Trade credits and shareholder wealth: Evidence from North Korea shock on South Korean Companies

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Abstract

This paper examines the relation between trade credits and stock price reaction to news that North Korea sank a South Korean warship. We find that the portfolio of firms with small accounts payable experiences a significant stock price reduction when the news was released public. The negative effect of small accounts payable is evident especially for small and high-leveraged companies. We also find that the portfolio investing in companies with large accounts receivable experiences negative excess returns during the event period. Those results suggest that trade credits provide constrained firms with insurance against negative shocks. We also find that accounts receivable decreases shareholder wealth especially for firms with many subsidiaries. To the best of our knowledge, this is the first research to show evidence that trade credits have favorable effects on shareholder value of financially constrained companies.

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1. Introduction

This paper investigates the relation between trade credits and stock price reaction to news of a negative external shock. Hill et al. (2012) indicate that account receivable occupy 18% of total assets of US manufacturing companies. Previous studies stress that trade credits are one of financing measures for customers rather than a simple privilege to delay payment (Metlzer, 1960; Atanasova, 2007). An important feature of trade credits is that lenders (suppliers) can closely monitor borrowers (customers) over the course of business, and thus information asymmetry between them is significantly reduced (Biais and Gollier, 1997; Petersen and Rajan, 1997).Accordingly, trade credits serve as an important financing source for financially constrained firms. In addition, trade credits tend to build on long-term relations between suppliers and clients, and suppliers have an incentive to rescue financially distressed clients to prevent violation of valuable relationships (Cunat, 2007).

Those ideas give rise to the prediction that trade credits serve as a substitute for bank debt (Meltzer, 1960). In fact, Cunat (2007) and Atanasova (2007) show evidence that low credit quality companies rely on trade credits especially when they cannot access to institutional loans. Financially constrained companies are likely to favor trade credits when the government tightens monetary policy, since banks tend to significantly decrease loan supply during tight monetary periods (Kashyap et al., 1993). Indeed, many previous studies show evidence to support the idea (Nilsen, 2002; Choi and Kim, 2003; De Blasio, 2005; Mateut et al., 2006; Atanasova, 2007). Previous studies also suggest that trade credit financing increases during liquidity shocks (Cunat, 2007; Garcia-Appendini and Montoriol-Garriga, 2013; Caobo-Valverde et al., 2016).

Those previous studies commonly suggest that trade credits create significant value for financially constrained companies through information production and insurance. However, most empirical studies focus on determinants of firms' reliance on trade credits, and to the best of our knowledge, only few studies show evidence that trade credits increase shareholder wealth. This research attempts to fill this gap. A potential reason for the lack of previous studies is that an inverse relation likely exists between firm value and trade credits since financially constrained companies tend to rely on trade credits. In addition, previous studies commonly suggest that trade credits are more expensive than other financing sources, and therefore offset their positive impacts on firm value (Ng et al., 1999). To overcome these

problems, we examine a few day stock price reactions to news of a negative external shock. Given that trade credits create additional value when the firm falls into constrained and/or distressed situations, stock price responses to unexpected shocks should be able to capture the value relevance of trade credits. We can also mitigate endogeneity concerns by using an unexpected event, which does not affect the pre-shock level of trade credits.

Specifically, we employ a North Korea shock which potentially harms Korean corporate performance as a research material. On March 26, 2010, Korean navy warship Cheonan went down in the West Sea, killing 46 sailors (see Table 1 for a series of events). The international joint investigation team announced on May 20 that a torpedo fired from a North Korean submarine sank the Cheonan. Then, the Korean government declared on May 24 that North Korea is responsible for the sinking of Cheonan, as well as announce economic sanctions against North Korea. The news of North Korea's attack and economic sanction is likely to increase investors' fear for future war and attacks, which potentially deteriorate Korean firm performance. In addition, investors are likely to require higher risk premium to Korean firms' securities due to increased uncertainty. Those potential negative impacts should be incorporated in stock prices immediately after the news. Indeed, the Korean stock price index (KOSPI) declined by about 4.3% during the three trading days from May 20 to May 25, 2010 (May 21 is a holiday in Korea, and May 22 and 23 were weekend). Importantly the North Korea shock was unexpected, and Korean firms were less likely to take potential negative impacts of the shock into consideration when they determined the level of trade credits before the news. We can substantially mitigate endogeneity concerns by using the geopolitical event.

[Insert Table 1 about here]

We examine the performance of portfolios formed by the pre-shock level of accounts payable by using the Fama-French 3-factor model and Fama-French-Carhart 4-factor model. Results suggest that the portfolio investing in firms with small accounts payable experience significant stock price (alpha) reduction during the period from May 20 to May 25, 2010. This evidence highlights uniqueness of trade credits, since we find the opposite result for total liabilities. Namely, the portfolio of firms with large total liabilities experience a significantly negative excess returns during the event period, probably due to high bankruptcy costs and financial constraints. Previous studies also argue that banks are informed investors who can monitor borrowers (Diamond, 1984; James, 1987). However, we do not find a significant relation between the level of bank debt and excess return during the

event period. The negative stock price effect of small accounts payable is especially evident for small and high leveraged companies. The result supports the view that trade credits are advantageous for financially constrained companies.

We also find that the portfolio of firms with large accounts receivable significantly underperforms during the three day event period. This negative effect of accounts receivable is also significant for small and high-leveraged firms. Taken together, our results show clear evidence that business suppliers provide insurance to constrained clients. Finally, we find that the negative effect of accounts receivable is especially evident for firms with many subsidiaries, large investments, and large minority interests. Parent companies are likely to incur costs to extend trade credits to subsidiaries when negative external shocks occur.

