

**Does Accounting Quality Matter for Short-term Financing?
Evidence from Firms' Amount of Trade Credit***

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Abstract

This paper examines the relation between a firm's amount of trade credit and its accounting quality. I use earnings smoothness, asymmetric timeliness of earnings, earnings management, and internal control weakness to proxy for accounting quality. Consistent with the theory that high accounting quality reduces information asymmetry between firms and stakeholders, I hypothesize and find evidence that firms with higher accounting quality are able to obtain more trade credit from their suppliers. Using a customer-supplier paired subsample, I show that the results are robust after controlling for suppliers' characteristics. Moreover, using the 2007–2008 financial crisis as an exogenous shock to credit supply, I hypothesize and find that the positive relation between trade credit and accounting quality is more pronounced during the period of credit tightening. Furthermore, I find that the characteristics of firms' products also impact the relation in such a way that the association is stronger when companies purchase services or differentiated goods. Finally, I show that the positive association is concentrated in small firms and firms without credit ratings on senior debt.

Keywords: trade credit; accounting quality; earnings smoothness; asymmetric timeliness of earnings; conditional conservatism; earnings management; internal control weakness

Data availability: Data are available from sources identified in the paper.

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1. INTRODUCTION

The intuition that the quality of accounting information plays an integral part of the efficient operation of capital markets has motivated both theoretical and empirical studies in accounting. While the precise theoretical underpinnings of the relation between accounting quality and capital market resource allocation is somewhat controversial, empirical studies have provided evidence to support this relation.¹ For example, Bharath et al. (2008) find that high accounting quality facilitates firms' access to the public debt market, and Francis et al. (2005) show that high accounting quality lowers firms' cost of equity.² However, with only a few exceptions, the link between accounting quality and trade credit financing (i.e., suppliers' lending to customer firms) remains relatively unexplored.³ In fact, trade credit is the largest and most important source of short-term financing, and plays a critical role in providing liquidity to the economy (Bernanke and Gertler, 1995).⁴ Perhaps this omission in the literature is due to the perception that trade credit decisions are less likely to rely on accounting information than are other forms of financing. Yet, financial accounting textbooks frequently mention the importance of accounting information to support suppliers' trade credit decisions.

This paper explores whether a firm's accounting quality affects the cost of its trade credit. There is no doubt that trade credit differs from standard debt because it comingles an operating decision with a financing decision. The fact that a customer firm and a supplier rely on each

¹ For examples of theoretical models, see Easley and O'Hara (2004), Hughes et al. (2007), and Lambert et al. (2007). For empirical literature, see surveys by Armstrong et al. (2010) and Dechow et al. (2010).

² Other studies include, for debt, Zhang (2008), and for equity, Bhattacharya et al. (2003) and Francis et al. (2004).

³ Hui et al. (2012), being one exception, find that a firm's reporting conservatism increases with its suppliers' bargaining power.

⁴ According to the U.S. Flow of Funds Account historical data, the total amount of trade credit extended by non-financial businesses was \$77 billion in 1993. More recently, Barrot (2013) documents that accounts payable reached about \$2 trillion for non-financial U.S. corporate businesses, about three times as large as bank loans, as of September 2012 (based on the U.S. Flow of Funds Account).

other in an operating context implies that the supplier's financing decision is made in a setting with inherently low information asymmetry. Indeed, Petersen and Rajan (1997) argue that the information a supplier has about its customer firms is superior to the information that is available to financial institutions because the supplier can collect information faster and at a lower cost through daily business activities.⁵ This argument suggests that accounting information plays a smaller and perhaps insignificant role in the supplier's trade credit decision-making, which would entail that accounting quality does not matter.

It is still possible, however, to argue that accounting quality can play an important role in suppliers' trade decision-making. First, the argument put forward by Petersen and Rajan (1997) is based on the assumption that customer firms' operational information is perfectly correlated with their accounting information so that suppliers can infer their customer firms' financial conditions from normal business operations. Nevertheless, in reality, managers are often likely to manipulate both accounting and operational information. For example, customer firms can exercise discretion in accounting estimates, such as warranty expense, to manage earnings upwards. Meanwhile, such firms can be ordering more parts from their suppliers, betting on a future recovery. If suppliers sell the parts on credit and customer firms' expected recovery does not occur, suppliers can hold receivables that are illiquid. Second, this sort of problem is likely to increase with the number of customers with whom a supplier trades, and operational knowledge of customers will be supplemented with financial reporting information. In summary, although suppliers can have some direct information about their customer firms, suppliers are still prone to information asymmetry between themselves and customer firms.

⁵ Suppliers can develop intimate knowledge of their customers by accessing customer firms' information systems. For example, as battery supplier for Tesla's electric automobiles, Panasonic can access Tesla's information system.

These arguments suggest that accounting quality can facilitate trade credit financing by reducing information asymmetry between suppliers and their customer firms, although the economic magnitude of this relation is not well documented. In fact, the importance of accounting quality is likely to vary across firms and over time. In particular, the recent financial crisis highlighted the crucial role trade credit can play when credit is scarce. Research has shown that during the crisis, firms that were able to obtain more trade credit from their suppliers experienced less negative consequences (Bastos and Pindado, 2013; Coulibaly et al., 2013). On the other hand, cash-rich firms and firms with better access to bank credit extended more trade credit to their customer firms, and in return experience better performance afterwards (Kestens et al., 2012; Garcia-Appendini and Montoriol-Garriga, 2013). I conjecture that variability in accounting quality can assist supplier firms in allocating scarce capital during periods of crisis-induced heightened demand and economic uncertainty. This conjecture draws on prior research on standard debt. For example, Watts and Zuo (2012) find that during the financial crisis, firms with greater accounting conservatism were able to issue more debt to undertake more investment projects. Extending this literature to trade credit financing, I hypothesize that high accounting quality benefits firms more in terms of obtaining more trade credit from their suppliers during the 2007-2008 financial crisis.

The cost of trade credit is also likely to vary with product attributes that increase or decrease the likelihood of repayment. Prior literature suggests that trade credit decision is affected by the collateral value and the liquidation value of the transacted products (Mian and Smith, 1992; Cuñat, 2007; Giannetti et al., 2011). For example, when customers cannot make the payment, suppliers can repossess goods and resell them, which is not applicable to services. In addition, it will be easier for suppliers to resell standardized goods than differentiated goods.

Therefore, I examine whether and how product characteristics affect the relation between accounting quality and trade credit.

My research design regresses the inverse cost of trade credit (as measured by the amount of accounts payable) on four standard proxy variables for accounting quality. The quality measures include: earnings smoothness, asymmetric timeliness of earnings (conditional conservatism), abnormal accruals, and the existence of internal control weaknesses.⁶ After controlling for other determinants of the level of trade credit used by a customer firm, I find that a firm can obtain more trade credit from its suppliers when its earnings are smoother, when it has greater reporting conservatism, when it has less accumulated abnormal accruals, and when it has no internal control weakness. In addition, I use a customer-supplier paired subsample from 2006 to 2008 to simultaneously control for the demand and supply of trade credit because prior work shows that the amount of trade credit received by a customer firm will depend on the suppliers' liquidity and willingness to lend (Petersen and Rajan, 1997; Garcia-Appendini and Montoriol-Garriga, 2013). After controlling for suppliers' characteristics, I find that the positive association between a firm's accounting quality and its amount of trade credit is robust. Using the 2007–2008 financial crisis as an exogenous shock to the supply of credit, I show that the positive relation between accounting quality and trade credit is more pronounced during the crisis. This also suggests a heightened importance of accounting information in trade credit decisions during times of tight credit supply and high macro-economic uncertainty. Finally, I hypothesize and find

⁶ This choice of research design is influenced by prior studies in which a variety of measures were used. For example, Graham et al. (2005) reveal that managers use smoother earnings to lower their firms' perceived risk. Hui et al. (2012) use the analogy between trade credit and debt financing to argue that suppliers prefer their customer firms to report conservatively. Raman and Shahrur (2008) show that suppliers respond to their buyers' opportunistic earnings management by shortening the duration of customer-supplier relationships. Finally, Dechow et al. (2010) survey several widely used measures of accounting quality and suggest that the choice of measure depends on the decision context.

evidence that the positive relation between accounting quality and trade credit is stronger when the transacted products are services instead of goods, and when the products are differentiated goods instead of standardized goods (commodity).

The relation between accounting quality and the cost of trade credit can also vary with firm size and credit condition, as prior research finds that small firms rely more on trade credit and firms without credit ratings have poorer access to credit markets (Petersen and Rajan, 1997). Additional analyses conducted with two sets of subsamples (large vs. small and with credit ratings vs. without credit ratings) reveal that the positive association between trade credit and accounting quality is concentrated in small firms and firms without credit ratings.

The paper makes several contributions to the literature. First, it provides new and direct evidence that accounting quality matters for short-term financing. Several studies have documented that high accounting quality eases debt and equity financing (Bharath et al., 2008; Bhattacharya et al., 2003). This paper shows that a similar relation exists between accounting quality and trade credit financing. While prior research did not consider the role of accounting quality in trade credit financing, this study provides compelling evidence that accounting quality affects suppliers' trade credit decision-making.

This paper also documents a new and real benefit of high accounting quality by showing that firms reporting more conservatively can obtain more trade credit from their suppliers, especially during the financial crisis. While Hui et al. (2012) argue that suppliers demand conservative reporting from their buyers and find that a firm's conditional conservatism increases with its suppliers' bargaining power; they do not explore whether a firm can benefit from its suppliers by reporting conservatively. This paper complements their study by showing that firms with greater reporting conservatism can obtain more trade credit from their suppliers.

In another related study, Zhang (2008) shows that firms with greater conditional conservatism can get lower interest loans from banks. While Zhang focuses on bank credit channel only, my paper extends our understanding to trade credit channel and shows that high accounting quality also eases firms' access to trade credit financing.

Finally, this paper extends two recent studies by Watts and Zuo (2012) and Garcia-Appendini and Montoriol-Garriga (2013) and shows that the importance of accounting quality varies with macro-economic conditions. Watts and Zuo find that firms with greater accounting conservatism experienced less negative stock returns during the financial crisis because they were able to issue more public debt to undertake investment projects. This paper complements their study by showing that conservative firms were also able to obtain more trade credit from their suppliers to alleviate the negative impact of credit tightening. Garcia-Appendini and Montoriol-Garriga find that firms with sufficient liquidity were able to help their customer firms by extending more trade credit. However, they do not explore what firm characteristics, in terms of financial reporting, can help customer firms get more trade credit from their suppliers. This paper complements their study by revealing a positive relation between customer firms' accounting quality and the amount of trade credit.

The paper proceeds as follows. Section 2 is the background, literature, and hypothesis development. Section 3 describes empirical proxies for accounting quality and research design. Section 4 is data and sample selection. Section 5 reports empirical results. Section 6 is additional tests. Section 7 concludes.

