure to the credit crunch shock. The credit crunch shock during the crisis restricts a firm's investment in the attractive projects (Campello et al., 2010; Duchin et al., 2010; Cingano et al., 2016).<sup>44</sup> The firms that depend more on external finance demonstrate higher level of investment reduction during the crisis (Duchin et al., 2010). Dell'Ariscia et al. (2008) also find similar pattern through examining the impact of banking crises on real activities with the data from 41 countries between 1980 and 2000. Chinese firms rely more on bank loans rather than bond market or equity market (Allen et al., 2012), they are expected to be severely impacted during the crisis, and the firms that depend more on external finance should be exposed to severer credit crunch shock.

We follow Rajan and Zingales (1998) to calculate the external finance dependence prior to the crisis at industry level. An industry's dependence on external finance is defined as the ratio of external finance to total investment in 2006 and 2007, where external finance is calculated as total investment minus internal finance. We collect the data from the *China Fixed Asset Investment Yearbook* (2006, 2007).<sup>45</sup> Since the China Fixed Asset Investment Yearbook is based on the China National Economic Industry Classification (GB2002), we manually match it with the industry classification of China Securities Regulatory

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<sup>44</sup> Campello et al. (2010) conduct a survey on 1050 CFOs around the world. They find that credit constrained firms cut their expenditures on technology development and capital accumulation. Duchin et al. (2010) and Cingano et al. (2016) also find that corporate investment significantly reduced during the global financial crisis.

<sup>45</sup> Rajan and Zingales (1998) argue that external finance dependence reflects each industry's intrinsic demand for external finance, which is determined by the production technology. Since Chinese firms could have different production technology, we do not directly use the external finance dependence measure from the U.S. firms.

Commission (CSRC).<sup>46</sup>

We test the validity of the proxy for heterogeneous credit crunch shock by examining the impact of external finance dependence on firms' crisis period stock return. Since the credit crunch shock constrains firms' investment on attractive projects, it would ultimately reflect on stock return.<sup>47</sup> Tong and Wei (2008) also use similar method to investigate the real effect of subprime crisis. We partition the total sample into two subsamples based on firms' external finance dependence. As shown in Panel A of Table 3.1, the average crisis period stock return in the high dependence group is negative, and it is significantly lower than that of the low dependence group. The above results suggest that external finance dependence is negatively related to stock return.

[Insert Table 3.1 about here]

As a further check, we also compare the cumulative excess return of high dependence group and low dependence group. As demonstrated in Figure 3.4, the cumulative excess return of high dependence group is monotonically decreasing with time, whereas the stock return of low dependence group is monotonically increasing. The above findings suggest that firms depending more on external finance are exposed to severer credit crunch shock during the crisis. Therefore, external finance dependence is a good proxy for the heterogeneous credit crunch shock during the crisis.

[Insert Figure 3.4 about here]

### 3.3.4 *Measurement of corporate governance*

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<sup>46</sup> To better match these two industry classifications, we use the 2-digit China National Economic Industry Classification (GB2002) and the 3-digit industry classification of China Securities Regulatory Commission (CSRC).

<sup>47</sup> We can also derive the linkage between external shock and stock return based on the theoretical model. Taking the first order derivative of stock return  $r$  with respect to investment payoff rate  $\pi$ , we have  $\frac{\partial r}{\partial \pi} = 1 + \frac{(2\rho\pi-1)\kappa\cdot\lambda\rho}{\omega_{init}}$ . The above equation is positive in most cases, and it implies that the severer external shock is related to lower stock return.

In this section, we first measure the separation of a controlling shareholder's voting rights and cash flow rights (i.e., control-ownership disparity), then introduce three shareholder protecting corporate governance mechanisms that are widely used in China

Most public firms in China are controlled by controlling shareholders through pyramid control chains, which result in the separation of a controlling shareholder's voting rights and cash flow rights. Following Claessens et al. (2000), Claessens et al. (2002), and La Porta et al. (2002), we define a controlling shareholder's voting rights as its minimum ownership along the control chain. Its cash flow rights measure the shares of payoff that the controlling shareholder receives from the listed firm, and it is calculated as the product of the controlling shareholder's ownership along the control chain. Accordingly, the control-ownership disparity is measured as the ratio of the controlling shareholder's voting rights to cash flow rights. We manually collect the control chains from each firm's annual report in fiscal year 2007.

Figure 3.5 demonstrates the control chain of a public firm in China. The publicly listed firm, the *Sichuan New Hope Agricultural Co., Ltd.*, is ultimately controlled by *Mr. Yonghao LIU* through a two-layer control chain. The voting rights of the controlling shareholder are 45.26%, and its cash flow rights are 28.04% (i.e.,  $61.95\% \times 45.26\%$ ). The control-ownership disparity is 1.61, which is calculated as  $45.26 / 28.04$ . The controlling shareholder's voting rights and cash flow rights show apparent disparity in this example.

[Insert Figure 3.5 about here]

We examine three shareholder protecting corporate governance mechanisms that are widely used in China. They are *block shareholding*, *board independence*, and *big four*

*auditing*. First, *block shareholding* in a listed firm is defined as the shareholding of all the block shareholders excluding the controlling shareholder. Following Mitton (2002), Baek et al. (2004), and Bae et al. (2012), we classify a shareholder as a block shareholder if it holds at least 5% shares.<sup>48</sup> Attig et al. (2008) find that the existence of block shareholders can work as an internal governance mechanism to reduce controlling shareholders' expropriation, and the governance role of block shareholders is especially strong in East Asian countries.

Second, *board independence* is measured as the proportion of independent directors on the board. As documented by Hermalin and Weisbach (2003) and Chhaochharia and Grinstein (2007), independent directors are likely to work on behalf of all the shareholders. Therefore, independent directors can counterbalance the power of controlling shareholders on the board. We classify a director as an independent director if it is not employed by the company and does not have close economic relation with the company or the large shareholders.

The third corporate governance mechanism we examine is whether a firm is audited by the big four accounting companies. Mitton (2002) argues that the big four accounting companies can improve a firm's financial reporting quality, and thus facilitate monitoring the controlling shareholder's expropriation behavior. The *big four auditing* is defined as an indicator variable, which takes the value of one if a firm is audited by the big four accounting companies, and zero otherwise.