This research makes significant contributions to the literature. Although previous studies argue that trade credits provide an important financing channel to financially constrained firms, most empirical analyses are limited to determinants of firms' reliance on trade credits (Nilsen, 2002; Choi and Kim, 2003; De Blasio, 2005; Mateut et al., 2006; Atanasova, 2007; Cunat, 2007; Garcia-Appendini and Montoriol-Garriga, 2013; Caobo-Valverde et al., 2016).To the best of our knowledge, this paper is the first to show direct evidence that trade credits affects value (avoid stock price reduction) for constrained companies. Especially, our findings provide direct support to the view that trade credits serve as insurance for client companies (Wilner, 2000; Cunat, 2007), by taking advantage of an unexpected negative shock. Previous studies suggest that trade credits are advantageous for constrained companies during tight money period and financial crisis. We show evidence that trade credits become beneficial also when geopolitical risk becomes evident. Finally, our research adds to the literature of political risk, by showing that usage of relationship-based financing mitigates negative economic impacts of political risk (Chan and Wei, 1996; Chan et al., 2001; Amihud and Wohl, 2004).

The remainder of this paper is organized as follows. Section 2 describes previous studies and our hypothesis. Section 3 presents our empirical methodology and data. Section 4 shows our main empirical results. Additional analyses are presented in Section 5. Finally, Section 6 is a brief summary and conclusion of our research.

2. Literature review and hypotheses

Trade credits have been viewed as one of firms' financing sources (non-bank debt) (Metlzer, 1960; Biais and Gollier, 1997; Burkart and Ellingsen, 2004; Atanasova, 2007). An important feature of trade credit financing is that it builds on the relationship between suppliers and clients, which significantly decreases problems arising from information asymmetry. Dass et al. (2014) find that relationship-specific investments (proxied by R&D expenditures) of upstream firms are positively associated with trade credits. Given that suppliers can closely monitor clients over the course of business, trade credits serve as an important financing method especially for financially constrained firms that do not access to bank debt (Peterson and Rajan, 1995; Biais and Gollier, 1997). Cunat (2007) finds that firms without collateralized assets and less liquidity use more trade credits. Atanasova (2007) shows evidence that financially constrained companies rely on trade credits when they cannot access to institutional loans. Once constrained companies receive trade credits, the information of suppliers is transmitted to banks, and those firms may get access to bank loans (Biais and Gollier, 1997).[1] These natures of trade credits should affect investment behaviors of constrained companies. In fact, Guariglia and Mateut (2006) find that internal funds (proxied by coverage ratio) do not affect inventory investments by UK financially constrained firms when those firms have large trade credits, although inventory investments of the average constrained firm shows a significant sensitivity to internal funds. These results suggest that trade credits significantly support financing of constrained companies.

Generally, monetary tightening decreases bank loan supply especially to financially constrained companies. Literature has investigated whether trade credits absorb the reduction of bank loan supply during monetary tightening (Meltzer, 1960). Nilsen (2002) shows that small firms and large firms without bond rating increase trade credits when the government tightens monetary policy. Choi and Kim (2003) find that accounts payable and receivable increase during monetary tightening. By using UK data, Mateut et al. (2006) show evidence that bank loans decrease during a tight monetary policy period (1990 – 1992) and instead trade credits increase. Atanasova (2007) also finds that financially constrained UK firms rely more on trade credits during periods of tight money. Although financially constrained firms are generally forced to curtail investments by monetary tightening, substitution role of trade credits will decrease the negative impact (Biais and Gollier, 1997). De Blasio (2005) shows

[1]This theoretical argument explains the fact that many companies use both bank debt and trade credits. Burkart and Ellingsen (2004) theoretically argue that banks are willing to lend to firms that receive trade credits since availability of trade credits boots firms' investments rather than diversion.

evidence that trade credits are positively associated with investments in Italy when the government tightens monetary policy.

Given that it takes time to build long-term business relationships, both creditors and suppliers desire to keep their relationship once it is established. Cunat (2007) argues that suppliers provide clients with an insurance against liquidity shocks, which potentially violate the business relationship. Wilner (2000) postulates that trade credit suppliers can renegotiate with lenders less costly. In addition, trade credits are less risky for suppliers compared to bank debt. Suppliers can threaten to cut off future supplies to enforce repayment and easily repossess goods in case of failed payment (Petersen and Rajan, 1997; Kohler et al., 2000). By using survey data, Ng et al. (1999) find that firms generally do not respond to fluctuations in market demands and interest rates. Cunat (2007) also finds that trade credits tend to increase when firms encounter unexpected liquidity shocks. Garcia-Appendini and Montoriol-Garriga (2013) and Caobo-Valverde et al. (2016) show evidence that credit constrained firms tend to increase trade credits especially during a financial crisis while less constrained firms use bank debt.[2]

Those previous studies commonly suggest that trade credits generate significant benefits to financially constrained companies (information production and insurance). To the best of our knowledge, however, there are only few studies to show that trade credits increase shareholder wealth. There are two potential reasons for the lack of previous findings. Firstly, there is likely a reverse causality problem that poorly-performing (and thus financially distressed) firms rely on trade credits. Secondly, trade credits are generally considered more costly than bank debt for borrowing companies (Petersen and Rajan, 1994). For example, a common term of trade credits in the sample of Ng et al. (1999) is "2/10 net 30", which combines a two percent discount for payment within ten days and a net period ending on day 30 (implicit interest rate is 43.9 percent). Put differently, firms receiving trade credits incur high costs in exchange of the monitoring and insurance effects, which will offset positive effects on shareholder value. In a similar vein, Wilner (2000) theoretically argues that trade credits are associated with low costs of renegotiation, and thus firms are willing to pay high interest rates on trade credits.