2. BACKGROUND, LITERATURE, AND HYPOTHESIS DEVELOPMENT

2.1 Background and related literature

Trade credit arises when a firm buys goods and (or) services from its suppliers without paying cash immediately. Survey evidence by Ng et al. (1999) shows that suppliers usually do not directly charge interest on their trade credit sales; instead, they offer a discount to promote early payment.⁷ If customer firms are unable to take the advantage of such discount, the implicit interest on trade credit can be very high. Using 2-10 net 30 as common terms of sales, Petersen and Rajan (1994) estimate the interest rate to be 44.6 percent annually.⁸ Once the discount period ends, the later customers pay, the lower the effective interest rate. While delayed payment can reduce the rate significantly, the interest rate is still higher than that of alternative short-term financing sources.⁹ Survey evidence by Ng et al. (1999) also reveals that when a supplier decides to extend trade credit to its customer firms, the term of trade credit is relatively uniform across all customer firms. This suggests that the main credit decision that a supplier makes is the amount of trade credit to extend, rather than the interest rate (see Appendix A for an example in which suppliers refuse to adjust the amount of trade credit).¹⁰ As a result, this paper uses the amount of trade credit as an inverse proxy for the cost of short-term inter-firm borrowing.

Financing pecking order theory (Myers and Majluf, 1984) suggests that investors demand higher returns when information asymmetry increases. As the severity of information asymmetry varies between firms and their potential investors, firms that seek to minimize the cost of capital will work their way from the cheapest financing method to the most expensive one

⁷ For example, common terms of sale are 2-10 net 30, which means the full purchase price is due in 30 days and the customer can receive a two-percent discount if payment occurs within 10 days of the sale.

⁸ By taking the early payment discount at the 10th day after the sale, the firm is effectively borrowing at 2/98 percent per 20-day period, which is equivalent to an annual rate of 44.6 percent $([1 + 2/98]^{(365/20)} - 1)$ (Petersen and Rajan, 1994).

⁹ Survey evidence shows that 40–60 percent firms delay their payments (Altunok, 2012). Wilner (1997) estimates that delayed payment reduces the implicit interest rate by two-fifths.

¹⁰ Theoretically, suppliers can change the interest rate by adjusting either the cash discount or the discount period and full payment due date.

by first using their internal cash, then borrowing from banks, then raising public debt, and finally issuing equity. Considering its high implicit interest rate, trade credit is generally considered an expensive alternative to bank debt. However, it is not purely a form of financing. Suppliers' decisions to extend trade credit to their customer firms represent a mixture of operating and financing considerations. These unique aspects make it difficult to pin down the place of trade credit in a pecking order.

Although it is not easy to fit trade credit into the pecking order theory, one can still argue that intuitively, high accounting quality should reduce information asymmetry and facilitate firms' borrowing from their suppliers. While no studies formally incorporate accounting quality into trade credit decision, existing theoretical models do leave room for the role of accounting quality. For example, Biais and Gollier (1997) develop a model of trade credit decision, in which there are three players: a bank, a buyer, and a seller.¹¹ The authors consider that the buyer may fall into one of two categories, good or bad, based on whether the buyer has access to a positive NPV project. Because of information asymmetry, the seller does not perfectly know the buyer's type. The seller, however, has access to private information (a signal) to infer the buyer's type and make a trade credit financing decision.¹² The seller is more likely to extend trade credit to the buyer if there is a high probability that the buyer is of good type. Biais and Gollier's model can be used to support my conjecture that supplying firms can use accounting quality as a supplemental signal to infer buyer types conditional on the signal is good.

¹¹ Biais and Gollier (1997) cover a complex relation among the three players, while my paper only focuses on the relation between the seller and the buyer.

¹² The seller can develop this type of information from its relationship with the buyer or from the buyer's order. In the model proposed by Biais and Gollier (1997), if the buyer is good, the signal received by the seller (θ) always takes the value 1. If the buyer is bad, the signal can take the value 1 with probability μ and 0 with probability $1-\mu$. If among all the buyers, the proportion of good buyers is π , then provided the signal received by the buyer is 1, the probability of the buyer being good is $\Pr(\text{good} \mid \theta=1) = \pi/(\pi+(1-\pi)\mu)$.

While no paper directly examines the relation between a firm's accounting quality and the amount of trade credit, two studies link accounting quality to the customer-supplier relationship. Bowen et al. (1995) hypothesize that customer firms overstate their earnings. More specifically, they examine firms' inventory and depreciation method choices and find that firms are more likely to adopt income-increasing choices when suppliers' implicit claims are higher. Hui et al. (2012), on the other hand, argue that suppliers prefer their customer firms to report more conservatively, and find evidence that customer firms' reporting conservatism increases with suppliers' bargaining power.

Finally, several recent studies investigate whether firms' performance during and after the 2007–2008 financial crisis is related to trade credit and accounting quality. For example, Kestens et al. (2012) show that, contrary to the authors' expectations, the negative impact of the financial crisis on firm performance was more pronounced for firms that increased the use of trade credit financing. Their interpretation is that customer firms with increased trade credit were having difficulties paying back their suppliers. Watts and Zuo (2012) provide evidence that firms with more conservative reporting experience less negative stock returns during the crisis because they were able to issue more debt to maintain operations and investments.

2.2 Hypothesis development

2.2.1 The relation between accounting quality and trade credit

As providers of short-term financing, suppliers consider several important aspects when they extend trade credit to their customers: the marginal profit on the additional sales on credit, the ability of the customer firm to pay its trading obligation on a timely basis, and the customer firm's long-term financial viability (See Appendix A for an example in which suppliers refused to increase trade credit). When suppliers make sales on credit, the effective marginal profit can

be much lower than the nominal profit. By allowing customers to pay late, suppliers actually lower the effective selling prices of products because of the time value of money. In addition, by extending credit to customers, suppliers are actually lending to customers without charging interest. Effectively, suppliers are subsidizing their customers. This may not be a problem if customers can make timely payments and suppliers have enough liquidity.

However, timely payment is actually a big concern in practice because customers often delay their payments to their suppliers. Based on the data from the National Survey of Small Business Finance (NSSBF), Altunok (2012) documents that about 40 to 60 percent of firms pay their suppliers late (after the due date). The amount being paid late by these firms is about 30 to 36 percent of their purchases on account. This payment delay problem is not limited to small businesses, as big companies are also slow to pay. According to recent news in the Wall Street Journal, some big firms (e.g., P&G and DuPont) delay their payments to suppliers by several weeks, which helps these big firms to free up cash.¹³ Studying a sample of small suppliers linked with large customers, Murfin and Njoroge (2013) show that the delay of payment by large customers can cause small suppliers' contraction in investment in plants and equipments and reduction in operating expenditures if suppliers do not have enough liquidity. Therefore, suppliers have to consider the possibility of late payment and, in some extreme cases, of payment default when they extend trade credit.

Long-term financial viability is also important for a supplier as it is costly to build up a long-term relationship and to switch from one customer to another. For example, suppose a supplier signs a long-term contract with a customer and subsequently acquires specialized

¹³ See the WSJ report "P&G, big companies pinch suppliers on payments" retrieved from <http://online.wsj.com/article/SB10001424127887324010704578418361635041842.html>. Another WSJ report can be retrieved from <http://online.wsj.com/article/SB10001424052702303296604577450561434496668.html>.

equipment to manufacture the products. In such cases, not only is the supplier concerned about the buyer's ability to meet short-term trading obligations, it could be even more concerned with the buyer's long-term viability because of the significant customer-specific investment. If the customer goes out of business, the supplier's investment loses its value. Although the supplier might be able to find other customers, the switching cost can be high.

Prior research on accounting quality has long argued that higher quality accounting information can benefit firms' investors and stakeholders (see literature survey by Dechow et al., 2010). Below I discuss how different aspects of accounting quality can affect a supplier's trade credit decision in detail, and I then state my hypotheses formally.

Earnings smoothness

Earnings smoothness is an important attribute of earnings quality. I expect that a firm with smoother earnings can obtain more trade credit from its suppliers for two reasons. First, firms with smoother earnings are perceived to be less risky. Suppliers' asymmetric payoff function suggests that they prefer their customer firms to have stable operations. Often, suppliers have to make relationship-specific investments to satisfy their customers' needs.¹⁴ Consistent with this idea, the results of the survey reported in Graham et al.'s (2005) show that firm managers prefer smoother earnings to assure their suppliers a stable business.

Second, smoother earnings can reduce information asymmetry. Several studies argue that managers intentionally use income smoothing to reveal their private information about future earnings and thereby reduce information asymmetry (Kirschenheiter and Melumad, 2002; Sankar and Subramanyam, 2001). Other models suggest that managers smooth earnings to meet outside shareholders' expectation in order to avoid shareholder intervention (Acharya and Lambrecht,

¹⁴ See Williamson (1975, 1979).

2013), or shareholders demand managers to smooth earnings to reduce the informational advantage between informed and uninformed investors caused by greater earnings volatility (Goel and Thakor, 2003). Regardless of the theoretical source of the demand to smooth earnings, empirical evidence consistently shows that smoother earnings reduce information asymmetry. For example, Tucker and Zarowin (2006) show that changes in the current stock price are more informative and contain more information about the future earnings when these firms have smoother earnings. Based on this line of reasoning, I hypothesize that a firm's use of trade credit increases with earnings smoothness.

Asymmetric timeliness of earnings (conditional conservatism)

Positive accounting theory suggests that accounting conservatism lowers debt contracting costs, so firms benefit from reporting conservatively (Watts, 2003a,b; Armstrong et al., 2010). Several models show how conservatism affects contracting.¹⁵ For example, Gao (2013) analytically shows that by reducing managers' opportunities to manipulate earnings, accounting conservatism improves debt renegotiation efficiency. Empirically, Biddle et al. (2012) find that conservatism helps to reduce bankruptcy risk, which is consistent with conservatism lowering debt contracting costs.¹⁶ Another study by LaFond and Watts (2008) argues that conservatism reduces information asymmetry by providing the best possible non-stock price information regarding a firm's current performance; the authors present empirical evidence that higher conservatism is associated with lower information asymmetry.

Although suppliers are not debt holders and trade credit is not debt financing, suppliers' asymmetric payoff function and their long-term implicit claims make trade credit provision

¹⁵ See Gao (2013), where the author provides a short yet thorough review of the existing models.

¹⁶ Zhang (2008) also shows that conservatism benefits lenders by accelerating covenant violation, which provides earlier signals of default risk.

similar to debt financing. Using the analogy between trade credit and debt financing and following the contracting rationale, Hui et al. (2012) argue that this contracting role leads suppliers to demand accounting conservatism from customers. They find that greater supplier bargaining power leads to greater reporting conservatism by customer firms. Consistent with conservatism lowering contracting costs, I hypothesize that a firm's use of trade credit increases with its accounting conservatism.

Earnings management

Suppliers are interested in determining whether a buyer's performance is sustainable in order to ensure repayment and recovery of customer-specific investments. Survey evidence (Dichev et al. 2013) suggests that managers believe that higher quality earnings are those that are sustainable and repeatable, as well as earnings that are backed by cash flows. Following this definition of earnings quality, earnings management through discretionary accruals reduces earnings quality because these accruals are not persistent earnings.

Suppliers, however, are aware of their customers' opportunistic behavior. Raman and Shahrur (2008) find that while earnings management is used opportunistically by firms to influence the perception of suppliers, it adversely impacts the duration of customer-supplier relationships. Their finding suggests that suppliers take real actions to compensate. Based on this line of reasoning, I hypothesize that suppliers anticipate their customers' earnings management by reducing the supply of trade credit, which means that a firm's use of trade credit decreases with its extent of earnings management.