To check the exogenous property of credit crunch shock, we compare corporate governance under the low / high external finance dependence group. As shown in Panel B of

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<sup>48</sup> A controlling shareholder holds at least 10% shares of the listed firm in the sample, and hence it is also a block shareholder. However, since we aim to measure the governance mechanisms that can deter controlling shareholders' expropriation, we exclude controlling shareholders from block shareholders when measuring the governance variable *block shareholding*.

Table 3.1, the control-ownership disparity and corporate governance do not show significant difference between the low dependence group and the high dependence group. It suggests that the extent to which a firm is exposed to the credit crunch shock is independent of its *ex ante* corporate governance mechanism. Therefore, the credit crunch shock during the financial crisis can be viewed as an external shock to Chinese firms.

### **3.4 Results**

#### *3.4.1 Summary Statistics*

Table 3.2 presents the summary statistics for the sample. Panel A of Table 3.2 reports the univariate statistics. The average annualized abnormal return during the crisis period (May 2008 - February 2009) is 0.02. The median value of abnormal return is 0.01, with the lower quartile of -0.28 and the upper quartile of 0.33. Since the abnormal return shows symmetric distribution with the median value around zero, it suggests that the listed firms have different performance during the crisis. The abnormal return during the alternative crisis period (May 2008 – November 2008) is higher, with the mean value of 0.05 and the median value of 0.14. The firms' average dependence on external finance is 0.21, with the lower quartile of 0.14 and the upper quartile of 0.26. It indicates that, on average, external finance accounts for 21% of corporate investments prior to the crisis.

Similar to Claessens et al. (2000, 2002), we observe concentrated ownership and the disparity between controlling shareholders' voting rights and cash flow rights in the sample. The average voting rights of controlling shareholders are 38%, with the lower quartile of 26% and the upper quartile of 48%. It suggests that Chinese firms show concentrated ownership, and controlling shareholders in China have strong power over the listed firms. The average



cash flow rights are 31%, which is less than voting rights. The average ratio of controlling shareholders' voting rights to cash flow rights is 1.56, and the median value is 1.01. It suggests that pyramid ownership structure exists in more than half of sample firms, which results in the disparity between voting rights and cash flow rights.

As for the corporate governance variables, the average block shareholding is 9%, which is much smaller than the ownership of controlling shareholders. Independent directors represent 56% of board members on average. 8% of publicly listed firms in the sample are audited by the big four accounting companies. Panel B of Table 3.2 reports the correlation matrix for the independent variables. The correlation coefficients are relatively small, and there are not severe multicollinearity concerns.

[Insert Table 3.2 about here]

#### 3.4.2 *The effectiveness of corporate governance*

We test the effectiveness of corporate governance by regressing the crisis period stock return on the control-ownership disparity and corporate governance. The results are reported in column 1 of Table 3.3. The coefficient estimate of control-ownership disparity (*voting rights / cash flow rights*) is -0.022, which is statistically significant at the 10% level. It indicates that a greater separation of voting rights and cash flow rights is associated with lower stock return during the crisis. As we discussed in the theoretical section, a controlling shareholder's expropriation ultimately reflects on stock return. Therefore, the negative coefficient estimate suggests that the separation of voting rights and cash flow rights stimulates controlling shareholders' expropriation during the crisis. With the control-ownership disparity increasing by one standard deviation (1.19), the annualized crisis

period stock return decreases by 2.62% (i.e.,  $1.19 \times 0.022$ ), which is economically significant.

Column 1 of Table 3.3 also reports the coefficient estimates of corporate governance variables. The coefficient estimates of *block shareholding* and *big four auditing* are positive, but they are not statistically significant. The coefficient estimate of *board independence* is negative and not statistically significant. The above results indicate that corporate governance does not show significant influence on the stock return during the crisis. It could be due to that different firms are heterogeneously exposed to the credit crunch shock during the crisis. It makes the effectiveness of corporate governance varies across different firms. We will test this explanation in the next section.

We also examine the effectiveness of corporate governance before and after the financial crisis. The results are reported in column 2 and 3 of Table 3.3. In contrast to the results during the crisis, the control-ownership disparity does not show significant influence on stock return either before or after the crisis. It suggests that there are not significant expropriation concerns in the absence of a crisis, which is consistent with our prediction. Similarly, the coefficient estimates of corporate governance are also not statistically significant. We further employ Chow test to compare the coefficient estimates in different periods. The  $\chi^2$  statistics are statistically significant with the p-value of 0.00, which indicates the coefficient estimates during the crisis are significantly different from that of before or after the crisis.

[Insert Table 3.3 about here]

### 3.4.3 *Heterogeneous credit crunch shock and the effectiveness of corporate governance*

In the theoretical section, we predict that the effectiveness of corporate governance increases with the severity of credit crunch shock. We test the moderating role of

heterogeneous credit crunch shock by introducing the interaction between corporate governance and external finance dependence. With a firm depending more on external finance, it is exposed to severer credit crunch shock during the crisis. Therefore, we expect that corporate governance would be more effective in improving firm performance with a firm depending more on external finance.

The estimation results are reported in column 1 of Table 3.4. The coefficient estimate of external finance dependence (*Dependence*) is -7.957, which indicates the firms that depend more on external finance are exposed to severer credit crunch shock during the crisis. The coefficient estimate of interaction between control-ownership disparity (*Voting rights / Cash flow rights*) and external finance dependence (*Dependence*) is -0.484, which is statistically significant at the 5% level. It suggests that, with a firm being exposed to severer credit crunch shock, separation of voting rights and cash flow rights is more likely to induce controlling shareholders' expropriation behavior. Hence the negative association between control-ownership disparity and crisis period stock return is stronger.

The coefficient estimates of interactions between external finance dependence (*Dependence*) and corporate governance mechanisms (i.e., *Block shareholding*, *board independence*, and *big four auditing*) are positive, and they are statistically significant at the 1% or 5% level. The positive coefficients imply that the effectiveness of corporate governance increases with the severity of credit crunch shock, which is consistent with our prediction. When a firm relies more on external finance and hence is exposed to severer credit crunch shock, corporate governance is more effective in deterring expropriation and improving firm performance.

The above findings can also partially explain why corporate governance mechanisms do not show significant influence on crisis period stock return in column1 of Table 3.3. Since different firms could heterogeneously suffer from credit crunch shock during the crisis,

controlling shareholders' expropriation incentive vary across firms. For the firms that suffer less from the crisis, corporate governance could not significantly improve firm performance. Therefore, we cannot observe significant coefficient estimates if we do not differentiate a firm's exposure to the credit crunch shock.