We predict that trade credits are value-enhancing especially when firms fall into a difficult

[2]Meanwhile, Love and Zaidi (2007) and Love et al. (2010) find that firms in emerging markets decrease trade credits as well as bank debt after a financial crisis.

situation. This research attempts to examine the relation between trade credits and the stock price response to an unpredicted negative external shock to uncover the value-creating effects of trade credits. Given the nature of trade credits, low-value companies are likely to rely on trade credits. Besides, firm characteristics (including unobservable ones) associated with trade credit usage will also affect firm value. Those facts generate typical endogeneity problems when we implement cross-sectional analyses of firm value and trade credits. An effective way to avoid the endogeneity concern is to trace stock price responses during a few days when unexpected negative shocks are announced. We propose the following hypothesis:

Hypothesis: *Trade credits are positively associated with stock price reactions to unpredicted negative shocks.*

3. Methodology and data

To capture value effects of trade credits, this research examines stock price reactions to negative external shocks. Numerous studies have examined few-day stock price reactions to specific corporate announcements, given the premise that stock prices immediately incorporate value of new information. In this research, we adopt macro-level shocks rather than firm-level events, since firms announcing a specific event (in this case, events related to negative shocks) are likely to share common characteristics, which may generate sample selection biases. Many previous studies focus on monetary tightening policy, since those studies attempt to examine effects of monetary policy on corporate financing behaviors. Given that we have interests in insurance effects as well as liquidity supply effects, we adopt an unexpected shock which increases uncertainty of corporate economic performance.

Specifically, we adopt the North Korea shock on South Korean companies. It is commonly recognized that South Korea is exposed to geopolitical risk. On March 26, 2010, Korean navy warship Cheonan went down in the West Sea, killing 46 sailors (see Table 1 for a series of events). The international joint investigation team announced on May 20 that a torpedo fired from a North Korean submarine sank the Cheonan. In response to the announcement, the North Korea government declared on May 20 that the North will start all-out war against the South if the South conducted economic sanctions. Then, the South Korean government declared on May 24 that North Korea is responsible for the sinking of Cheonan, as well as

announce economic sanctions against North Korea. This incident is likely to increase uncertainty, at least temporally, which Korean companies encounter. Investors become reminded the geopolitical risk which Korean firms encounter, and fear the possibility of future war. Indeed, The Korean currency (Won) was depreciated to 1 USD = 1194.10 Won on May 20, which is the highest level since October 29, 2009. The South Korea's credit default swap premium recorded its highest level of the year after the announcement of the Cheonan investigation results (The Hankyoreh, May 26, 2010).

Korean firms may need to stop (or decrease) production, logistics, and sales activities if North Korea launched missile to South Korea, and thus encounter substantial decline of economic performance. The South Korea government also had a concern on economic slowdown, which is illustrated by the fact that the government and Ministry of Strategy and Finance launched a special joint response team of economic and finance on May 21, 2010 in order to mitigate the shock in South Korea market. In fact, tension between the two nations significantly increased since the sinking of Cheonan. For instance, North and South Korea fired at each other for about one hour on an island that sits off a disputed border. Given that the stock market incorporates the value of potential future events, we trace stock price reactions on May 20 and 25, when investors know that North Korea sank Cheonan.

Since all firms share the event window, abnormal returns across firms are likely correlated. The conventional event study methodology may understate the standard error and lead to biased statistical inference. Schwert (1981) and Campbell, Lo, and MacKinlay (1997) suggest to examine returns of portfolios during event window, which invests in firms with specific characteristics, to diversify away this cross-sectional correlation. Recent studies on stock price impacts of a macro-level event commonly employ this approach.[3]We adopt this approach and form portfolios by trade credits ratio (trade credits over assets) or a specific variable of interest at the end of June, year t, by using financial data during January to December, year $t - 1$. We invest in those portfolios until June of year $t + 1$, then rebalance the portfolio at the end of June, year $t + 1$. To capture the effect of North Korean shock on stock price, we implement calendar-time portfolio regressions, based on Fama and French 3-factor model and Fama-French-Carhart 4-factor model, with event window dummy (Cai and Walkling, 2011):

[3]For instance, Cai and Walkling (2011) adopts this method to examine the effect of SOX on stock prices.

$$R_{p,t} - R_{f,t} = \alpha + \beta_1(R_{m,t} - R_{f,t}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_5 D\_EVENT_t + e_t,$$
$$R_{p,t} - R_{f,t} = \alpha + \beta_1(R_{m,t} - R_{f,t}) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 MOM_t + \beta_5 D\_EVENT_t + e_t,$$

where$R_{p,t}$ is the value-weighted return of the portfolio, $R_{f,t}$ is the risk-free rate, $R_{m,t}$ is the market return, SMB is the size factor return, HML is the book-to-market factor return, *MOM* is the momentum factor return. The dummy variable D_EVENT equals 1 for the 3 trading days May 20 and May 25, 2010, and 0 for all other dates (event dummy). We estimate the models by using daily stock return data during the period from November 25, 2009 and November 25, 2010. We pay attention to the coefficient β_5, which is the average daily excess return during the event window. We predict the portfolio investing in firms with high accounts payable have larger β_5 than the portfolio investing in low accounts payable companies.

We obtain daily stock price data as well as annual financial data from the OSIRIS, provided by Bureau van Dijk. Financial institutions are not included in the analysis due to the different format of financial information. Firms are removed from portfolio formation, if stock return data are not available during the investment period. Table 2 presents summary statistics of companies which are included in portfolios formed at June 2009 (year 2008 financial data). Accounts payable occupies about 9.2% of total assets while accounts receivable accounts for 20% of assets. Accounts receivable is larger than payable probably because our sample consists of listed companies. The average percentage ownership by largest shareholder is 28%, suggesting that sample companies have concentrated ownership structures. The ownership data from Osiris includes indirect ownership as well as direct one, and the maximum of the largest shareholder ownership is 93.5%.

[Insert Table 2 about here]

4. Empirical results

4.1. Accounts payable and stock price reaction to the North Korean shock

To examine whether trade credits reduce negative impacts of North Korean shock, we firstly investigate excess returns of portfolios formed by accounts payable over total assets. Companies in our dataset are equally divided into three groups upon accounts payable

variable over assets at the end of June 2009 and 2010, respectively, and included in the assigned portfolio from the July to June of next year. Year 2008 (2009) accounting information is used for portfolio construction at June 2009 (2010). We conduct calendar-time portfolio regressions for those portfolios by using data during the period from November 25, 2009 and November 25, 2010.