Internal control weaknesses

Whether a firm has effective internal control can greatly affect its ability to borrow money. Costello and Wittenberg-Moerman (2011) use internal control reports to measure accounting quality and show that lenders react to borrowers' internal control weaknesses. They find that lenders reduce the use of financial covenants and financial-ratio-based performance pricing provisions and increase the use of price and security protections and credit-rating-based performance pricing provisions. As trade credit provisions usually do not include financial covenants and firms do not disclose their trade credit terms, I only study the relation between the amount of trade credit a firm is able to obtain and the quality of its internal control.¹⁷ Specifically, I expect that suppliers reduce the supply of trade credit when customers have internal control weaknesses.

To summarize, my first hypothesis is that a firm's use of trade credit increases with its accounting quality. Using various measures of accounting quality, I expand this hypothesis into a set of four hypotheses:

***H1a:** Other things equal, a firm's amount of trade credit is positively associated with its earnings smoothness.*

***H1b:** Other things equal, a firm's amount of trade credit is positively associated with its accounting conservatism.*

***H1c:** Other things equal, a firm's amount of trade credit is negatively associated with its earnings management.*

***H1d:** Other things equal, a firm's amount of trade credit is negatively associated with its internal control weakness.*

2.2.2 The impact of financial crisis

The recent financial crisis provides an ideal opportunity to study how the association between accounting quality and trade credit varies with macro-economic conditions. The 2007–2008

¹⁷ Prior studies document that trade credit terms do not vary significantly (Petersen and Rajan, 1997; Giannetti, Burkart, and Ellingsen, 2011; Altunok, 2012).

financial crisis created a shock to the credit markets. Banks reduced their lending significantly (Ivashina and Scharfstein, 2010). While firms normally prefer bank credit over trade credit, the shortfall in bank credit forced firms that were reliant on bank loans to turn to their suppliers and ask for more trade credit. Empirical studies find evidence consistent with the substitution relation between bank credit and trade credit. For example, using the 1997 Asian crisis as a shock to bank credit supply, Love et al. (2007) show that the amount of trade credit provided and received increased immediately after the crisis. More recently, Garcia-Appendini and Montoriol-Garriga (2013) show that, indeed, cash-rich firms and firms with better access to credit extended more trade credit to their credit-constrained customers during the crisis.

I hypothesize that during the financial crisis, the positive relation between accounting quality and trade credit is more pronounced for two reasons. First, as the economic uncertainty heightens and credit supply tightens, the opportunity cost of suppliers' fund also increases (Bernanke and Gertler, 1995). As a result, suppliers become more stringent on extending trade credit to their customers. If suppliers use earnings quality to screen their buyer firms, then they will reduce trade credit to firms with lower accounting quality. Second, the scarcity of credit gives suppliers more bargaining power. When suppliers have greater bargaining power, they are able to demand higher accounting quality from their customers (see e.g., Hui et al., 2012). Those firms that cannot meet this higher demand are unlikely to obtain more trade credit from suppliers. Therefore, my second hypothesis is:

***H2:** The positive association between accounting quality and the amount of trade credit is more pronounced during the financial crisis.*

2.2.3 The effect of product characteristics

Product characteristics can affect the association between accounting quality and the use of trade credit. If a firm files for bankruptcy, its suppliers are entitled to seize the goods they sold to the firm. Suppliers can repossess and sell the goods to other buyers on the market. Therefore, suppliers are (at least partially) secured by the liquidation value of the goods. On the other hand, service providers are not able to reverse the services they have already performed for their customers (no liquidation value). Thus, while goods have collateral value, services do not. As service buyers do not post any collateral, the consequence of information asymmetry becomes more severe and it is more risky for service providers to extend trade credit. Therefore, I hypothesize that the positive association between accounting quality and trade credit is stronger when the transacted products are services.

Furthermore, within the goods category, standardized goods and differentiated goods have different liquidation values. Suppliers can repossess standardized goods and sell them to other buyers quickly. This is less true for differentiated goods, which are normally tailored to the needs of a specific buyer or a few buyers. As differentiated goods have a higher liquidity risk, a supplier will try to reduce the overall risk of extending trade credit by demanding higher quality accounting information. Partially in line with this intuition, Mian and Smith (1992) argue that suppliers of durable goods are more likely to extend trade credit to their customers than are suppliers of non-durable goods. To summarize the above discussion, my last set of hypotheses is the following:

***H3a:** The positive association between accounting quality and the amount of trade credit is stronger when firms purchase services than when they buy goods.*

***H3b:** The positive association between accounting quality and the amount of trade credit is stronger when purchased goods are differentiated than when the goods are standardized.*

3. EMPIRICAL PROXIES AND RESEARCH DESIGNS

3.1 Accounting quality metrics

Given that there is no consensus on the measure of accounting quality, I use several measures developed in prior literature to proxy for different aspects of accounting quality.

Earnings smoothness

Dechow et al. (2010) use the variability of earnings relative to that of cash flows from operations to proxy for earnings smoothness. Following this definition, I use a firm's past five-year earnings and cash flows data to calculate earnings smoothness:

$$\text{earnings smoothness}_{it} = -\sigma_{it}(\text{Earnings}) / \sigma_{it}(\text{Operating Cash Flows}) \quad (1)$$

where σ denotes standard deviation, *Earnings* is net income before extraordinary items, and *Operating Cash Flows* is cash from operations. Under this definition, the higher the number the smoother earnings are. The use of a five-year period is in line with prior literature and represents a trade-off between sample size and a sufficiently long time-series (e.g. Tucker and Zarowin, 2006).

Asymmetric earnings timeliness (conditional conservatism)

I use the *C-Score* developed by Khan and Watts (2009) to capture firm-specific and time-varying asymmetric timeliness of earnings. Khan and Watts argue that a firm's conditional conservatism is a linear function of three characteristics (size, book-to-market, and leverage) and estimate the *G-Score* and *C-Score* as follows:¹⁸

¹⁸ *G-Score* measures the timeliness of earnings reflecting good news, while *C-Score* measures the timeliness of earnings reflecting bad news (Khan and Watts, 2009).

$$Earnings_{it} = \beta_1 + \beta_2 D_{it} + \beta_3 Ret_{it} + \beta_4 D_{it} \cdot Ret_{it} + \varepsilon \quad (2)$$

$$G-Score_{it} \equiv \beta_3 \equiv \mu_1 + \mu_2 Mkv_{it} + \mu_3 M / B_{it} + \mu_4 Lev_{it} \quad (3)$$

$$C-Score_{it} \equiv \beta_4 \equiv \lambda_1 + \lambda_2 Mkv_{it} + \lambda_3 M / B_{it} + \lambda_4 Lev_{it} \quad (4)$$

where *Earnings* is net income before extraordinary items scaled by the market capitalization at the beginning of the year, *Ret* is the one-year stock return, *D* is an indicator variable that equals 1 when *Ret* is non-positive, *Mkv* is the natural logarithm of the market capitalization, *M/B* is the market-to-book ratio, and *Lev* is the leverage. Equation (2) is the original Basu (1997) regression model. Note that Equations (3) and (4) are not regression models. Substituting Equations (3) and (4) into the regression equation (2) yields:

$$\begin{aligned} Earnings_{it} = & \beta_1 + \beta_2 D_{it} + Ret_{it}(\mu_1 + \mu_2 Mkv_{it} + \mu_3 M / B_{it} + \mu_4 Lev_{it}) \\ & + D_{it} Ret_{it}(\lambda_1 + \lambda_2 Mkv_{it} + \lambda_3 M / B_{it} + \lambda_4 Lev_{it}) \\ & + (\delta_1 Mkv_{it} + \delta_2 M / B_{it} + \delta_3 Lev_{it} + \delta_4 D_{it} Mkv_{it} + \delta_5 D_{it} M / B_{it} + \delta_6 D_{it} Lev_{it}) + \varepsilon_{it} \end{aligned} \quad (5)$$

I estimate this equation using annual cross-sectional regressions to obtain empirical estimators μ_i and λ_i ($i=1$ to 4), which are assumed constant across firms, but can vary over time. Then I calculate the firm- and time-specific *C-Score* using Equation (4) and average over the past 5 years to obtain the measure of asymmetric earnings timeliness. Higher values of *C-Score* indicate more conservative financial reporting.

Earnings management

Following prior literature, I use abnormal accruals to proxy for earnings management. Abnormal accruals are estimated by the model presented in Francis et al. (2005). Dechow and Dichev (2002) originally developed the model to estimate the degree to which earnings are backed by past,

current, and future cash flows. Francis et al. modify the model by including the change in sales and *PPE* (the gross amount of property, plant, and equipment), as proposed by McNichols (2002):

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

where *TCA* is total current accruals measured by the balance sheet approach ($TCA = \Delta CA - \Delta CL - \Delta Cash + \Delta STDEBT$).¹⁹ *CFO* is cash flow from operations in past, current, and future years ($CFO = Earnings - TA$). *Earnings* is net income before extraordinary items, and $TA = \Delta CA - \Delta CL - \Delta Cash + \Delta STDEBT - DEPN$. ΔCA is change in current assets, ΔCL is change in current liabilities, $\Delta Cash$ is change in cash, $\Delta STDEBT$ is change in debt in current liabilities, *DEPN* is depreciation and amortization expense, and ΔREV is the change in sales. Unexplained accruals are abnormal accruals. I accumulate abnormal accruals over the past five years as the measure of earnings management. A higher number means that the firm engages in more earnings management.

Internal control effectiveness

Firms are required to disclose any material weaknesses in internal controls under the Sarbanes-Oxley Act of 2002. Dechow et al. (2010) point out that SOX reports of internal control deficiency unambiguously reflect accounting quality problems. I use an indicator variable to measure if a firm has had internal control weaknesses in the previous 2 years (*Internal control weakness*=1), and zero otherwise.

¹⁹ I use the balance sheet approach because my sample dates back to 1977. Collins and Hribar (2002) point out that the cash flow statement approach gives less measurement error in calculating accruals. I also use this measure to test my hypotheses and the results remain qualitatively unchanged.

3.2 Regression models

I use the following regression model to test H1:

$$AP_{it} = \beta_0 + \beta_1 \cdot Accounting\ Quality_{it} + \beta_2 \cdot X_{it} + Firm\ FE + Year\ FE + \varepsilon_{ijt} \quad (7)$$

where AP_{it} is the ratio of accounts payable to total assets (Petersen and Rajan, 1997; Giannetti et al., 2011). Scaling by total assets controls for the systematic effect of size (Lev and Sunder, 1979). *Accounting Quality* is one of the four measures of accounting quality, and X_{it} is a vector of control variables for the firm. Industry and year fixed effects are included. H1 predicts that use of trade credit increases with accounting quality.

Following prior literature (Petersen and Rajan, 1997; Giannetti et al., 2011; Garcia-Appendini and Montoriol-Garriga, 2013), I include several firm characteristics as control variables. The first one is *Size*. Large firms are able to access external financing more easily, so that they are less likely to rely on trade credit. Thus, I expect the coefficient on *Size* to be negative. Next, I include two variables related to firm age, *Age* and Age^2 (see Petersen and Rajan, 1997), where *Age* is the natural logarithm of the firm's age. When a firm is young and small, it has less access to the credit markets and, therefore, uses more trade credit to grow its business. However, when the firm matures, it replaces the use of trade credit with other sources of finance. Petersen and Rajan show this is indeed the case for their small business sample. Therefore, I expect the coefficients on *Age* and Age^2 to be positive and negative, respectively. I include *Profit margin* and *ROA* to control for profitability, and I expect the coefficient to be negative because firms with higher profit margin and return on assets are able to support their operations with internally generated cash (Giannetti et al., 2008). I also include *Sales growth* and expect the coefficient to be positive because high growth firms require trade credit to support their business

growth (Petersen and Rajan, 1997). I include *AR* (accounts receivable scaled by assets) to control for firms' cash collection ability and expect the sign to be positive. Garcia-Appendini and Montoriol-Garriga find that firms with higher *Net worth* and higher *Tobin's q* use less trade credit. I include these control variables and expect the coefficients on *Net worth* and *Tobin's q* to be negative. Firms with more *Cash* and *Debt* are able to use their own cash or tap the bond market to reduce the use of trade credit. Therefore, I expect the coefficients on *Cash* and *Debt* to be negative. Finally, I include *Market share*, a firm-level measure to control for bargaining power. It is equal to a firm's sales over the total sales of the industry. I expect the coefficient on *Market share* to be positive, since firms with greater bargaining power are more likely to take this advantage to get more trade credit from their suppliers.