[Insert Table 3.4 about here]

We also predict that controlling shareholders' cash flow rights play an important role in the effectiveness of corporate governance. When a controlling shareholder holds more cash flow rights of a listed firm, the controlling shareholder's payoff is more likely to be influenced by adverse shock. Therefore, the controlling shareholder has higher expropriation incentive, and hence the moderating role of heterogeneous credit crunch shock on the effectiveness of corporate governance is stronger.

We do subsample analysis by partitioning the total sample based on controlling shareholders' cash flow rights. The results are reported in column 2 and 3 of Table 3.4. When a controlling shareholder's cash flow rights are greater than 50%, the coefficient estimate of interaction between control-ownership disparity (*Voting rights / Cash flow rights*) and external finance dependence (*Dependence*) is -56.43, which is statistically significant at the 10% level. In contrast, the corresponding coefficient estimate is not statistically significant when a controlling shareholder's cash flow rights are less than 50%. The above findings suggest that, when a controlling shareholder holds higher cash flow rights, heterogeneous credit crunch shock more likely to induce controlling shareholders' expropriation and hence moderate the effectiveness of corporate governance.

Corporate governance variables also show similar pattern across subsamples. In the higher cash flow rights subsample, the coefficient estimates of *Block shareholding* × *Dependence* and *Board independence* × *Dependence* are 68.47 and 39.42, respectively. Both coefficient estimates are statistically significant at the 1% level. Whereas the coefficient

estimate of *Block shareholding* × *Dependence* is not statistically significant in the lower cash flow rights subsample. The coefficient estimate of *Block shareholding* × *Dependence* is statistically significant in the lower cash flow rights subsample, but the magnitude is much smaller. The exception is the coefficient estimate of *Big four auditing* × *Dependence*, which is only statistically significant in the lower cash flow rights subsample.

It is worth to note that, the exact threshold of cash flow rights for subsamples is difficult to determine solely based on the theoretical model. To check robustness, we employ the cash flow rights of 45%, 35%, and 25% as alternative threshold points for subsamples. The results are reported in Table 3.5. In general, the coefficient estimates of interaction between corporate governance and external finance dependence are statistically significant in the higher cash flow rights subsamples (i.e., even columns). Whereas, the coefficient estimates in the lower cash flow rights subsample (i.e., odd columns) are either statistically insignificant or much smaller in magnitude.

We further use Chow test to compare the coefficient estimates across subsamples. All the  $\chi^2$  statistics are significantly different from zero with the p-value of 0.00. It indicates that the coefficient estimates of higher cash flow rights subsample are significantly different from that of lower cash flow rights subsample. The above finding is consistent with our prediction, and it indicates that cash flow rights affect controlling shareholders' expropriation incentive and hence impact the effectiveness of corporate governance under the heterogeneous credit crunch shock.

[Insert Table 3.5 about here]

Overall, our findings suggest that heterogeneous adverse shock could moderate the effectiveness of corporate governance. With a firm being exposed to severer credit crunch shock, corporate governance is more effective in deterring expropriation and improving firm performance. It could potentially explain why previous literature documents mixed findings

on the effectiveness of corporate governance. Since different firms could be heterogeneously influenced by an adverse shock, it is difficult to examine the effectiveness of corporate governance if neglecting firms' heterogeneous exposure to the shock.

#### *3.4.4 Alternative crisis period*

China government announced a massive economic stimulus program in November 2008 (Liang, 2010; Overholt, 2010). Considering the possible distortion caused by government intervention, we set the period between May 2008 and November 2008 as an alternative crisis period. We calculate the annualized abnormal return based on the alternative crisis period. The descriptive statistics are report in Table 3.2. The average annualized stock return is 0.05, and the median value is 0.14, which is greater than the value in the main crisis period.

We run regression based on the alternative crisis period, and the results are reported in Table 3.6. The estimation results are similar to that of main crisis period (i.e., May 2008 – February 2009). Column 1 reports the effectiveness of corporate governance during the alternative crisis period. The coefficient estimates of control-ownership disparity and corporate governance are consistent with our expectation, but they are not statistically significant. Column 2 shows the impact of heterogeneous credit crunch shock on the effectiveness of corporate governance. The coefficient estimates of interaction between corporate governance variables and external finance dependence are positive and statistically significant. It suggests that corporate governance become more effective in deterring expropriation with a firm being exposed to severer credit crunch shock.

We also employ subsample analysis to examine the role of controlling shareholders' cash flow rights. The thresholds of cash flow rights we use are the same as before. As shown

in column 3 to 10, the coefficient estimates of interaction between corporate governance and external finance dependence are more likely to be significant in the subsamples with higher cash flow rights (i.e., even columns). The above findings are similar to what we find in the main tests, and it indicates that our results are not distorted by China government's economic stimulus program during the crisis.

[Insert Table 3.6 about here]

We also compare our crisis period with previous literature. Since it takes time for the crisis to affect China, and we focus on the period when the global financial crisis have significant influence in Chinese economy, thus the crisis period we define is later than what defined in prior literature. For instance, Tong and Wei (2008) examine the influence of subprime crisis on the U.S. economy. They set the crisis period as between August 2007 and March 2008. Beltratti and Stulz (2012) and Erkens et al. (2012) investigate the financial crisis based on the international background. The crisis periods they define cover longer periods. Beltratti and Stulz (2012) set the crisis period as between July 2007 and December 2008, while Erkens et al. (2012) set it as between January 2007 and September 2008.

Although China economy experienced fluctuations before May 2008, it did not show significant collapse. Therefore, we predict the effectiveness of corporate governance in China is not significant in the crisis periods that are defined in previous literature. We use the stock return based on the crisis periods in previous literature as dependent variable to run the regression. We also calculate the return between October 2007 and April 2008, during which Chinese economy shows fluctuations. In the untabulated results, control-ownership disparity and corporate governance do not show significant influence on stock return. The

heterogeneous credit crunch shock does not show moderating role in the effectiveness of corporate governance either.