Results are presented in Table 3. Panel A indicates that the portfolio investing in firms with high trade credits (High) does not experience a significant stock price reduction during the negative shock (the coefficient of event dummy is insignificant). In contrast, the portfolio consisting of firms with low trade credits experiences a significant reduction of alpha when the North Korean shock was released to public. Panel A also presents results for the difference portfolio (High minus Low). It suggests that the coefficient of the event dummy is significantly different between High and Low portfolios. This result supports our hypothesis that trade credits absorb damages from negative external shock.

[Insert Table 3 about here]

To highlight the uniqueness of trade credits, we form portfolios by leverage (total liabilities over assets). Panel B of Table 3 suggests that the portfolio of high leveraged firms (High) experiences a significantly negative excess returns when the news of North Korea Shock was released. The difference portfolio (High minus Low) has a negative and significant coefficient on the event dummy, suggesting that the stock market significantly depreciates high-leveraged companies. There are several interpretations of the result. The North Korea shock raises the probability that Korean firms encounter operating performance decline, which increases expected bankruptcy costs. The increased uncertainty may worsen firms' financing conditions, since investors may charge high risk premium, and thus firms may be forced to curtail investments. This negative effect is likely serious for high leveraged companies which do not have sufficient internal funds. Those arguments highlight the positive aspect of trade credits. Although trade credit is a component of liabilities, it has the opposite effects on shareholder wealth from liabilities.

Hoshi et al. (1990) suggest that Japanese firms with close relations with a bank decrease investments less than those without. Gilson et al. (1990) show evidence that financially distressed firms with more bank debt are more likely to restructure debt privately (less likely to choose in-court bankruptcy). These facts motivate us to make portfolios formed by bank loans (scaled by assets). Panel C of Table 3 shows that bank debt is not substitute for trade

credits in terms of shareholder wealth effects. All the three portfolios formed by bank loans carry an insignificant coefficient on event dummy.

To further examine the effect of trade credits against negative external shock, we formulate 2*2 portfolios which adopt trade credits as one criteria. Specifically, firms are equally divided into two groups upon a specific variable, and then the each portfolio is further divided into two portfolios based on trade credits. Table 3 suggests that leveraged companies tend to experience significant stock price reduction at the release of news on North Korea shock. We posit that trade credits mitigate the negative leverage effects, since trade credits are stable financing source for companies (Ng et al., 1999). Panel A of Table 4 indicates that the portfolio investing in firms with high leverage and low trade credits (High-Low) experiences a significant reduction in alpha during the event period. This result suggests that non-trade credit liabilities harm shareholder wealth when negative external shocks occur. Meanwhile, stocks prices of high-leveraged firms do not show significant stock price reduction if the trade credits account for a significant portion of liabilities (High-High). This result provides clear evidence that trade credits significantly decreases costs associated with leverage. We also form portfolios by debt ratio (debt over assets) and trade credits. Again, Panel B suggests that trade credits mitigate costs associated with debt financing.

[Insert Table 4 about here]

Previous studies commonly suggest that small companies tend to rely on trade credits (Carbo et al., 2013). Given that small companies are generally subject to financing constraints and high default probability, trade credits should have large value impacts for small companies. Carbo et al. (2013) find that small firms rely on trade credits during a financial crisis. We construct 2*2 portfolios by firm size (total assets) and trade credits. Panel C indicates that the effect of trade credits is more evident for small firms. Specifically, large companies do not experience a reduction of alpha at the event period, irrespective of the level of trade credits. However, small companies with low trade credit ratios show a significant stock price decline at the time of North Korea shock. Taken all together, the results support our hypothesis that trade credits generate benefits to distressed and/or constrained companies.

4.2. Accounts receivable and stock price reaction to the North Korean shock

We have so far shown evidence that firms relying on trade credits can mitigate stock price reduction due to negative external shock. Cunat (2007) indicates that suppliers have an

incentive to provide clients with liquidity to avoid violation of business relationship. Accordingly, we predict that suppliers are willing to incur costs to extend trade credits to their clients when negative external shocks occur. We investigate whether firms with large accounts receivable experience stock price reduction during the event period, to examine characteristics of trade credits from the side of credit providers.

Firstly, we construct three portfolios solely by accounts receivable over assets. Panel A of Table 5 suggests that the portfolio investing in large accounts receivable (High) experience a significant decline in alpha during the event period (the event dummy coefficient is significantly negative). Meanwhile, the portfolio of firms with small accounts receivable (Low) show insignificant excess returns, and the result on the difference portfolio indicates that firms with large accounts receivable underperform those with small ones when the news on North Korea shock was released. Suppliers incur costs since they are supposed to extend credits to customers in distressed situation.

[Insert Table 5 about here]

Panel B of Table 5 presents results of 2*2 portfolios of accounts receivable and payable. The result shows clear contrasts between accounts payable and receivables. Only the portfolio investing in firms with large accounts receivable and small payable (High-Low) show a significant stock price reduction during the event period. Even though firms have large accounts receivable (small accounts payable), stock prices of those firms do not show negative reaction if they have large accounts payable (small accounts receivable). Put differently, the result suggests that wealth transfer exists from suppliers to customers when negative external shocks occur. Those results show evidence that trade credits serve as insurance against negative shocks.

Panels C and D of Table 5 examine firm characteristics associated with costs of trade credits supply. Results are in spirit consistent with the finding for trade credit borrowers (Panels A to C of Table 4). Namely, small and high-leveraged firms incur significant costs when negative external shock comes to the market, if they have large accounts receivable in advance. Trade credit supply generates significant costs for distressed and/or constrained companies.