It is important to control for suppliers' characteristics because the use of trade credit represents an equilibrium outcome between the demand and supply of trade credit. However, finding all customer-supplier relationships is impossible because a firm is only required by SFAS No. 14 and No. 131 to disclose a customer's identity information when the sales to that customer exceeds 10 percent of the firm's total annual sales. Despite the limitation of the database, for a subsample that I can identify a firm's suppliers, I also include suppliers' characteristics as control variables in the following regression model in the same fashion as I include customer firms' characteristics:

$$AP_{it} = \beta_0 + \beta_1 \cdot Accounting\ Quality_{it} + \beta_2 \cdot X_{it} + \beta_3 \cdot X_{jt} + Firm\ FE + \varepsilon_{ijt} \quad (8)$$

where X_{jt} is a vector of control variables for a supplier j .

To test H2, I use the following model:

$$AP_{it} = \beta_0 + \beta_1 \cdot Accounting\ Quality_{it} + \beta_2 \cdot Crisis + \beta_3 \cdot Accounting\ Quality_{it} \cdot Crisis + \beta_4 \cdot X_{it} + Firm\ FE + \varepsilon_{ijt}, \quad (9)$$

where *Crisis* is an indicator variable for the financial crisis period. Following Garcia-Appendini and Montoriol-Garriga (2013), I define *Crisis* as the period from July 1, 2007 to June 30, 2008.²⁰ Other studies use a longer crisis period. For example, Watts and Zuo (2012) define it to be August 1, 2007 to August 31, 2009. A longer crisis period can increase the size of the sample, and hence, the testing power. However, as Garcia-Appendini and Montoriol-Garriga point out that during the later stage of the financial crisis, the product market demand effects can affect customer firms' demand of trade credit.

To test hypothesis H3, I also need information about the products that suppliers sell to their customers. Therefore, the test is again restricted to the customer-supplier pair sample. I obtain information on product characteristics from Giannetti et al. (2008), which is based on Rauch (1999). Suppliers are first classified as providers of either services or goods; this classification is represented by a two-digit SIC code. Goods providers are further classified as providers of differentiated or standardized goods. Appendix C presents the classification information. To investigate the effect of product characteristics, I first partition the sample into two subsamples: goods versus services. Then, I further separated the subsample of goods into standardized goods and differentiated goods. I also use Equation (8) to test the hypotheses.

4. DATA AND SAMPLE SELECTION

²⁰ Garcia-Appendini and Montoriol-Garriga (2013) use COMPUSTAT quarterly data to study the change in trade credit during the financial crisis. I use annual data in this study, which potentially reduce my chance of finding the relation between trade credit and accounting quality if a firm's accounts payable turnover is faster so that my annual measure does not capture it. In addition, Garcia-Appendini and Montoriol-Garriga argue that a shorter crisis period captures the drop of bank credit supply more accurately.

I start with the CRSP-COMPUSTAT Merged database from 1977 to 2010. Following prior literature, I exclude financial, insurance, and real estate firms (SIC 6000-6999) and regulated utilities (SIC 4900-4999). I exclude firms with negative values of total assets, cash, or sales, as well as firms reporting cash greater than total assets, and those with missing values of accounts payable (Garcia-Appendini and Montoriol-Garriga, 2013). Finally, I exclude firms with missing variables required for regression analysis. My full sample has 8,392 firms and 79,783 firm-years. Table 1 Panel A summarizes the sampling procedure. For the regression analysis, the number of observations varies depending on which measure of accounting quality is used.

My second and smaller sample contains suppliers' information. I obtained a customer-supplier paired dataset from Professor Garcia-Appendini.²¹ Using the Customer Segment File in COMPUSTAT and hand-collected data, Garcia-Appendini and Montoriol-Garriga (2013) collected information about firms' key customers and compiled this database from 2006 to 2008.²² The original dataset has 5,303 unique customer-supplier pairs. After data restrictions discussed above, I end up with 1,592 unique customer-supplier pair-years (Table 1 Panel B). Panel C reports the fiscal year distribution of the full sample.

5. EMPIRICAL RESULTS

5.1 Descriptive statistics

Table 2 reports the descriptive statistics for the variables in the two samples. To mitigate the influence of outliers, I winsorize all continuous variables at the 1% and 99% levels in each fiscal

²¹ The data is downloaded from Professor Garcia-Appendini's website at <https://sites.google.com/site/mariemigarcia/research/data>. It can also be obtained from the Journal of Financial Economics at <http://jfe.rochester.edu/data.htm>.

²² For detailed information on the construction of the dataset, please see Garcia-Appendini and Montoriol-Garriga (2013).

year. Sample A is the full sample, and sample B is the customer-supplier paired sample. For Sample A, the average ratio of accounts payable to total assets is about 9.4 percent, while the median is 7.5 percent. The sample is therefore skewed to the right, which means that some firms use trade credit heavily.

For the customer-supplier paired sample, the mean and median ratios of accounts payable to total assets are 11.8 percent and 8.5 percent, respectively. These numbers are higher than those of the full sample, which suggests that firms with concentrated customers provide more trade credit to their customers. The comparison between two samples shows that firms in the customer-supplier paired sample are generally larger and older, which suggests a survivorship bias. This means that one should be cautious about generalizing the findings using this paired sample. The full sample has more fixed assets, higher sales growth, higher accounts receivable, higher net worth, higher cash level, and higher debt level. The customer-supplier paired sample, on the other hand, has higher profit margin, higher *ROA*, and higher Tobin's *q*. Another point worth mentioning, within the customer-supplier paired sample, is that suppliers are, on average, smaller and younger than customers, which again suggests that customers' greater bargaining power may bias the results. However, *ex ante*, it is not clear in which direction it will bias the results because there is no study showing the association between firms' bargaining power and accounting quality. Finally, firms in the paired sample have more market shares.

In terms of the accounting quality measures, firms in the customer-supplier paired sample have smoother earnings than firms in the full sample. This is consistent with the conventional wisdom that larger firms have greater flexibility to smooth earnings than smaller firms. Firms in the paired sample also use more negative discretionary accruals to manage their earnings down and disclose less internal control weaknesses than firms in the whole sample. However, the

asymmetric timeliness of earnings in the full sample is on average greater than that of the paired sample.

Table 3 reports the correlation coefficient matrix. Spearman (Pearson) correlations are above (below) the diagonal. Consistent with H1, there is a significant positive correlation between *AP* and *Earnings smoothness*, a significant positive correlation between *AP* and *Earnings timeliness*, and a significant negative correlation between *AP* and *Earnings management*. The correlation between *AP* and *Internal control weakness* is not significant. The correlations between *AP* and control variables generally agree with prior studies.

5.2 The association between accounting quality and trade credit

Table 4 presents the results of testing H1. Panel A shows the results using the full sample without controlling for suppliers' characteristics. For all columns, the dependent variable is *AP* (accounts payable divided by total assets). In the first column, the measure of accounting quality is earnings smoothness. The coefficient is 0.004 and statistically significant at the 1 percent level. This negative coefficient is consistent with H1, which states that firms with smoother earnings are able to obtain more trade credit from their suppliers. The coefficient is also economically significant, as one standard deviation increase (std. dev. = 0.980) in earnings smoothness leads to a 0.004 increase in trade credit (4.3 percent of the mean level of trade credit).

Column (2) employs asymmetric earnings timeliness as the measure of accounting quality. The coefficient is also significantly positive at the 1 percent level (0.053, $t = 5.12$). The result is consistent with the idea that firms reporting more conservatively are able to obtain more trade credit from their suppliers. In Column (3), I use the extent of earnings management to proxy for accounting quality. The coefficient is significantly negative (-0.021, $t = -4.42$). This is also consistent with suppliers being aware of their customers' earnings management so that firms

with more abnormal accruals have a reduced ability to obtain trade credit. In the last column, I use internal control weakness to proxy for accounting quality. The result is weak. The coefficient is negative but only significant at the 5 percent level in one-sided test, which suggests that firms with effective internal control obtain more trade credit from their suppliers.

The coefficients for the control variables are generally consistent with prior studies. The use of trade credit is negatively associated with firm size, consistent with Garcia-Appendini and Montoriol-Garriga (2013). Consistent with Petersen and Rajan (1997), firm age has a non-linear inverted “U” shape relation with the level of trade credit. The negative coefficients on profit margin and return on assets show that profitable firms use less trade credit (Petersen and Rajan, 1997; Garcia-Appendini and Montoriol-Garriga 2013). The results also suggest that firms with higher sales growth use more trade credit to support their business growth.

The use of trade credit depends not only on a firm’s demand for credit but also on its suppliers’ ability to grant credit. Prior studies suggest that it is important to control for the supply of trade credit (Garcia-Appendini and Montoriol-Garriga, 2013). Table 4 Panel B reports the regression results controlling for supplier’s characteristics. Except for internal control weaknesses, the coefficients remain significant in the other three measures of accounting quality.

5.3 The impact of financial crisis

Table 5 provides the results of testing H2, the hypothesis that the relation between the use of trade credit and accounting quality is more pronounced during the financial crisis. Panel A shows the results without controlling for suppliers’ characteristics. The coefficients of the interaction terms (*Crisis*Accounting quality*) have signs that are consistent with the prediction. The coefficients are statistically significant in Column (1) – (3) in the directions predicted. Consistent with H1, the base coefficients on accounting quality are still significantly positive in Column (1)

- (3). The main effect coefficient on *Crisis* is negative and statistically significant at the 5 percent level in all columns. This result is consistent with the finding reported in Garcia-Appendini and Montoriol-Garriga (2013), which indicates that a drop in the amount of trade credit occurred during the financial crisis.

Similarly, Table 5 Panel B presents the results of testing H2 with the inclusion of suppliers' characteristics. In general, the results are similar to those obtained for the full sample in Panel A, and they are consistent with the hypothesis that, during the financial crisis, the positive association between accounting quality and trade credit is stronger.

5.4 The impact of product characteristics

The results of testing H3 are reported in Table 6. Panel A shows that the positive relation between accounting quality and trade credit is more pronounced when the transacted products are services. When accounting quality is measured by earnings smoothness (Columns 1 and 2), asymmetric earnings timeliness (Columns 3 and 4), and earnings management (Columns 5 and 6), I find that while the coefficients are significant for services, they are not significant for goods. The table also provides the *F*-statistics and the *p*-value associated with the test of equality of the coefficients across the two subsamples. The null hypothesis is rejected, which is consistent with service providers demanding higher quality accounting information from their customers to compensate for the higher risk of service provision. However, when accounting quality is measured by internal control weaknesses (Columns 7 and 8), I find no results.