### **3.5 Conclusion**

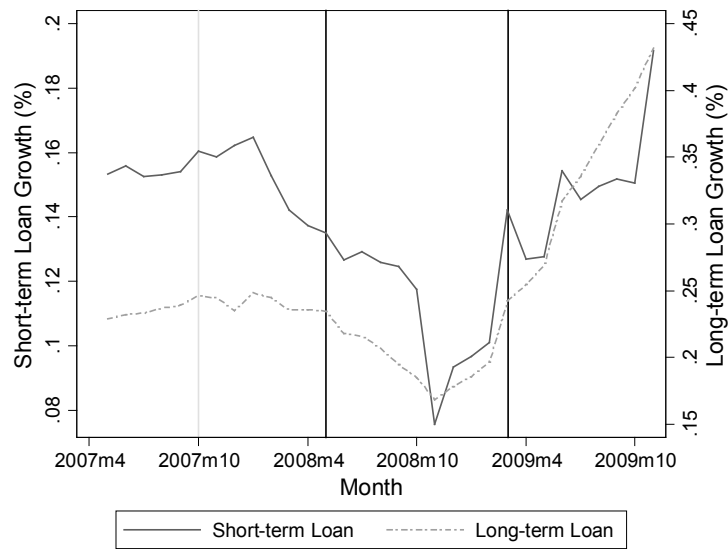
In this paper, we theoretically and empirically examine the moderating role of heterogeneous adverse external shock in the effectiveness of corporate governance. We theoretically show that a controlling shareholder has high incentive to expropriate minority shareholders under an adverse external shock. With a firm being exposed to severer external shock, the controlling shareholders' expropriation incentive is higher. Therefore, shareholder protecting governance mechanisms would be more effective on deterring expropriation and improving firm performance in those periods with significant adverse external shock.

We test the above hypotheses using Chinese nonfinancial firms during the recent global financial crisis. Most Chinese firms show concentrated ownership, and are controlled by controlling shareholders, which is consistent with our theoretical setting. We find that separation of controlling shareholders' voting rights and cash flow rights is negatively associated with firms' crisis period stock return. However, corporate governance is not effective in improving stock return in the level regression. We further show that, heterogeneous credit crunch shock could moderate the effectiveness of corporate governance. When a firm suffers more from the credit crunch shock, corporate governance is more effective in deterring expropriation and improving firm performance. Furthermore, the above is more likely to occur when a controlling shareholder has higher cash flow rights and more sensitive to the external shock. Taken together, our evidence suggests that corporate governance is more likely to play a role when a firm is exposed to a severer external shock.



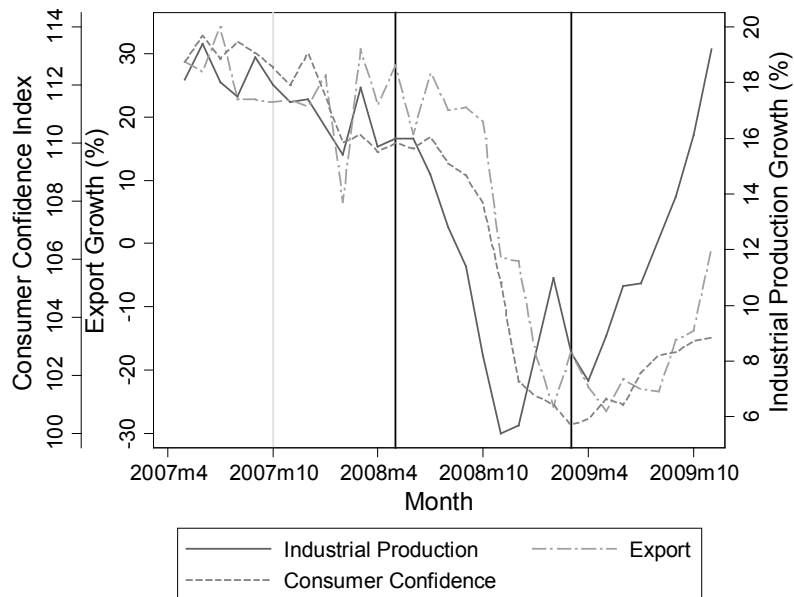
### Appendix 3. A:

Variables	Definitions
Abnormal return (AR)	The firm-level abnormal return during the global financial crisis. The crisis period is defined as the period from May 2008 to February 2009. We use the Fama-French three factors model to adjust the systematic risks (Fama and French, 1993). Abnormal return is calculated based on daily observations. To facilitate interpreting the regression coefficients, we use annualized abnormal return as the dependent variable.
Abnormal return (AR) (alternative)	The firm-level abnormal return based on an alternative crisis period. In November 2008, China government announced the economic stimulus plan, so we define the period between May 2008 and November 2008 as the alternative crisis period. The Fama-French three factors model is employed to adjust the systematic risks, and annualized abnormal return is calculated as the dependent variable.
External finance dependence	An industry's dependence on the external finance prior to the global financial crisis. It is calculated as the ratio of an industry's external finance to total investments in 2006 and 2007. The industry is based on the 2-digit <i>China National Economic Industry Classification (GB2002)</i> , and the data of external finance dependence is from the <i>China Fixed Asset Investment Yearbook</i> .
<i>Corporate governance</i>	
Voting rights / Cash flow rights (or control ownership disparity)	The ratio of a controlling shareholder's voting rights to cash flow rights. The controlling shareholder's voting rights are its minimum ownership along the control chain. The cash flow rights are the shares of payoff that the controlling shareholder receives from the listed firm. It can be calculated as the product of the controlling shareholder's ownership along the control chain. We manually collect the control chains from each firm's annual report in fiscal year 2007.
Block shareholding	Total shareholding of all the block shareholders excluding the controlling shareholder. A shareholder is classified as a block shareholder if it holds at least 5% shares of the listed firm. We take the observations at the end of fiscal year 2007.
Board independence	The percentage of independent directors on the board based on the observations at the end of fiscal year 2007.
Big four auditing	Indicator variable for the big four accounting companies. It takes the value of one if a firm is audited by the big four accounting companies in fiscal year 2007, and zero otherwise.
<i>Control variables</i>	
Size	The natural log of total revenue at the end of fiscal year 2007.
Market-to-book	The ratio of the market value of the tradable equity to the book value of total equity. It is based on the observations at the end of fiscal year 2007.
Leverage	The percentage of total liability in total assets at the end of fiscal year 2007.
Intangible assets	The percentage of intangible assets in total assets at the end of fiscal year 2007.