5. Additional analysis

5.1 Subsidiaries and trade credits

Former analyses suggest that trade credit providers experienced significant stock price reductions when the news on North Korea shock came to the market. It is well-documented that family business groups exist in Korea, in which affiliated firms have long-term business relationships. Given that internal capital markets are developed in business groups, a potential pattern is that subsidiaries receive trade credits from their parent companies within the group. Generally, parent companies do not need to rely on trade credits since they are large and less subject to information asymmetry. In contrast, it is difficult for subsidiaries to get access to public finance (e.g., bond issue) and even to bank debt. Once negative shocks occurred, investors may expect companies to extend trade credits to their subsidiaries.

To examine whether business groups are associated with costly trade credit supply, we make 2*2 portfolios by investments (in balance sheet) over assets and accounts receivable. Since investments include shareholdings of subsidiaries, we premise that firms with large investments are expected to provide financial supports to their subsidiaries when negative shocks occur. Consistent with this notion, Panel A of Table 6 indicates that the portfolio of firms with large investments and large accounts receivable (High-High) shows significant underperformance during the event period while the other three portfolios do not experience significant stock price reductions.

[Insert Table 6 about here]

We also construct 2*2 portfolios by the number of subsidiaries and accounts receivable (Panel B). Besides, portfolios are formed by minority interests (scaled by assets) and accounts receivable, since large minority interests indicate that the firm has large subsidiaries with a significant portion of minority shareholders (Panel C). Results suggest that firms with many subsidiaries and large minority interests show significant reductions in alpha during the event period, if they have large accounts receivable before the North Korea shock. Overall, our results support the idea that parent companies are expected to extend trade credits to subsidiaries when negative shocks occur.

5.2 Trade credits and ownership structure

Next, we investigate whether trade credits are advantageous especially for borrowing firms associated with a business group. Given the premise that subsidiaries receive trade credits from their parent companies, we make portfolios by the percentage ownership by largest

shareholder and accounts payable. Panel A of Table 7 indicates that the portfolio of firms with low parent company ownership and small trade credits (Low-Low) experiences a significantly negative excess returns at the North Korea shock. This result is consistent with our prediction, suggesting that investors do not expect those firms to receive trade credits. Meanwhile, the High-High portfolio result does not support our prediction that firms with large parent company ownership and large accounts payable outperform other portfolios. Rather the portfolio shows a negative coefficient on the event dummy (significant at the 10% level). A potential interpretation is that our sample consists of listed companies for which public finance is available. Large ownership by parent company does not simply mean reliance on trade credits.

[Insert Table 7 about here]

It is commonly recognized that minority shareholders' rights are not well protected in emerging markets (La Porta et al., 1998). Given that expropriation of minority shareholder wealth becomes serious during a financial crisis, previous studies investigate whether corporate ownership structures affect stock price performance during the East Asian financial crisis. Mitton (2002) finds that firms with higher outside ownership concentration showed better stock price performance in emerging markets during the crisis. Using a sample of 800 firms in eastern Asian countries, Lemmon and Lins (2003) find that crisis-period stock returns are 10–20 percentage points lower for firms in which managers had high levels of control rights, but who had separated their control and cash flow ownership. Baek et al. (2004) show evidence that Korean firms with higher ownership concentration by unaffiliated foreign investors suffered less from deteriorating stock performance during the financial crisis of 1997. To test whether that is the case for North Korea shock, we examine the relation between ownership concentration and stock price performance during our event period by forming three portfolios by the percentage ownership of largest shareholder. However, Panel B of Table 7 does not find a significant stock price reduction during the event period for firms with concentrated ownership structure (High).

6. Conclusion

This paper investigates the relation between trade credits and stock price reaction to news of a negative external shock. Previous studies suggest that trade credits build on long-term

relationships between suppliers and customers, and problems arising from information asymmetry are substantially mitigated (Biais and Gollier, 1997; Petersen and Rajan, 1997). Besides, suppliers have an incentive to renegotiate with distressed clients to prevent violation of valuable relationships. However, most empirical studies focus on determinants of firms' reliance on trade credits, and to the best of our knowledge, only few studies show evidence that trade credits affect shareholder wealth. This research attempts to fill this void. Specifically, we investigate excess returns of portfolios, formed by the level of trade credits, when news of the North Korea shock was released on May, 2010. This approach is advantageous in mitigating potential endogeneity problems.

Results suggest that the portfolio investing in firms with small accounts payable experience significant stock price (alpha) reduction during the period from May 20 to May 25, 2010. The negative stock price effect of small accounts payable is especially evident for small and high leveraged companies. We also find that the portfolio of firms with large accounts receivable experiences a significant stock price reduction during the three day event period. This negative effect of accounts receivable is also significant for small and high-leveraged firms. Firms with large accounts receivable (small accounts payable) do not experience negative excess returns if they have large accounts payable (small accounts receivable). Taken together, our results show clear evidence that business suppliers provide insurance to constrained clients.

This research makes significant contributions to the literature. To the best of our knowledge, this paper is the first to show direct evidence that trade credits affects shareholder value (avoid stock price reduction) for constrained companies. Especially, our findings provide direct support to the view that trade credits serve as insurance for client companies (Wilner, 2000; Cunat, 2007). We also show evidence that trade credits become beneficial when geopolitical risk becomes evident. Finally, our research adds to the literature of political risk, by showing that usage of relationship-based financing mitigates negative economic impacts of political risk (Chan and Wei, 1996; Chan et al., 2001; Amihud and Wohl, 2004).

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Table 1

A series of events associated with the North Korea shock

This table presents a serious of events associated with the North Korea shock. The information is available from the News library of Ministry of National Defense Republic of Korea web site (http://www.mnd.go.kr/mbshome/mbs/mnd_eng/) and Ministry of Unification web site (http://eng.unikorea.go.kr/), Ministry of Foreign Affairs Republic of Korea (http://www.mofa.go.kr/ENG/), and Ministry of Strategy and Finance (http://english.mosf.go.kr/).