Panel B further separates the goods into standardized goods and differentiated goods. Consistent with the idea that the liquidation cost of differentiated goods is higher, I find that the positive association between accounting quality and trade credit is only significant for

differentiated goods sample. In addition, for these three measures, the coefficients of two subsamples are significantly different.

6. ADDITIONAL TESTS

6.1 The effect of firm size

Prior studies also show that the use of trade credit is concentrated in small firms because these firms have limited access to the credit markets and are likely to be credit-constrained (Petersen and Rajan, 1997). In addition, Nilsen (2002) shows that small firms borrow more from their suppliers during monetary contractions. As one additional test, I examine the effect of firm size on the relation between accounting quality and trade credit. For each year, I partition firms into large and small subsamples using the median. Then I estimate regression equation (7) on each subsample separately. The results are shown in Table 7.

For earnings smoothness, the coefficients for both groups are significant. However, the magnitude for small firms is greater, and the difference is significant. Regarding asymmetric timeliness of earnings and earnings management, the results are similar. However, there are no significant differences internal control weakness.

6.2 The effect of credit rating

Firms' credit risk can potentially affect the relation between accounting quality and trade credit. Prior studies document that having a credit rating increases a firm's ability to obtain external financing (Faulkender and Petersen, 2008), and that firms without credit ratings have limited access to credit markets and use more trade credit (Petersen and Rajan, 1997). If a firm has a credit rating, its demand for suppliers' trade credit is expected to decrease. On the other hand, when a firm has a credit rating, its suppliers are also likely to use the rating to evaluate the firm's creditworthiness and reduce the use of accounting information in the customer screening process.

Therefore, the positive association between accounting quality and trade credit is expected to be stronger in firms without ratings.

Following prior literature (Jiang, 2008), to test the effect of credit rating, I collect firms' senior debt ratings from the annual COMPUSTAT file available between 1985 and 2011. Then I classify firms into two subsamples: those with ratings and those without ratings. I estimate regression equation (7) on these two subsamples. The results are reported in Table 8.

The results for earnings smoothness and earnings management are generally consistent with the predictions. Not only are the coefficients on accounting quality statistically significant for firms without credit ratings, but they are also significantly different from those for firms with ratings. The coefficient on earnings smoothness for firms without ratings is 0.002 and significant at the 1 percent level, while it is 0.001 and less significant for firms with ratings. The difference is statistically significant at the 10 percent level. The coefficient on earnings management is -0.014 for high credit risk firms (without ratings) and significant at the 1 percent level ($t = -7.05$), while it is -0.040 for firms with ratings but statistically insignificant. The difference again is statistically significant at better than the 0.01 level. When accounting quality is measured by asymmetric timeliness of earnings, the result is weaker. And accounting quality measured by internal control weakness, I find no result.

7. CONCLUSION

Trade credit is an important source of short-term financing, and this paper seeks to understand whether accounting quality affects firms' ability to obtain trade credit. Consistent with the intuition that accounting information reduces information asymmetry between a firm and its outsiders, I find that firms with higher earnings quality (measured by earnings smoothness,

asymmetric earnings timeliness, earnings management, and internal control weakness) are able to obtain more trade credit from their suppliers. The positive relation between trade credit and accounting quality is robust after controlling for supplier's characteristics. Additional analyses show that the positive association is concentrated in small firms and firms without credit ratings.

Using the 2007–2008 financial crisis as an exogenous shock to the supply of bank credit, I investigate the impact of the liquidity shock on the association between accounting quality and trade credit. Consistent with the idea that suppliers become stringent on their lending and use accounting information to screen their buyers, I find that the positive association is more pronounced during the financial crisis.

Finally I predict and find that product characteristics also impact the relation between accounting quality and trade credit. Specifically, if the transacted products are services instead of goods, the positive relation between accounting quality and trade credit is stronger. Furthermore, within the goods category, the positive association is stronger for differentiated goods.

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Appendix A: An example of suppliers refusing to increase trade credit

TravelCenters of America LLC (NYSE: TA) 10-K 2008

We rely upon trade creditors for a significant amount of our working capital.

Our fuel purchases are our largest operating cost. In 2007, we purchased \$4.9 billion of fuel. Historically, we have paid for our fuel purchases after delivery. During the past year as our fuel costs have increased some of our fuel suppliers have been *unwilling to adjust the amounts of our available trade credit* to accommodate the increased costs of the fuel volumes which we purchase; for example, a \$10 million amount of trade credit will allow us to purchase five million gallons of fuel at \$2.00 per gallon, but only 3.33 million gallons at \$3.00 per gallon. Also, *our financial results and business conditions in the U.S. financial markets generally have caused some fuel suppliers to request letters of credit or other forms of security for our purchases*. As a result, our investment in our working capital has increased. Any increased investment in working capital decreases our financial flexibility to use our capital for other business purposes and may cause us to continue to experience losses or our losses to increase.

Appendix B: Variable definitions

<i>Variable</i>	<i>Definition</i>
<i>AP</i>	A measure for a firm's use of trade credit: $AP = \text{accounts payable} / \text{total assets}$.
<i>Earnings smoothness</i>	The variance of earnings divided by the variance of cash flows over the past five years.
<i>(Asymmetric) Earnings timeliness</i>	Average C_Score over the past five years, where C_Score is estimated with Khan and Watts' (2009) model.
<i>Earnings management</i>	Accumulated abnormal accruals over the past five years, where abnormal accruals are estimated by Francis et al.'s (2005) model.
<i>Internal control weakness</i>	An indicator variable equals to 1 if a firm reports internal control weakness in the past two years, and zero otherwise.
<i>Size</i>	The natural logarithm of the book value of total assets at the end of the fiscal year.
<i>Age</i>	The natural logarithm of (1 + firm age), where firm age is measured as the number of years since a firm's first appearance in the CRSP monthly stock return file.
Age^2	The square of <i>Age</i> .
<i>Profit margin</i>	Net profit (earnings before extraordinary items) divided by total sales.
<i>ROA</i>	Return on assets, which equals income before extraordinary items divided by total assets.
<i>Fixed assets</i>	Net property, plant, and equipment divided by total assets.
<i>Sale growth</i>	This year's total sales divided by last year's total sale, and then minus 1.
<i>AR</i>	Accounts receivable divided by total assets.
<i>Net worth</i>	The total book value of equity divided by total assets.
<i>Tobin's q</i>	The sum of total market capitalization and total liabilities divided by total assets.
<i>Cash</i>	Total cash and cash equivalent divided by total assets.
<i>Debt</i>	The sum of long-term debt and debt in current liabilities divided by total assets.
<i>Market share</i>	A firm's total sales divided by its industry total sales, where industry is defined by two-digit SIC code.

Appendix C: Product characteristics classification

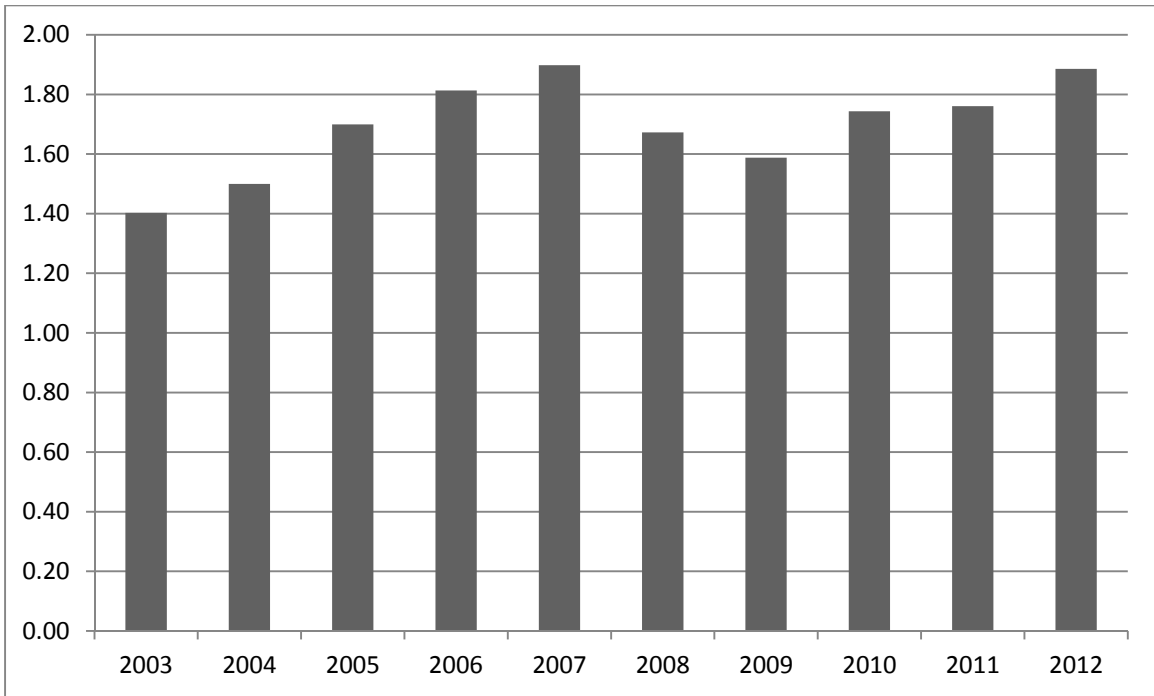
The classification is the same as Giannetti et al. (2008), which is based on Rauch (1999).

Sector	SIC code	Services	Differentiated goods	Standardized goods
Manufacturing				
Coal mining	12	0	0	1
Non metallic minerals	14	0	0	1
Food, kindred products	20	0	0	1
Textile mill products	22	0	0	1
Apparel	23	0	0	1
Lumber, wood products	24	0	0	1
Furniture, fixture	25	0	1	0
Paper, allied products	26	0	0	1
Printing, publishing	27	0	1	0
Chemicals	28	0	0	1
Petroleum, coal products	29	0	0	1
Rubber, plastic products	30	0	1	0
Leather	31	0	0	1
Stone, glass, clay products	32	0	1	0
Primary metal industries	33	0	0	1
Fabricated metal products	34	0	1	0
Machinery	35	0	1	0
Electrical, electronic equipment	36	0	1	0
Transportation, equipment	37	0	1	0
Instruments	38	0	1	0
Miscellaneous products	39	0	1	0
Transportation, communication, public utilities				
Other surface passenger transportation	41	1	0	0
Motor freight transportation, warehousing	42	1	0	0
Water transportation	44	1	0	0
Air transportation	45	1	0	0
Transportation services	47	1	0	0
Communications	48	1	0	0
Electric, gas, sanitary services	49	1	0	0
All wholesale trade				
Durable goods	50	1	0	0
Non durable goods	51	1	0	0
All retail trade				
Building materials	52	1	0	0
Department stores	53	1	0	0

Food stores	54	1	0	0
Automotive	55	1	0	0
Apparel, accessory stores	56	1	0	0
Furniture	57	1	0	0
Miscellaneous retail stores	59	1	0	0
Drug and proprietary stores	61	1	0	0
Finance, insurance, real estate				
Insurance agents, brokers	64	1	0	0
Real estate	65	1	0	0
Other services				
Business services	73	1	0	0
Automobile repair, services, parking	75	1	0	0
Legal services	78	1	0	0
Commercial engineering, accounting, research	79	1	0	0

Note: According to Rauch's (1999) classification, *standardized goods* are those goods with a clear reference price listed in trade publications, while *differentiated goods* are those goods with multidimensional characteristics so that the prices are highly heterogeneous. *Services* include the remaining industries.