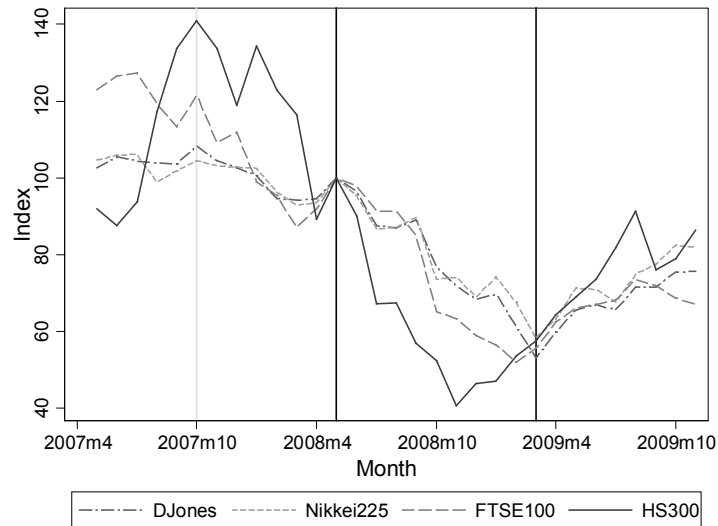
**Figure 3.1: Loan growth rate in China during the global financial crisis**

This figure shows the growth rate of short-term loan and long-term loan in China around the global financial crisis. We collect the data from the *RESSET* database.



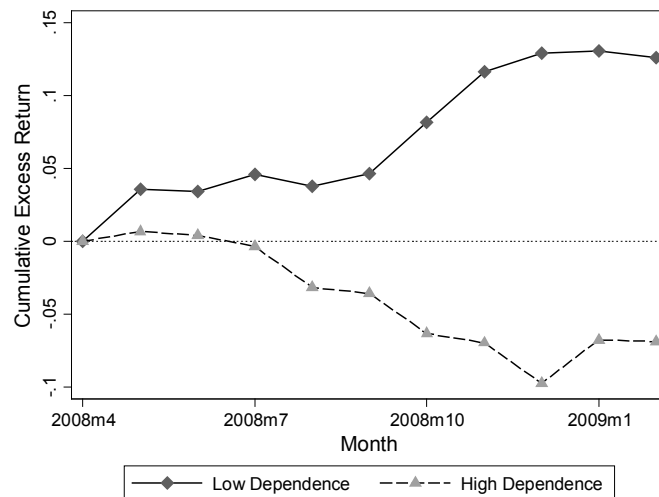
**Figure 3.2: Chinese economy during the global financial crisis**

This figure shows the evolution of Chinese economy around the global financial crisis. The macroeconomic indicators include industrial production growth rate, export growth rate, and consumer confidence index. Based on the macroeconomic evolution, the crisis period is defined as between May 2008 and February 2009. The data is from the *National Bureau of Statistics of China*.



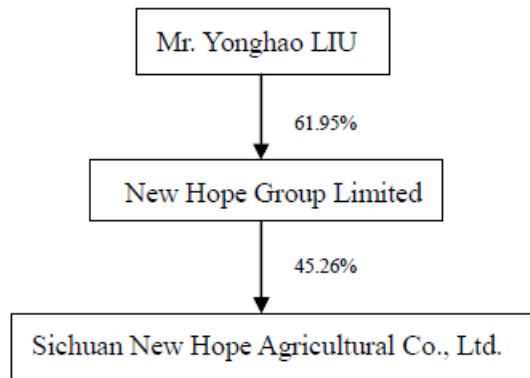
**Figure 3.3: Stock markets around the world during the global financial crisis**

This picture demonstrates the stock market indices around the world during the global financial crisis. DJones denotes the *S&P Dow Jones Industrial Average Index*, Nikkei225 denotes the *Nikkei Stock Average 225 Index*, which is based on the *Tokyo Stock Exchange*, FTSE100 denotes the *Financial Times Stock Exchange 100 Index*, and HS300 denotes the *China Shanghai & Shenzhen 300 Stock Index*. The crisis period is defined as between May 2008 and February 2009. To facilitate illustration, we standardize the value of indices at the beginning of the crisis (i.e., May 2008) to 100. The data is from the *RESSET* database.



**Figure 3.4: Cumulative excess return of the low / high external finance dependence group**

This figure demonstrates the cumulative excess return during the global financial crisis for the low / high external finance dependence group. The crisis period is defined as between May 2008 and February 2009. The low and high dependence groups are based on the lower and upper tertiles of external finance dependence, respectively. The excess return of each portfolio is calculated as the equally weighted average return excluding the market return. The excess return that is calculated based on the value weighting method shows similar pattern.



**Figure 3.5: The control chain of a publicly listed firm in China**

This figure shows one example of the control chain in a publicly listed firm in China. The publicly listed firm is the *Sichuan New Hope Agricultural Co., Ltd.*, and it is listed on the *Shenzhen Stock Exchange* in China with stock code 000876. The ultimate controlling shareholder is *Mr. Yonghao LIU*. The above control chain is collected from the firm's annual report in fiscal year 2007.

**Table 3.1: Heterogeneous credit crunch shock**

Panel A: Abnormal return (AR) in the low / high external finance dependence group					
	N	Average AR	Difference of AR	T-Test	Wilcoxon Test
Low dependence	296	0.12	0.20	2.66(0.01)	2.98(0.00)
High dependence	295	-0.08			
Panel B: Corporate governance in the low / high external finance dependence group					
	Low dependence	High dependence	T-Test	Wilcoxon Test	
Voting rights / Cash flow rights	1.62	1.52	0.97(0.33)	0.04(0.97)	
Block shareholding	0.10	0.09	0.80(0.42)	0.70(0.48)	
Board independence	0.56	0.56	0.70(0.48)	0.65(0.51)	
Big four auditing	0.08	0.08	-0.01(0.99)	-0.01(0.99)	

This table demonstrates the heterogeneous credit crunch shock by comparing abnormal return and corporate governance in the low / high external finance dependence group. *External finance dependence* measures an industry's dependence on external finance prior to the global financial crisis (i.e., 2006 and 2007). Based on the sample median value of *external finance dependence*, we partition the total sample into the low dependence group and high dependence group. Panel A reports abnormal return in the low / high external finance dependence group. Abnormal return (AR) is the firm-level abnormal return during the global financial crisis (May 2008 – February 2009). The Fama-French three factor model (Fama and French, 1993) is used to adjust the systematic risk. We annualize abnormal return to facilitate interpretation. Panel B reports the control-ownership disparity and corporate governance in the low / high external finance dependence group. *Voting rights / Cash flow rights* (or *control-ownership disparity*) is measured as the ratio of a controlling shareholder's voting rights to its cash flow rights. *Block shareholding* is the total shareholding of all the block shareholders excluding the controlling shareholder. *Board independence* is calculated as the percentage of independent directors on the board. *Big four auditing* is the dummy variable for the big four accounting companies. Appendix A contains all variable definitions. We compare abnormal return and corporate governance based on T-Test and non-parametric Wilcoxon signed-rank test. The null hypothesis is that the two sets of observations in the low / high external finance dependence group are not significantly different from each other. P-values are reported in brackets.