March 26, 2010 Korea navy warship Cheonan went down in the West Sea (37°55'45"N, 124°36'02"E (The southwest of Baengnyeong Island)). 46 South Korea naval sailors died.
May 20, 2010 The international joint investigation team (consists of 24 members from South Korea, Australia, U.S., Sweden, England) officially announced that a torpedo fired from a North Korean submarine sank the Cheonan.
May 21, 2010 South Korea Government and Ministry of Strategy and Finance launched a special joint response team of economic and finance in order to mitigate the shock in South Korea market from the Cheonan incident. (http://english.mosf.go.kr/). North Korea government declared that it will start all-out war against the South Korea if the South conducted economic sanctions.
May 24, 2010 President Lee Myung-bak released a statement to the nation, declaring that North Korea is responsible for the sinking of Cheonan, as well as announcing the following economic sanctions against North Korea. (1) Prohibit North Korean ships from sailing in South Korean territorial waters (2) Cease all North-South trades (3) Ban South Koreans visit to North Korea (4) Prohibit investment by South Koreans in North Korea (5) Cease aid projects The Ministry of Unification South Korea announced that the South Korea government reports the Cheonan incident to the United Nations Security Council The Ministry of National Defense Republic of Korea declared that the ministry will undertake the following acts: (1) broadcasting propaganda to North Korea and anti-Kim Jong-il (2) blocking sea lane to the North Korea (3) holding a large scale military drills with U.S. forces in the West sea in June 2010.

Table 2

Summary statistics

This table shows summary statistics for 1205 companies which are included in our portfolio formation at the end of June, 2009. Year 2008 financial data are used and presented. Accounts payable/Assets is the firm's accounts payable divided by the book value of total assets. Bank loans/Assets is the firm's bank loans divided by the book value of total assets. Debt/Assets is defined as the sum of loans and other short term debt, total long term interest bearing debt divided by the book value of total assets. Accounts receivable/Assets is the accounts receivable divided by the book value of total assets. Leverage is computed by the book value of total liabilities divided by the book value of total assets.

	Mean	Std. Dev.	Minimum	Median	Maximum	N
Accounts payable/ Assets	0.0916	0.0802	0	0.0726	0.5467	1205
Bank loans/ Assets	0.0492	0.0701	0	0.0182	0.4773	1205
Debt/ Assets	0.2400	0.1832	0	0.2326	0.8462	1205
Accounts Receivable/Assets	0.2010	0.1302	0.0020	0.1773	1.8977	1205
Leverage	0.4859	0.2473	0.0086	0.4856	3.9077	1205
Total assets (million Won)	1225.3050	6622.6700	5.0198	96.7519	105829.3000	1205
Largest shareholder ownership (%)	27.81	14.35	2.97	25.46	93.52	1200

Table 3

Calendar time portfolio regression: Leverage variable portfolios

This table presents calendar-time portfolio regression results for portfolios formed by a leverage variable. Firms in our dataset are divided into3 portfolios based on accounts payable over assets (Panel A), total liabilities over assets (Panel B), and bank loan assets (Panel C) at the end of June 2009 and 2010, respectively. Those firms are included in the assigned portfolio from the July to June of next year. Year 2008 (2009) accounting information is used for portfolio construction at June 2009 (2010). The regression uses portfolio data during the period from November 25, 2009 and November 25, 2010 (251 trading days).Each panel includes the results from Fama and French 3-factor model and Fama-French-Carhart 4-factor model, with event dummy (EVENTD). EVENTD is takes a value of one for the three trading days from May 20 to May 25, 2010, and 0 for all other dates. Difference indicates the difference portfolio whose return is High portfolio return minus Low portfolio return. T-statistics are reported in parentheses.

	Rm –Rf	SMB	HML	Mom	EVENTD	Alpha	R2	N
Panel A: Accounts payable portfolio								
3-factor model								
Low	0.541 (11.29)***	-0.590 (-8.76)***	-1.570 (-34.37)***		-0.025 (-5.50)***	-0.008 (-7.70)***	0.975	251
Middle	1.028 (30.27)***	-0.023 (-0.48)	-0.018 (0.56)		-0.004 (-1.21)	0.000 (0.14)	0.805	251
High	0.975 (29.99)***	0.171 (3.74)***	-0.120 (-3.88)***		-0.000 (-0.01)	-0.000 (-0.40)	0.792	251
Difference	0.434 (7.21)***	0.761 (9.00)***	1.450 (25.29)***		0.025 (4.38)***	0.008 (5.92)***	0.959	251
4-factor model								
Low	0.548 (11.41)***	-0.574 (-8.45)***	-1.581 (-34.32)***	-0.052 (-1.54)	-0.025 (-5.43)***	-0.008 (-7.52)***	0.975	251
Middle	1.042 (31.91)***	0.010 (0.23)	-0.040 (-1.27)	-0.111 (-4.81)***	-0.003 (-1.01)	0.000 (0.64)	0.821	251
High	0.972 (29.79)***	0.163 (3.54)***	-0.115 (-3.69)***	0.025 (1.10)	-0.000 (-0.07)	-0.000 (-0.51)	0.792	251
Difference	0.424 (7.05)***	0.738 (8.67)***	1.465 (25.41)***	0.078 (1.83)*	0.024 (4.30)***	0.008 (5.73)***	0.959	251
Panel B: Leverage portfolio								
3-factor model								
Low	0.721 (26.06)***	0.301 (7.75)***	-0.216 (-8.20)***		-0.004 (-1.71)*	-0.006 (-9.32)***	0.753	251
Middle	0.960 (37.16)***	-0.080 (-2.21)**	0.038 (1.53)		-0.000 (-0.03)	-0.001 (-1.71)*	0.861	251
High	0.616 (13.86)***	-0.636 (-10.20)***	-1.542 (-36.41)***		-0.025 (-6.00)***	-0.006 (-6.29)***	0.978	251
Difference	-0.105 (-2.14)**	-0.938 (-13.58)***	-1.326 (-28.30)***		-0.021 (-4.46)***	-0.000 (-0.44)	0.972	251
4-factor model								
Low	0.724 (26.05)***	0.307 (7.81)***	-0.220 (-8.26)***	-0.020 (-1.00)	-0.004 (-1.66)*	-0.006 (-9.17)***	0.753	251
Middle	0.959 (36.92)***	-0.081 (-2.22)**	0.039 (1.55)	0.005 (0.27)	-0.000 (-0.05)	-0.001 (-1.73)*	0.861	251
High	0.621 (13.91)	-0.626 (-9.92)***	-1.549 (-36.21)***	-0.035 (1.12)	-0.025 (-5.93)***	-0.006 (-6.15)***	0.978	251
Difference	-0.103 (-2.09)**	-0.933 (-13.33)***	-1.329 (-28.02)***	-0.015 (-0.44)	-0.021 (-4.42)***	-0.000 (-0.39)	0.972	251