Figure 1
Total amount of trade credit extended by U. S. non-financial businesses (\$ trillion)



Data are from the U.S. Flow of Funds Account at <http://www.federalreserve.gov/releases/z1/>.

Table 1
Sample selection

Panel A:					
Sampling procedure			Sample A. Full sample (1977-2011)		
			Firms	Firm-years	
COMPUSTAT universe			11,065	121,745	
Excluding financial, insurance, and real estate firms (SIC 6000-6999)			-2,132	-21,488	
Excluding regulated utilities (SIC 4900-4999)			-238	-5,213	
Excluding firms with missing variables			-303	-15,261	
Sample A: Whole COMPUSTAT firms			8,392	79,783	
Panel B:					
Sampling procedure			Sample B. Customer-supplier paired sample (2006-2008)		
			Pair-years		
Initial dataset			5,303		
Excluding regulated utilities (SIC 4900-4999)			-93		
Excluding firms with missing variables			-3,618		
Sample B: Customer-supplier pair-years			1,592		
Panel C:					
Fiscal year	Firms	Percent	Fiscal year	Firms	Percent
1977	2,113	2.65	1994	2,502	3.14
1978	2,384	2.99	1995	2,527	3.17
1979	2,486	3.12	1996	2,578	3.23
1980	2,397	3.00	1997	2,622	3.29
1981	2,343	2.94	1998	2,635	3.30
1982	2,238	2.81	1999	2,620	3.28
1983	2,228	2.79	2000	2,536	3.18
1984	2,172	2.72	2001	2,541	3.18
1985	2,093	2.62	2002	2,510	3.15
1986	2,097	2.63	2003	2,515	3.15
1987	2,051	2.57	2004	2,552	3.20
1988	2,172	2.72	2005	2,564	3.21
1989	2,148	2.69	2006	2,402	3.01
1990	2,157	2.70	2007	2,239	2.81
1991	2,331	2.92	2008	2,068	2.59
1992	2,440	3.06	2009	2,045	2.56
1993	2,476	3.10	2010	2,001	2.51
			Total	79,783	100

Table 2
Descriptive statistics

Variables	Sample A: Full sample								Sample B: Customer-supplier paired sample							
	N	Mean	Std. Dev.	Min	Q1	Median	Q3	Max	N	Mean	Std. Dev.	Min	Q1	Median	Q3	Max
Dependent variable:																
<i>AP</i>	79,783	0.094	0.073	0.002	0.044	0.075	0.121	0.449	496	0.118	0.103	0.003	0.043	0.085	0.160	0.404
Accounting quality:																
<i>Earnings smoothness</i>	79,783	-1.055	0.980	-11.126	-1.175	-0.823	-0.546	-0.097	496	-0.973	0.909	-6.930	-1.113	-0.766	-0.476	-0.124
<i>Earnings timeliness</i>	52,002	0.120	0.109	-0.290	0.047	0.122	0.196	0.507	368	0.036	0.086	-0.085	-0.036	0.029	0.089	0.312
<i>Earnings management</i>	63,350	-0.002	0.142	-0.502	-0.079	-0.004	0.072	0.530	445	-0.043	0.124	-0.405	-0.094	-0.033	0.022	0.373
<i>Internal control weakness</i>	13,012	0.080	0.272	0	0	0	0	1	486	0.039	0.194	0	0	0	0	1
Firm characteristics:																
<i>Size</i>	79,783	5.088	1.990	0.130	3.618	4.969	6.472	10.671	496	8.511	1.659	2.719	7.558	8.757	9.962	10.504
<i>Age</i>	79,783	2.625	0.572	0	2.197	2.639	3.045	3.892	496	3.118	0.622	0.693	2.639	3.135	3.761	3.850
<i>Age²</i>	79,783	7.219	2.972	0	4.828	6.965	9.269	15.146	496	10.107	3.730	0.480	6.965	9.831	14.147	14.824
<i>Profit margin</i>	79,783	0.297	0.633	-3.424	0.214	0.318	0.456	0.928	496	0.325	0.478	-5.496	0.196	0.308	0.510	0.905
<i>ROA</i>	79,783	0.013	0.138	-0.911	-0.001	0.042	0.079	0.327	496	0.046	0.108	-0.853	0.030	0.062	0.094	0.280
<i>Fixed assets</i>	79,783	0.302	0.217	0.005	0.134	0.253	0.421	0.914	496	0.262	0.216	0.006	0.097	0.184	0.396	0.909
<i>Sales growth</i>	79,783	0.128	0.394	-0.743	-0.019	0.082	0.196	6.768	496	0.119	0.298	-0.508	0.021	0.079	0.147	2.705
<i>AR</i>	79,783	0.189	0.124	0	0.096	0.176	0.260	0.662	496	0.145	0.118	0.000	0.055	0.127	0.198	0.572
<i>Net worth</i>	79,783	0.518	0.203	0.032	0.373	0.510	0.668	0.966	496	0.451	0.175	0.032	0.339	0.441	0.557	0.911
<i>Tobin's q</i>	79,783	1.625	1.220	0.413	0.977	1.252	1.798	25.289	496	1.777	0.777	0.557	1.215	1.566	2.152	5.924
<i>Cash</i>	79,783	0.139	0.171	0	0.023	0.069	0.187	0.943	496	0.125	0.156	0	0.024	0.063	0.168	0.943
<i>Debt</i>	79,783	0.221	0.179	0	0.060	0.203	0.338	0.784	496	0.210	0.146	0	0.093	0.197	0.310	0.713
<i>Market share</i>	79,783	0.020	0.064	0	0.001	0.003	0.012	1	496	0.077	0.116	0	0.009	0.034	0.094	0.659
Supplier's characteristics:																
<i>Size</i>									1,124	5.951	1.890	2.041	4.494	5.846	7.307	10.504
<i>Age</i>									1,124	2.843	0.565	0.693	2.398	2.773	3.258	3.850
<i>Age²</i>									1,124	8.402	3.261	0.480	5.750	7.687	10.615	14.824
<i>Profit margin</i>									1,124	0.311	0.655	-7.703	0.230	0.364	0.536	0.922
<i>ROA</i>									1,124	-0.012	0.172	-0.853	-0.038	0.037	0.078	0.288
<i>Fixed assets</i>									1,124	0.197	0.191	0.006	0.065	0.135	0.260	0.909
<i>Sales growth</i>									1,124	0.130	0.337	-0.614	-0.028	0.074	0.214	2.705
<i>Net worth</i>									1,124	0.560	0.218	0.032	0.397	0.566	0.750	0.943
<i>Tobin's q</i>									1,124	1.797	1.118	0.432	1.096	1.491	2.100	8.148
<i>Cash</i>									1,124	0.220	0.219	0	0.038	0.143	0.346	0.943
<i>Debt</i>									1,124	0.180	0.174	0	0.007	0.140	0.302	0.750
<i>Market share</i>									1,124	0.017	0.065	0	0.000	0.002	0.007	1

All variables are defined in Appendix B. All continuous variables are winsorized at 1% and 99% in each fiscal year.

Table 3
Correlation matrix

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)	(18)
(1) AP	1	0.10	0.03	-0.04	0.03	0.05	0.20	0.20	-0.41	0.03	0.08	0.01	0.43	-0.26	-0.12	-0.23	0.03	0.22
(2) Earnings smoothness	0.08	1	-0.05	0.00	-0.02	0.11	0.09	0.09	-0.12	0.14	0.14	0.02	0.04	-0.07	-0.06	-0.20	0.05	0.18
(3) Earnings timeliness	0.01	-0.05	1	0.13	0.08	-0.87	-0.16	-0.16	-0.09	-0.26	-0.12	-0.08	0.16	0.25	-0.23	0.10	-0.20	-0.64
(4) Earnings management	-0.08	-0.02	0.12	1	0.03	-0.10	-0.04	-0.04	-0.02	-0.04	-0.02	0.03	0.11	0.11	-0.08	-0.09	0.04	-0.08
(5) Internal control weakness	0.03	-0.02	0.08	0.02	1	-0.09	-0.04	-0.04	-0.02	-0.11	-0.02	0.00	0.02	-0.02	-0.05	0.00	0.00	-0.08
(6) Size	0.08	0.07	-0.87	-0.09	-0.09	1	0.23	0.23	-0.06	0.16	0.21	0.06	-0.16	-0.47	-0.04	-0.31	0.43	0.78
(7) Age	0.12	0.08	-0.16	-0.04	-0.04	0.24	1	1.00	-0.11	0.11	0.15	-0.11	0.11	-0.13	-0.09	-0.17	0.09	0.25
(8) Age ²	0.12	0.08	-0.17	-0.04	-0.04	0.25	1.00	1	-0.11	0.11	0.15	-0.11	0.11	-0.13	-0.09	-0.17	0.09	0.25
(9) Profit margin	-0.04	0.02	-0.05	-0.01	0.00	0.07	0.05	0.04	1	0.19	-0.21	0.09	-0.23	0.27	0.31	0.26	-0.15	-0.25
(10) ROA	0.01	0.15	-0.20	0.00	-0.07	0.23	0.13	0.13	0.36	1	0.07	0.29	0.11	0.19	0.51	0.03	-0.19	0.20
(11) Fixed assets	-0.08	0.11	-0.10	-0.03	-0.02	0.21	0.08	0.08	0.00	0.07	1	-0.02	-0.28	-0.24	-0.10	-0.43	0.32	0.29
(12) Sale growth	-0.01	0.01	-0.02	0.02	0.00	0.02	-0.10	-0.10	-0.03	0.09	-0.01	1	0.05	0.04	0.31	-0.01	-0.01	0.00
(13) AR	0.48	0.05	0.17	0.12	0.03	-0.15	0.09	0.09	0.05	0.08	-0.34	0.00	1	-0.01	0.00	-0.09	-0.14	0.01
(14) Net worth	-0.28	0.00	0.23	0.10	-0.02	-0.45	-0.13	-0.15	0.03	0.10	-0.24	0.02	-0.04	1	0.22	0.50	-0.78	-0.46
(15) Tobin's q	-0.11	0.01	-0.15	-0.07	-0.04	-0.13	-0.12	-0.12	-0.02	0.17	-0.13	0.20	-0.02	0.24	1	0.32	-0.27	-0.10
(16) Cash	-0.22	-0.12	0.14	-0.09	0.00	-0.36	-0.20	-0.21	-0.17	-0.20	-0.40	0.05	-0.18	0.47	0.33	1	-0.54	-0.39
(17) Debt	-0.07	-0.04	-0.15	0.05	0.01	0.37	0.04	0.04	-0.03	-0.11	0.31	0.01	-0.18	-0.77	-0.26	-0.42	1	0.36
(18) Market share	0.13	0.06	-0.26	-0.02	-0.04	0.32	0.11	0.11	-0.01	0.07	0.09	-0.02	0.04	-0.18	-0.05	-0.13	0.10	1

Spearman correlations are above the diagonal, and Pearson correlations are below the diagonal. All correlations that are significant at the 10% level (two-tailed) are highlighted in bold.