**Table 3.2: Summary statistics**

Panel A: Univariate statistics							
	N	Mean	SD	Q1	Median	Q3	
Abnormal return (AR)	625	0.02	0.92	-0.28	0.01	0.33	
Abnormal return (AR) (alternative)	625	0.05	1.67	-0.27	0.14	0.55	
External finance dependence	591	0.21	0.10	0.14	0.18	0.26	
Voting rights / Cash flow rights	625	1.56	1.19	1.00	1.01	1.74	
Voting rights	625	0.38	0.14	0.26	0.37	0.48	
Cash flow rights	625	0.31	0.16	0.19	0.28	0.42	
Block shareholding	625	0.09	0.12	0.00	0.05	0.18	
Board independence	625	0.56	0.12	0.50	0.50	0.60	
Big four auditing	625	0.08	0.27	0	0	0	
Size	625	21.30	1.28	20.44	21.18	22.03	
Market-to-book	625	2.96	2.06	1.63	2.36	3.65	
Leverage	625	0.49	0.16	0.37	0.50	0.62	
Intangible assets	625	0.04	0.05	0.01	0.03	0.06	

Panel B: Correlation matrix								
	I	II	III	IV	V	VI	VII	VIII
Voting rights / Cash flow rights (I)		0.07	-0.05	0.01	-0.07	0.04	-0.01	0.05
Block shareholding (II)	0.08		0.04	0.15	-0.09	-0.02	-0.04	0.09
Board independence (III)	-0.06	0.01		-0.02	-0.03	-0.02	-0.06	-0.02
Big four auditing (IV)	-0.02	0.22	-0.05		0.32	-0.25	0.03	-0.01
Size (V)	-0.09	-0.02	-0.05	0.39		-0.25	0.35	-0.21
Market-to-book (VI)	0.03	-0.02	0.00	-0.19	-0.22		0.04	0.11
Leverage (VII)	-0.04	-0.04	-0.08	0.04	0.33	0.02		-0.03
Intangible assets (VIII)	-0.01	0.07	-0.02	-0.04	-0.26	0.05	-0.03	

This table presents the summary statistics for main variables of interests. Panel A reports the univariate statistics. Panel B reports the correlation matrix for independent variables. The upper triangle is based on the Spearman correlation, and the lower triangle is based on the Pearson correlation. The dependent variable *abnormal return (AR)* is firm-level abnormal return during the global financial crisis (May 2008 – February 2009). *Abnormal return (AR) (alternative)* is firm-level abnormal return based on an alternative crisis period (May 2008 - November 2008). We calculate abnormal return based on the Fama-French three factor model (Fama and French, 1993). To facilitate interpretation, we use annualized abnormal return in the regression. *External finance dependence* measures an industry's dependence on external finance prior to the financial crisis (i.e., 2006 and 2007). The data on external finance dependence is from the *National Bureau of Statistics of China*, and the industries are based on the 2-digit *China National Economic Industry Classification (GB2002)*. *Voting rights / Cash flow rights* (or *control-ownership disparity*) is measured as the ratio of a controlling shareholder's voting rights to its cash flow rights. *Block shareholding* is the total shareholding of all the block shareholders excluding the controlling shareholder. *Board independence* is the percentage of independent directors on the board. *Big four auditing* is the dummy variable for the big four accounting companies. *Size* is the natural log of total revenue. *Market to book* is the ratio of the market value of equity to the book value of equity. *Leverage* is the percentage of total liability in total assets. *Intangible assets* measures the percentage of intangible assets in total assets. Appendix A contains all variable definitions. All the independent variables are based on the observations

at the end of fiscal year 2007. We winsorize all variables at the 1% and 99% levels.

**Table 3.3: The effectiveness of corporate governance during, before, and after the global financial crisis**

	During the crisis May 2008 - Feb 2009	Before the crisis May 2007 - Feb 2008	After the crisis May 2009 - Feb 2010
Independent variables	(1)	(2)	(3)
Voting rights / Cash flow rights	-0.022* (-1.92)	0.035 (1.07)	-0.006 (-1.32)
Block shareholding	0.382 (1.35)	-0.196 (-1.02)	0.159 (1.24)
Board independence	-0.347 (-1.13)	0.031 (0.15)	-0.016 (-0.10)
Big four auditing	0.160 (1.07)	0.024 (0.27)	-0.172** (-2.48)
Size	-0.091 (-1.69)	0.029 (0.97)	0.038 (1.57)
Market-to-book	0.001 (0.07)	0.031** (2.45)	-0.013 (-1.08)
Leverage	0.316 (0.77)	0.282* (1.91)	-0.132 (-1.43)
Intangible assets	-1.037* (-1.95)	-0.049 (-0.10)	0.143 (0.43)
Industry fixed effects	Yes	Yes	Yes
Observations	625	636	693
R-squared	0.055	0.136	0.062
Chi2 (P-value)		770.29(0.00)	1474.83(0.00)

This table presents the effectiveness of corporate governance during, before, and after the global financial crisis. Column 1 uses the firm-level abnormal return during the global financial crisis as dependent variable. The crisis period is defined as between May 2008 and February 2009. Independent variables are based on the observations at the end of fiscal year 2007. Appendix A contains all variable definitions. Column 2 and 3 use the firm-level abnormal return before and after the crisis as dependent variable, respectively. The period before the crisis is set as between May 2007 and February 2008, and the period after the crisis is set as between May 2009 and February 2010. Independent variables in column 2 and 3 are based on the observations at the end of fiscal year 2006 and 2008, respectively. We use Chow test to compare the regression coefficients before (after) the crisis with crisis period coefficients. Chi2 statistics and p-value are reported in the last row of column 2 and 3. Industry fixed effects based on the 2-digit industry classification of *China Securities Regulatory Commission (CSRC)* are used in all specifications. Standard errors are clustered at industry levels, T-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.