Table 3 (Continued)

Panel C: Bank loan portfolio								
3-factor model								
Low	0.205 (0.69)	-0.171 (-0.41)	-1.778 (-6.30)***		-0.027 (-0.98)	-0.011 (-1.65)	0.479	251
Middle	0.967 (45.55)***	-0.048 (-1.60)	0.015 (0.75)		-0.000 (-0.18)	-0.001 (-1.77)*	0.902	251
High	0.989 (22.68)***	0.068 (1.12)	-0.081 (-1.96)*		-0.005 (-1.30)	-0.001 (-0.65)	0.696	251
Difference	0.784 (2.59)***	0.239 (0.56)	1.697 (5.88)***		0.022 (0.77)	0.010 (1.52)	0.457	251
4-factor model								
Low	0.141 (0.48)	-0.325 (-0.78)	-1.677 (-5.94)***	0.512 (2.46)**	-0.031 (-1.12)	-0.013 (-1.91)*	0.490	251
Middle	0.973 (46.45)***	-0.034 (-1.13)	0.006 (0.30)	-0.046 (-3.13)***	-0.000 (-0.02)	-0.001 (-1.47)	0.906	251
High	1.000 (23.24)***	0.096 (1.58)	-0.100 (-2.41)**	-0.093 (-3.06)***	-0.005 (-1.16)	-0.000 (-0.34)	0.706	251
Difference	0.859 (2.86)***	0.421 (0.99)	1.577 (5.49)***	-0.605 (-2.86)***	0.026 (0.93)	0.012 (1.82)*	0.473	251

***: Significant at the 1% level; **: Significant at the 5% level; *: Significant at the 10% level

Table 4

Calendar time portfolio regression: 2*2 Portfolios by accounts payable

This table presents calendar-time portfolio regression results for 2*2 portfolios. Firms in our dataset are divided into 2 portfolios based on total liabilities over assets (Panel A), debt over assets (Panel B), and total assets (Panel C) at the end of June 2009 and 2010, respectively. Then, the each portfolio is further divided into two portfolios based on accounts payable over assets. Those firms are included in the assigned portfolio from the July to June of next year. Year 2008 (2009) accounting information is used for portfolio construction at June 2009 (2010). The regression uses portfolio data during the period from November 25, 2009 and November 25, 2010 (251 trading days). Each panel includes the results from Fama and French 3-factor model and Fama-French-Carhart 4-factor models, with event dummy (EVENTD). EVENTD takes a value of one for the three trading days from May 20 to May 25, 2010, and 0 for all other dates. T-statistics are reported in parentheses.

	Rm –Rf	SMB	HML	Mom	EVENTD	Alpha	R2	N
Panel A: Leverage and accounts payable portfolio (2*2 portfolio)								
3-factor model								
Low-Low	0.866 (22.47)***	0.016 (0.29)	-0.011 (-0.31)		-0.002 (-0.64)	-0.003 (-3.42)***	0.688	251
Low-High	1.009 (25.00)***	0.030 (0.53)	-0.039 (-1.01)		0.004 (1.03)	-0.000 (-0.13)	0.728	251
High-Low	0.608 (13.99)***	-0.633 (-10.37)***	-1.546 (-37.36)***		-0.025 (-6.08)***	-0.007 (-6.86)***	0.979	251
High-High	1.016 (18.90)***	0.165 (2.18)**	-0.104 (-2.03)**		-0.001 (-0.24)	0.000 (0.20)	0.601	251
4-factor model								
Low-Low	0.868 (22.40)***	0.020 (0.37)	-0.014 (-0.38)	-0.015 (-0.55)	-0.002 (-0.61)	-0.003 (-3.34)***	0.687	251
Low-High	1.013 (24.97)***	0.038 (0.65)	-0.044 (-1.13)	-0.026 (-0.90)	0.004 (1.07)	-0.000 (-0.04)	0.728	251
High-Low	0.612 (14.05)***	-0.622 (-10.09)***	-1.554 (-37.17)***	-0.037 (-1.19)	-0.025 (-6.01)***	-0.007 (-6.71)***	0.979	251
High-High	1.031 (19.49)***	0.202 (2.70)***	-0.128 (-2.53)**	-0.124 (-3.32)***	-0.000 (-0.07)	0.001 (0.55)	0.616	251
Panel B: Debt and trade credits portfolio (2*2 portfolio)								
3-factor model								
Low-Low	0.947 (29.92)***	-0.045 (-1.02)	0.022 (0.74)		0.001 (0.39)	-0.001 (-1.48)	0.798	251
Low-High	1.001 (27.99)***	0.148 (2.96)	-0.119 (-3.48)		-0.000 (-0.08)	0.000 (0.28)	0.770	251
High-Low	0.579 (12.45)***	-0.605 (-9.27)***	-1.564 (-35.30)***		-0.024 (-5.57)***	-0.008 (-7.33)***	0.976	251
High-High	0.998 (21.09)***	0.065 (0.97)	-0.042 (-0.93)		-0.004 (-0.93)	0.000 (0.10)	0.659	251
4-factor model								
Low-Low	0.953 (30.27)***	-0.030 (-0.66)	0.012 (0.40)	-0.052 (-2.32)**	0.002 (0.52)	-0.001 (-1.25)	0.801	251
Low-High	1.005 (28.05)***	0.159 (3.13)***	-0.126 (-3.65)***	-0.035 (-1.38)	-0.000 (-0.01)	0.000 (0.42)	0.771	251
High-Low	0.583 (12.50)***	-0.595 (-9.01)***	-1.571 (-35.09)***	-0.035 (-1.05)	-0.024 (-5.51)***	-0.008 (-7.18)***	0.976	251
High-High	1.009 (21.46)***	0.090 (1.35)	-0.059 (-1.30)	-0.084 (-2.52)**	-0.004 (-0.81)	0.000 (0.36)	0.666	251