Table 4 Panel A
The relation between trade credit and accounting quality

Independent variable	Predicted sign	Dependent variable: AP			
		(1)	(2)	(3)	(4)
<i>Intercept</i>		-0.001*** (-3.00)	-0.002*** (-4.73)	-0.002*** (-7.70)	0.001* (1.72)
<i>Earnings smoothness</i>	+	0.004*** (5.02)			
<i>Earnings timeliness</i>	+		0.053*** (5.12)		
<i>Earnings management</i>	-			-0.021*** (-4.42)	
<i>Internal control weakness</i>	-				-0.003* (-1.73)
<i>Size</i>	-	-0.005*** (-6.81)		-0.004*** (-5.04)	-0.005*** (-5.36)
<i>Age</i>	+	0.012*** (2.88)	0.007 (1.10)	0.013** (2.31)	0.002 (0.31)
<i>Age²</i>	-	-0.003*** (-3.22)	-0.002 (-1.52)	-0.003*** (-2.73)	-0.001 (-0.15)
<i>Profit margin</i>	-	-0.003*** (-4.59)	-0.005*** (-3.70)	-0.003*** (-3.82)	-0.002*** (-2.79)
<i>ROA</i>	-	-0.012*** (-4.65)	-0.008*** (-2.58)	-0.013*** (-5.93)	-0.009*** (-4.01)
<i>Fixed assets</i>	?	-0.006 (-1.54)	-0.010* (-1.82)	-0.010** (-2.47)	-0.017** (-2.53)
<i>Sales growth</i>	+	0.005*** (7.51)	0.006*** (6.36)	0.006*** (7.81)	0.003** (2.17)
<i>AR</i>	+	0.127*** (17.26)	0.199*** (16.96)	0.130*** (16.04)	0.167*** (12.38)
<i>Net worth</i>	-	-0.228*** (-24.29)	-0.056*** (-14.64)	-0.222*** (-22.69)	-0.179*** (-18.84)
<i>Tobin's q</i>	-	-0.001*** (-3.34)		-0.001*** (-3.22)	-0.001 (-0.37)
<i>Cash</i>	-	-0.032*** (-7.86)	-0.016*** (-3.42)	-0.037*** (-8.92)	-0.021*** (-4.31)
<i>Debt</i>	-	-0.216*** (-24.05)		-0.212*** (-22.35)	-0.183*** (-17.89)
<i>Market Share</i>	+	0.025* (1.81)	0.023 (1.37)	0.029* (1.76)	0.018 (1.29)
<i>Firm FE</i>		Yes	Yes	Yes	Yes
<i>Year FE</i>		Yes	Yes	Yes	Yes
<i>Number of observations</i>		79,783	52,002	63,350	13,012
<i>Adj. R-squared</i>		0.674	0.515	0.553	0.573

This table tests the association between firms' use of trade credit and accounting quality using the whole COMPUSTAT sample from the fiscal years 1977 to 2010. The dependent variable is the ratio of accounts payable to total assets. The independent variable is accounting quality, which is measured by earnings smoothness (Column 1), asymmetric earnings timeliness (Column 2), earnings management (Column 3), and internal control weakness (Column 4). All variables are defined in Appendix C. Standard errors are clustered at the firm and year level. ***, **, * denote the significance level at the 1%, 5%, and 10% levels, respectively (0.5%, 2.5%, and 5% level, respectively, when it is a one-tailed test). The OLS regression model is:

$$AP_{it} = \beta_0 + \beta_1 \cdot Accounting\ Quality_{it} + \beta_2 \cdot X_{it} + Firm\ FE + Year\ FE + \varepsilon_{ijt}$$

Table 4 Panel B
The relation between trade credit and accounting quality
after controlling for supplier's characteristics

Independent variable	Predicted sign	Dependent variable is AP			
		(1)	(2)	(3)	(4)
<i>Intercept</i>		0.009 (0.12)	0.182 (0.85)	0.048 (0.33)	0.059 (0.82)
<i>Earnings smoothness</i>	+	0.003* (1.86)			
<i>Earnings timeliness</i>	+		0.139** (1.96)		
<i>Earnings management</i>	-			-0.042*** (-2.86)	
<i>Internal control weakness</i>	-				-0.004 (-0.79)
<i>Firm variables:</i>					
<i>Size</i>	-	0.012 (1.48)		0.021** (2.55)	0.007 (0.92)
<i>Age</i>	+	0.297*** (8.14)	0.157 (0.76)	0.304*** (3.51)	0.285*** (8.15)
<i>Age²</i>	-	-0.078*** (-9.20)	-0.050 (-1.16)	-0.081*** (-4.65)	-0.076*** (-9.32)
<i>Profit margin</i>	-	-0.021*** (-4.09)	-0.011 (-0.49)	-0.029*** (-5.35)	-0.020*** (-3.96)
<i>ROA</i>	-	-0.014 (-0.92)	-0.013 (-0.57)	-0.002 (-0.18)	-0.014 (-1.21)
<i>Fixed assets</i>	?	0.034 (0.96)	-0.042 (-0.58)	-0.013 (-0.41)	0.040 (1.21)
<i>Sales growth</i>	+	-0.021*** (-3.78)	-0.021** (-1.98)	-0.025*** (-3.59)	-0.021*** (-3.80)
<i>AR</i>	+	0.292*** (5.88)	0.390*** (4.30)	0.259*** (6.98)	0.299*** (6.30)
<i>Net worth</i>	-	-0.162*** (-4.66)	-0.040 (-1.19)	-0.290*** (-7.27)	-0.165*** (-5.07)
<i>Tobin's q</i>	-	0.001 (0.24)		-0.001 (-0.32)	0.001 (0.28)
<i>Cash</i>	-	0.050*** (3.54)	-0.008 (-0.21)	0.057*** (4.63)	0.049*** (3.32)
<i>Debt</i>	-	-0.209*** (-6.28)		-0.324*** (-8.13)	-0.221*** (-6.84)
<i>Market share</i>	+	-0.010 (-0.26)	-0.105 (-1.37)	-0.056 (-1.22)	-0.003 (-0.07)

Supplier variables:

<i>Size</i>	-0.001 (-0.67)	-0.001 (-0.38)	-0.001 (-0.88)	-0.001 (-0.71)
<i>Age</i>	0.001 (0.46)	-0.016* (-1.87)	-0.001 (-0.37)	0.001 (0.43)
<i>Age</i> ²	-0.002 (-0.44)	0.003* (1.87)	0.001 (0.41)	-0.001 (-0.42)
<i>Profit margin</i>	0.001 (0.65)	-0.002 (-0.24)	0.002 (0.49)	0.001 (0.55)
<i>ROA</i>	0.001 (0.40)	-0.001 (-0.21)	0.002 (0.98)	0.001 (0.62)
<i>Fixed assets</i>	-0.004** (-2.16)	-0.009 (-1.16)	-0.003 (-1.62)	-0.004** (-2.29)
<i>Sales growth</i>	-0.001 (-0.99)	-0.002 (-0.85)	-0.001 (-0.75)	-0.001 (-0.81)
<i>Net worth</i>	-0.001 (-0.39)	0.001 (0.23)	-0.001 (-0.24)	-0.001 (-0.38)
<i>Tobin's q</i>	-0.002 (-0.12)	-0.001 (-0.50)	-0.001 (-0.65)	0.001 (0.10)
<i>Cash</i>	-0.003* (-1.76)	-0.007** (-2.05)	-0.002 (-1.16)	-0.003* (-1.84)
<i>Debt</i>	-0.002 (-0.59)	-0.001 (-0.20)	-0.002 (-0.80)	-0.001 (-0.55)
<i>Market share</i>	0.003 (0.48)	0.007 (0.43)	0.006 (0.90)	0.004 (0.53)
<i>Firm FE</i>	Yes	Yes	Yes	Yes
<i>Number of observations</i>	1,592	752	1,465	1,577
<i>Adj. R-squared</i>	0.902	0.889	0.893	0.873

This table tests the association between trade credit and earnings quality controlling for supplier's characteristics. Customer-supplier pairs between 2006 and 2008 are obtained from Professor Garcia-Appendini. The dependent variable is accounts payable over total assets. The independent variable focused by this study is accounting quality, which is measured by earnings smoothness (Column 1), asymmetric earnings timeliness (Column 2), earnings management (Column 3), and internal control weakness (Column 4). All variables are defined in Appendix B. Robust standard errors are clustered at the pair level. ***, **, * denote the significance level at the 1%, 5%, and 10% levels, respectively (0.5%, 2.5%, and 5% level, respectively, when it is a one-tailed test). The OLS regression model is:

$$AP_{it} = \beta_0 + \beta_1 \cdot Accounting\ Quality_{it} + \beta_2 \cdot X_{it} + \beta_3 \cdot X_{jt} + Firm\ FE + \varepsilon_{ijt}$$

Table 5 Panel A
The impact of financial crisis on the relation between trade credit and accounting quality

Independent variable	Predicted sign	Dependent variable: AP			
		(1)	(2)	(3)	(4)
<i>Intercept</i>		-0.001 (-0.26)	0.003* (1.93)	-0.001 (-0.88)	0.002 (1.26)
<i>Earnings smoothness</i>	+	0.002** (2.27)			
<i>Earnings timeliness</i>	+		0.070*** (2.69)		
<i>Earnings management</i>	-			-0.030*** (-3.38)	
<i>Internal control weakness</i>	-				-0.002 (-0.11)
<i>Crisis</i>	-	-0.001** (-2.16)	-0.002** (-2.51)	-0.002** (-2.50)	-0.002** (-2.52)
<i>Crisis*Earnings smoothness</i>	+	0.002* (1.83)			
<i>Crisis*Earnings timeliness</i>	+		0.005** (2.16)		
<i>Crisis*Earnings management</i>	-			-0.015* (-1.71)	
<i>Crisis*Internal control weakness</i>	-				0.003 (0.63)
<i>Firm control variables</i>		Yes	Yes	Yes	Yes
<i>Firm FE</i>		Yes	Yes	Yes	Yes
<i>Number of observations</i>		6,709	4,809	5,790	5,921
<i>Adj. R-squared</i>		0.680	0.682	0.687	0.673

This table tests the association between trade credit and earnings quality in the financial crisis period from 2006 to 2008 using the whole COMPUSTAT sample. The dependent variable is accounts payable over total liabilities. The independent variable focused by this study is accounting quality, which is measured by earnings smoothness (Column 1), asymmetric earnings timeliness (Column 2), earnings management (Column 3), and internal control weakness (Column 4). The indicator variable *Crisis* takes the value of 1 for fiscal years 2007 and 2008, and 0 for fiscal year 2006. All variables are defined in Appendix B.

Robust standard errors are clustered at the firm level. ***, **, * denote the significance level at the 1%, 5%, and 10% levels, respectively (0.5%, 2.5%, and 5% level, respectively, when it is a one-tailed test).