**Table 3.4: Heterogeneous credit crunch shock and the effectiveness of corporate governance during the crisis**

	Total sample	Subsamples	
		<50%	≥50%
Independent variables	(1)	(2)	(3)
(Voting rights / Cash flow rights) × Dependence	-0.484** (-2.13)	-0.234 (-1.53)	-56.430* (-1.80)
Block shareholding × Dependence	5.935*** (4.29)	-1.003 (-0.60)	68.470*** (4.05)
Board independence × Dependence	7.815*** (7.02)	1.691** (2.59)	39.420*** (5.05)
Big four auditing × Dependence	1.683** (2.70)	0.922* (1.85)	-5.015 (-0.15)
Dependence	-7.957*** (-6.57)	-2.160* (-2.02)	27.030 (1.00)
Voting rights / Cash flow rights	-0.107** (-2.29)	0.010 (0.28)	9.697 (1.70)
Block shareholding	-0.820* (-1.77)	0.258 (0.47)	-11.250*** (-3.11)
Board independence	-2.020*** (-9.10)	-0.958*** (-4.73)	-7.980*** (-4.38)
Big four auditing	-0.184* (-2.00)	-0.127 (-0.94)	1.370 (0.23)
Size	-0.095 (-1.63)	-0.026 (-1.05)	-0.317 (-1.27)
Market-to-book	0.002 (0.15)	0.006 (0.39)	-0.068 (-1.11)
Leverage	0.426 (1.01)	0.079 (0.45)	0.985 (0.48)
Intangible assets	-1.257** (-2.07)	-1.231* (-1.84)	-2.136 (-1.56)
Constant	4.156*** (3.38)	1.994*** (2.93)	3.065 (0.58)
Industry fixed effects	Yes	Yes	Yes
Observations	591	503	88
R-squared	0.087	0.130	0.229
Chi2 (P-value)		2418.72(0.00)	

This table presents the moderating role of heterogeneous credit crunch shock on the effectiveness of corporate governance during the crisis. The dependent variable is firm-level abnormal return during the global financial crisis. The crisis period is defined as between May 2008 and February 2009. Independent variables are based on the observations at the end of fiscal year 2007. *Dependence* denotes an industry's external finance dependence, and it measures the extent of heterogeneous credit crunch shock. A higher level of dependence on external

finance implies severer credit crunch shock during the global financial crisis. The variables of interests are the interaction between corporate governance and external finance dependence. Column 1 is based on the total sample. Column 2 and 3 use the subsamples that are partitioned by controlling shareholders' cash flow rights. Column 2 corresponds to the subsample in which controlling shareholders' cash flow rights are less than 50%, while column 3 corresponds to the subsample in which controlling shareholders' cash flow rights are equal to or higher than 50%. We employ Chow test to compare the regression coefficients in the subsamples in column 2 and 3, the Chi2 statistics and p-value are reported in the last row. Appendix A contains all variable definitions. Industry fixed effects based on the 2-digit industry classification of *China Securities Regulatory Commission (CSRC)* are used in all specifications. Standard errors are clustered at industry levels, T-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 3.5: Subsample analysis based on cash flow rights**

	Subsamples		Subsamples		Subsamples	
	Cash flow rights		Cash flow rights		Cash flow rights	
	<45%	≥45%	<35%	≥35%	<25%	≥25%
Independent variables	(1)	(2)	(3)	(4)	(5)	(6)
(Voting rights / Cash flow rights)	-0.289*	9.861	-0.022	8.905**	-0.029	2.316
× Dependence	(-1.71)	(1.12)	(-0.15)	(2.15)	(-0.15)	(1.55)
Block shareholding × Dependence	-0.829	18.740***	2.485	13.340***	5.662	6.268***
	(-0.39)	(6.19)	(1.12)	(5.72)	(1.45)	(3.28)
Board independence × Dependence	1.224*	27.980***	2.403***	20.960***	2.502	9.106***
	(1.81)	(5.74)	(3.19)	(5.14)	(1.61)	(10.26)
Big four auditing × Dependence	0.344	1.290	-0.619	2.445**	-3.007*	2.004***
	(0.63)	(0.58)	(-0.89)	(2.49)	(-1.95)	(3.69)
Dependence	-1.502	-31.440**	-3.034**	-25.550***	-4.473***	-10.720***
	(-1.31)	(-2.66)	(-2.49)	(-3.98)	(-2.85)	(-4.62)
Voting rights / Cash flow rights	0.022	-3.070	-0.033	-2.077**	-0.027	-0.367
	(0.55)	(-1.30)	(-0.96)	(-2.24)	(-0.69)	(-0.96)
Block shareholding	0.322	-3.323**	-0.283	-2.175**	-1.006	-0.771
	(0.52)	(-2.81)	(-0.55)	(-2.72)	(-1.47)	(-1.19)
Board independence	-0.814***	-5.657***	-1.056***	-4.208***	-1.041***	-2.307***
	(-4.25)	(-5.77)	(-4.87)	(-4.81)	(-3.14)	(-7.00)
Big four auditing	-0.138	0.602	0.064	-0.153	0.544	-0.179
	(-1.13)	(0.67)	(0.50)	(-0.46)	(1.68)	(-0.97)
Size	-0.023	-0.281	-0.009	-0.161*	-0.001	-0.144*
	(-1.03)	(-1.46)	(-0.34)	(-1.78)	(-0.04)	(-1.82)
Market-to-book	0.002	-0.035	0.003	0.007	-0.000	0.005
	(0.11)	(-0.68)	(0.24)	(0.25)	(-0.02)	(0.23)

Leverage	0.079 (0.51)	1.122 (0.73)	0.180 (0.96)	0.542 (0.55)	0.176 (0.64)	0.548 (0.78)
Intangible assets	-0.981* (-1.96)	-1.359 (-1.44)	-0.709 (-1.35)	-1.684** (-2.38)	-0.652 (-0.80)	-1.622** (-2.36)
Constant	1.657** (2.49)	13.730** (2.34)	1.592** (2.15)	9.346*** (3.38)	2.005** (2.30)	5.547*** (3.03)
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	467	124	373	218	249	342
R-squared	0.119	0.181	0.145	0.110	0.201	0.082
Chi2 (P-value)	4978.95 (0.00)		1691.55 (0.00)		621.88 (0.00)	

This table presents the moderating role of heterogeneous credit crunch shock on the effectiveness of corporate governance across different subsamples. Column 1 and 2 use the cash flow rights of 45% as threshold to partition subsamples. Column 1 corresponds to the subsample where controlling shareholders' cash flow rights are less than 45%, and column 2 corresponds to the subsample where controlling shareholders' cash flow rights are equal to or higher than 45%. Similarly, column 3 and 4 use the cash flow rights of 35% as threshold, column 5 and 6 use the cash flow rights of 25% as threshold. Dependent variable is firm-level abnormal return during the global financial crisis, and the crisis period is defined as between May 2008 and February 2009. The independent variables are based on the observations at the end of fiscal year 2007. *Dependence* denotes an industry's external finance dependence, and it measures the extent of heterogeneous credit crunch shock. Appendix A contains all variables definitions. We use Chow test to compare the regression results of subsamples, the Chi2 statistics and p-value are reported in the last row. Industry fixed effects based on the 2-digit industry classification of *China Securities Regulatory Commission (CSRC)* are used in all specifications. Standard errors are clustered at industry levels, T-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

**Table 3.6: Alternative crisis period**

	Total sample		Subsamples		Subsamples		Subsamples		Subsamples	
			Cash flow rights		Cash flow rights		Cash flow rights		Cash flow rights	
	(1)	(2)	<50%	≥50%	<45%	≥45%	<35%	≥35%	<25%	≥25%
Independent variables										
(Voting rights / Cash flow rights)		0.604	-0.324	-66.010	-0.428	2.252	0.118	6.263	0.004	1.255
× Dependence		(1.36)	(-0.72)	(-1.47)	(-0.89)	(0.17)	(0.46)	(0.88)	(0.01)	(0.42)
Block shareholding × Dependence		6.670**	-1.695	78.030***	-1.667	21.890***	4.743	13.000**	9.285***	5.548
		(2.20)	(-0.51)	(4.06)	(-0.41)	(3.12)	(1.61)	(2.11)	(2.93)	(1.35)
Board independence × Dependence		7.211***	1.066	37.800***	0.263	24.220***	1.693	17.950***	1.783	8.001***
		(6.20)	(0.65)	(6.62)	(0.14)	(5.34)	(1.51)	(4.04)	(1.07)	(5.09)
Big four auditing × Dependence		1.959***	1.633***	-16.090	0.636	2.164	-0.874	3.447*	-3.869	2.385**
		(2.95)	(2.76)	(-0.30)	(0.85)	(0.65)	(-1.09)	(1.85)	(-1.22)	(2.72)
Dependence		-8.604***	-2.707	47.710	-1.417	-17.710	-4.142**	-18.430**	-5.585**	-8.707**
		(-4.78)	(-1.21)	(1.10)	(-0.58)	(-1.07)	(-2.32)	(-2.16)	(-2.57)	(-2.16)
Voting rights / Cash flow rights	-0.003	-0.108	0.035	14.680	0.056	-1.012	-0.068	-1.572	-0.037	0.009
	(-0.13)	(-1.17)	(0.34)	(1.46)	(0.51)	(-0.25)	(-1.13)	(-0.97)	(-0.53)	(0.01)
Block shareholding	0.741	-0.614	0.716	-13.970**	0.723	-3.477	-0.685	-1.319	-1.513**	-0.251
	(1.57)	(-0.62)	(0.63)	(-2.54)	(0.56)	(-1.19)	(-1.02)	(-0.55)	(-2.24)	(-0.17)
Board independence	-0.203	-1.722***	-0.805	-6.199***	-0.571	-3.881***	-0.917***	-2.579*	-0.848**	-1.822***
	(-0.70)	(-4.96)	(-1.62)	(-3.52)	(-1.15)	(-3.29)	(-2.88)	(-1.82)	(-2.09)	(-3.00)
Big four auditing	0.204	-0.206	-0.333*	3.966	-0.216	0.715	-0.001	-0.173	0.498	-0.110
	(1.13)	(-1.25)	(-1.75)	(0.43)	(-1.00)	(0.56)	(-0.01)	(-0.28)	(0.82)	(-0.35)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	625	591	503	88	467	124	373	218	249	342
R-squared	0.037	0.048	0.070	0.153	0.063	0.127	0.123	0.069	0.171	0.048
Chi2 (P-value)			3852.69(0.00)		1969.87(0.00)		1812.69(0.00)		482.31(0.00)	

This table presents the influence of heterogeneous credit crunch shock on the effectiveness of corporate governance based on an alternative crisis period. The alternative crisis period is defined as between May 2008 and November 2008. In November 2008, China government announced its economic stimulus program. Dependent variable is firm level abnormal return based on the alternative crisis period. The independent variables are based on the observations at the end of fiscal year 2007. Column 1 and 2 use total sample. Column 3 to 10 use subsamples that are partitioned by controlling shareholders' cash flow rights. Four thresholds of cash flow rights are used, and they are 50%, 45%, 35%, and 25%. The odd (even) columns correspond to subsamples with lower (higher) cash flow rights. We use Chow test to compare the regression results across different subsamples. The Chi2 statistic and p-value are reported in the last row. *Dependence* denotes external finance dependence, and it measures the extent of heterogeneous credit crunch shock. A higher level of dependence on external finance implies severer credit crunch shock during the crisis. Appendix A contains all variables definitions. Industry fixed effects based on the 2-digit industry classification of *China Securities Regulatory Commission (CSRC)* are used in all specifications. Standard errors are clustered at industry levels, T-statistics are reported in brackets. \*\*\*, \*\*, and \* indicate statistical significance at the 1%, 5%, and 10% levels, respectively.

## ***Concluding remarks***

This thesis covers three topics: accounting conservatism, corporate social responsibility, and corporate governance. In chapter one, I find that firms with less conservative financial reporting are more likely to use trade credit during the recent global financial crisis. It suggests that suppliers rely less on conservative financial reporting to evaluate customer firms. In chapter two, I document that suppliers' preference on socially responsible customers. A customer with better social performance is more likely to receive trade credit from suppliers. In chapter three, I theoretically and empirically show the moderating role of a heterogeneous credit crunch shock on the effectiveness of corporate governance. When a firm is exposed to severer credit crunch shock, corporate governance is more likely to play a role in deterring expropriation and improving firm performance.

An interesting but unexplored question is the association between accounting conservatism and corporate social responsibility. It is unclear how corporate social responsibility is associated with accounting conservatism. On the one hand, socially responsible firms might rely less on accounting conservatism to obtain debt financing. On the other hand, socially responsible firms might be likely to conduct conservative financing reporting to be more transparent.

Another interesting issue is the influence of credit crunch shock on the agency conflict between shareholders and management. In chapter three, we mainly focus on the agency conflict between controlling shareholders and minority shareholder. However, the agency conflict between shareholders and management dominates in most development countries. A

natural prediction is that a heterogeneous credit crunch shock could also moderate the agency conflict between shareholders and management.



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