The OLS regression model is:

$$AP_{it} = \beta_0 + \beta_1 \cdot Accounting\ Quality_{it} + \beta_2 \cdot Crisis + \beta_3 \cdot Accounting\ Quality_{it} \cdot Crisis + \beta_4 \cdot X_{it} + Firm\ FE + \varepsilon_{ijt}$$

Table 5 Panel B
The impact of financial crisis on the relation between trade credit and accounting quality
after controlling for supplier's characteristics

Independent variable	Predicted sign	Dependent variable: AP			
		(1)	(2)	(3)	(4)
<i>Intercept</i>		0.031 (0.37)	0.296 (1.48)	0.042 (0.28)	0.079 (0.99)
<i>Earnings smoothness</i>	+	0.005*** (3.26)			
<i>Earnings timeliness</i>	+		0.227* (1.72)		
<i>Earnings management</i>	-			-0.024* (-1.75)	
<i>Internal control weakness</i>	-				0.003 (0.53)
<i>Crisis</i>	-	-0.003 (-1.58)	-0.010*** (-2.86)	-0.001 (-0.45)	0.002 (0.91)
<i>Crisis*Earnings smoothness</i>	+	0.005* (1.88)			
<i>Crisis*Earnings timeliness</i>	+		0.053* (1.76)		
<i>Crisis*Earnings management</i>	-			-0.030* (-1.71)	
<i>Crisis*Internal control weakness</i>	-				-0.011 (-1.48)
<i>Firm control variables</i>		Yes	Yes	Yes	Yes
<i>Supplier control variables</i>		Yes	Yes	Yes	Yes
<i>Firm FE</i>		Yes	Yes	Yes	Yes
<i>Number of observations</i>		1,592	752	1,465	1,577
<i>Adj. R-squared</i>		0.909	0.918	0.914	0.902

This table tests the association between trade credit and earnings quality controlling for supplier's characteristics. Customer-supplier pairs between 2006 and 2009 are obtained from Professor Garcia-Appendini. The dependent variable is accounts payable over total liabilities. The independent variable focused by this study is accounting quality, which is measured by earnings smoothness (Column 1), asymmetric earnings timeliness (Column 2), earnings management (Column 3), and internal control weakness (Column 4). All variables are defined in Appendix B. Robust standard errors are clustered at the firm level. ***, **, * denote the significance level at the 1%, 5%, and 10% levels, respectively (0.5%, 2.5%, and 5% level, respectively, when it is a one-tailed test). The OLS regression model is:

$$AP_{it} = \beta_0 + \beta_1 \cdot Accounting\ Quality_{it} + \beta_2 \cdot Crisis_{it} + \beta_3 \cdot Crisis * Accounting\ Quality_{it} + \beta_4 \cdot X_{it} + \beta_5 \cdot X_{jt} + Firm\ FE + \varepsilon_{ijt}$$

Table 6 Panel A
The impact of product characteristics on the relation between trade credit and accounting quality

Independent variable	Predicted sign	Dependent variable: AP							
		Goods (1)	Services (2)	Goods (3)	Services (4)	Goods (5)	Services (6)	Goods (7)	Services (8)
<i>Intercept</i>		-0.055 (-0.53)	0.231 (1.17)	0.088 (0.36)	1.054*** (2.67)	-0.064 (-0.34)	0.336 (1.05)	0.013 (0.13)	0.163 (0.79)
<i>Earnings smoothness</i>	+	0.001 (0.08)	0.003** (2.09)						
<i>Earnings timeliness</i>	+			0.165 (0.57)	0.384* (1.77)				
<i>Earnings management</i>	-					-0.001 (-0.02)	-0.038** (-2.39)		
<i>Internal control weakness</i>	-							-0.001 (-0.26)	0.004 (0.37)
<i>Firm control variables</i>		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Supplier control variables</i>		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>F statistics</i>			5.53		15.75		9.79		0.48
<i>p-Value</i>			0.02		0.00		0.00		0.51
<i>Number of observations</i>		1,196	396	580	172	1,105	360	1,186	391
<i>Adj. R-squared</i>		0.903	0.893	0.891	0.884	0.897	0.863	0.854	0.839

This table tests the impact of product characteristics on the relation between trade credit and accounting quality controlling for supplier's characteristics. Customer-supplier pairs between 2006 and 2008 are obtained from Professor Garcia-Appendini. The dependent variable is accounts payable over total liabilities. The independent variable focused by this study is accounting quality, which is measured by earnings smoothness, asymmetric earnings timeliness, earnings management, and internal control weakness. Column 1, 3, 5, 7 show the results when the transacted product is goods, while Column 2, 4, 6, 8 show the results when the transacted product is services. The *F*-statistics and the *p*-value are associated with the test of equality of the coefficients across two subsamples. All variables are defined in Appendix B. Robust standard errors are clustered at the pair level. ***, **, * denote the significance level at the 1%, 5%, and 10% levels, respectively (0.5%, 2.5%, and 5% level, respectively, when it is a one-tailed test). The OLS regression model is:

$$AP_{it} = \beta_0 + \beta_1 \cdot Accounting\ Quality_{it} + \beta_2 \cdot X_{it} + \beta_3 \cdot X_{jt} + Firm\ FE + \varepsilon_{ijt}$$

Table 6 Panel B
The impact of goods characteristics on the relation between trade credit and accounting quality

Independent variable	Predicted sign	Dependent variable: AP							
		Stan. (1)	Diff. (2)	Stan. (3)	Diff. (4)	Stan. (5)	Diff. (6)	Stan. (7)	Diff. (8)
<i>Intercept</i>		-0.549*** (-2.89)	0.075 (0.52)	-0.208 (-0.90)	0.269 (0.84)	-0.141 (-0.71)	-0.148 (-0.46)	-0.550*** (-2.80)	0.182 (1.48)
<i>Earnings smoothness</i>	+	0.001 (0.10)	0.005* (1.78)						
<i>Earnings timeliness</i>	+			0.239 (0.59)	1.021*** (4.15)				
<i>Earnings management</i>	-					-0.001 (-0.04)	-0.081*** (-5.06)		
<i>Internal control weakness</i>	-							0.001 (1.11)	-0.004 (-0.55)
<i>Firm control variables</i>		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Supplier control variables</i>		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>F statistics</i>		4.47			24.35		17.65		0.41
<i>p-Value</i>		0.04			0.00		0.00		0.52
<i>Number of observations</i>		524	672	261	319	512	593	521	665
<i>Adj. R-squared</i>		0.906	0.901	0.897	0.885	0.887	0.892	0.856	0.891

This table tests the impact of goods differentiation on the relation between trade credit and accounting quality controlling for supplier's characteristics. Customer-supplier pairs between 2006 and 2008 are obtained from Professor Garcia-Appendini. The dependent variable is accounts payable over total liabilities. The independent variable focused by this study is accounting quality, which is measured by earnings smoothness, asymmetric earnings timeliness, earnings management, and internal control weakness. Column 1, 3, 5, 7 show the results when the transacted goods are standardized goods, while Column 2, 4, 6, 8 show the results when the transacted goods are differentiated goods. The *F*-statistics and the *p*-value are associated with the test of equality of the coefficients across two subsamples. All variables are defined in Appendix B. Robust standard errors are clustered at the pair level. ***, **, * denote the significance level at the 1%, 5%, and 10% levels, respectively (0.5%, 2.5%, and 5% level, respectively, when it is a one-tailed test). The OLS regression model is:

$$AP_{it} = \beta_0 + \beta_1 \cdot Accounting\ Quality_{it} + \beta_2 \cdot X_{it} + \beta_3 \cdot X_{jt} + Firm\ FE + \varepsilon_{ijt}$$

Table 7
The effect of firm size on the relation between trade credit and accounting quality

Independent variable	Predicted sign	Dependent variable: AP							
		Small (1)	Large (2)	Small (3)	Large (4)	Small (5)	Large (6)	Small (7)	Large (8)
<i>Intercept</i>		0.001*** (2.60)	-0.001*** (-3.67)	-0.002*** (-7.20)	-0.001** (-2.32)	-0.001 (-0.13)	-0.002*** (-6.52)	-0.001 (-0.74)	0.002*** (4.07)
<i>Earnings smoothness</i>	+	0.003** (1.98)	-0.001 (-0.01)						
<i>Earnings timeliness</i>	+			0.045*** (4.39)	0.039 (1.38)				
<i>Earnings management</i>	-					-0.014*** (-4.83)	-0.027 (-1.46)		
<i>Internal control weakness</i>	-							-0.002** (-2.23)	0.001 (0.61)
<i>Firm control variables</i>		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Year FE</i>		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>F statistics</i>		25.73		0.53		53.14		5.32	
<i>p-Value</i>		0.00		0.57		0.00		0.04	
<i>Number of observations</i>		39,828	39,955	25,290	26,712	31,651	31,699	6,306	6,706
<i>Adj. R-squared</i>		0.578	0.583	0.533	0.565	0.581	0.618	0.564	0.637

This table tests the effect of firm size on the relation between trade credit and accounting quality. The dependent variable is accounts payable over total liabilities. The independent variable focused by this study is accounting quality, which is measured by earnings smoothness, asymmetric earnings timeliness, earnings management, and internal control weakness. Column 1, 3, 5, 7 show the results for small firms, while Column 2, 4, 6, 8 show the results for large firms. The *F*-statistics and the *p*-value are associated with the test of equality of the coefficients across two subsamples. All variables are defined in Appendix B. Standard errors are clustered at the firm and year level. ***, **, * denote the significance level at the 1%, 5%, and 10% levels (0.5%, 2.5%, and 5% level, respectively, when it is a one-tailed test), respectively. The OLS regression model is: $AP_{it} = \beta_0 + \beta_1 \cdot Accounting\ Quality_{it} + \beta_2 \cdot X_{it} + Firm\ FE + Year\ FE + \varepsilon_{ijt}$

Table 8
The effect of credit rating on relation between trade credit and accounting quality for low and high credit risk firms

Independent variable	Predicted sign	Dependent variable: AP							
		Has rating (1)	No rating (2)	Has rating (3)	No rating (4)	Has rating (5)	No rating (6)	Has rating (7)	No rating (8)
<i>Intercept</i>		-0.001 (-0.37)	-0.001*** (-4.27)	-0.001*** (-2.85)	-0.002*** (-4.38)	-0.001 (-0.11)	-0.002*** (-6.74)	0.001* (1.83)	-0.000* (-1.84)
<i>Earnings smoothness</i>	+	0.001 (1.63)	0.002*** (2.86)						
<i>Earnings timeliness</i>	+			0.048 (1.11)	0.037* (1.73)				
<i>Earnings management</i>	-					-0.040 (-1.01)	-0.016*** (-7.05)		
<i>Internal control weakness</i>	-							-0.002 (-1.10)	-0.001 (-1.52)
<i>Firm control variables</i>		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Firm FE</i>		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>Year FE</i>		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
<i>F statistics</i>		3.13		21.35		93.14		1.32	
<i>p-Value</i>		0.08		0.00		0.00		0.24	
<i>Number of observations</i>		14,041	47,381	10,877	21,127	11,442	32,902	3,948	9,064
<i>Adj. R-squared</i>		0.595	0.543	0.565	0.499	0.639	0.644	0.694	0.661

This table tests the effect of credit rating on the relation between trade credit and accounting quality. The dependent variable is accounts payable over total liabilities. The independent variable focused by this study is accounting quality, which is measured by earnings smoothness, asymmetric earnings timeliness, earnings management, and internal control weakness. Column 1, 3, 5, 7 show the results for firms that have credit ratings, while Column 2, 4, 6, 8 show the results for firms without credit ratings. The *F*-statistics and the *p*-value are associated with the test of equality of the coefficients across two subsamples. All variables are defined in Appendix B. Standard errors are clustered at the firm and year level. ***, **, * denote the significance level at the 1%, 5%, and 10% levels, respectively (0.5%, 2.5%, and 5% level, respectively, when it is a one-tailed test). The OLS regression model is: $AP_{it} = \beta_0 + \beta_1 \cdot Accounting\ Quality_{it} + \beta_2 \cdot X_{it} + Firm\ FE + Year\ FE + \varepsilon_{ijt}$