Table 4 (Continued)

Panel C: Size and accounts payable portfolio (2*2 portfolio)								
3-factor model								
Low-Low	0.520 (9.91)***	-0.318 (-4.32)***	-1.744 (-34.87)***		-0.020 (-4.06)***	-0.009 (-7.43)***	0.970	251
Low-High	0.920 (19.03)***	0.906 (13.36)***	-0.616 (-13.39)***		-0.003 (-0.62)	-0.003 (-2.34)**	0.673	251
High-Low	0.925 (36.36)***	-0.068 (-1.89)*	0.008 (0.34)		-0.003 (-1.37)	-0.002 (-3.39)***	0.858	251
High-High	1.014 (22.95)***	0.135 (2.18)**	-0.089 (-2.11)**		-0.002 (-0.46)	0.000 (0.34)	0.692	251
4-factor model								
Low-Low	0.525 (9.97)***	-0.306 (-4.11)***	-1.752 (-34.66)***	-0.040 (-1.06)	-0.020 (-3.99)***	-0.009 (-7.29)***	0.970	251
Low-High	0.919 (18.90)***	0.904 (13.14)***	-0.615 (-13.19)***	0.009 (0.26)	-0.003 (-0.64)	-0.003 (-2.35)**	0.671	251
High-Low	0.931 (37.07)***	-0.052 (-1.45)	-0.002 (-0.09)	-0.053 (-3.00)***	-0.003 (-1.23)	-0.002 (-3.12)***	0.863	251
High-High	1.026 (23.59)***	0.165 (2.68)***	-0.108 (-2.60)***	-0.100 (-3.25)***	-0.001 (-0.30)	0.001 (0.68)	0.703	251

***: Significant at the 1% level; **: Significant at the 5% level; *: Significant at the 10% level

Table 5

Calendar time portfolio regression: Portfolios by accounts receivable

This table presents calendar-time portfolio regression results. In Panel A, firms in our dataset are divided into3 portfolios based on accounts receivable over assets at the end of June 2009 and 2010, respectively, and those firms are included in the assigned portfolio from the July to June of next year. Year 2008 (2009) accounting information is used for portfolio construction at June 2009 (2010). In Panel B, firms are divided into 2 portfolios based on accounts receivable over assets and the each portfolio is further divided into two portfolios based on accounts payable over assets. In the following panels, firms are divided into 2 portfolios based on total assets (Panel C) or total liabilities over assets (Panel D), and then the each portfolio is further divided into two portfolios based on accounts payable over assets. The regression uses portfolio data during the period from November 25, 2009 and November 25, 2010 (251 trading days).Each panel includes the results from Fama and French 3-factor model and Fama-French-Carhart 4-factor models, with event dummy (EVENTD). EVENTD takes a value of one for the three trading days from May 20 to May 25, 2010, and 0 for all other dates. Difference indicates the difference portfolio whose return is High portfolio return minus Low portfolio return. T-statistics are reported in parentheses.

	Rm –Rf	SMB	HML	Mom	EVENTD	Alpha	R2	N
Panel A: Accounts receivable portfolio								
3-factor model								
Low	0.914 (25.99)***	-0.110 (-2.23)**	0.045 (1.35)		-0.005 (-1.37)	-0.002 (-2.58)***	0.758	251
Middle	0.985 (29.47)***	0.109 (2.33)**	-0.096 (-3.01)***		-0.002 (-0.53)	-0.000 (-0.63)	0.790	251
High	0.622 (12.26)***	-0.563 (-7.91)***	-1.588 (-32.87)***		-0.024 (-4.98)***	-0.006 (-5.33)***	0.972	251
Difference	-0.292 (-5.11)***	-0.453 (-5.65)***	-1.633 (-30.02)***		-0.019 (-3.58)***	-0.004 (-3.14)***	0.962	251
4-factor model								
Low	0.919 (26.17)***	-0.097 (-1.95)*	0.036 (1.08)	-0.044 (-1.79)*	-0.004 (-1.27)	-0.002 (-2.40)**	0.760	251
Middle	0.997 (30.56)***	0.136 (2.96)***	-0.114 (-3.63)***	-0.091 (-3.94)***	-0.001 (-0.33)	-0.000 (-0.24)	0.801	251
High	0.626 (12.29)***	-0.554 (-7.68)***	-1.595 (-32.64)***	-0.033 (-0.91)	-0.024 (-4.93)***	-0.006 (-5.20)***	0.972	251
Difference	-0.294 (-5.11)***	-0.457 (-5.62)***	-1.631 (-29.60)***	0.011 (0.28)	-0.019 (-3.59)***	-0.004 (-3.15)***	0.962	251
Panel B: Accounts receivable and trade credits portfolio (2*2 portfolio)								
3-factor model								
Low-Low	0.706 (15.67)***	-0.041 (-0.65)	-0.045 (-1.06)		-0.006 (-1.36)	-0.007 (-6.72)***	0.544	251
Low-High	1.052 (35.76)***	-0.001 (-0.03)	-0.004 (-0.14)		0.001 (0.31)	0.001 (1.61)	0.848	251
High-Low	0.588 (11.05)***	-0.650 (-8.70)***	-1.529 (-30.19)***		-0.026 (-5.17)***	-0.007 (-5.71)***	0.969	251
High-High	0.984 (26.00)***	0.169 (3.18)***	-0.124 (-3.43)***		0.001 (0.28)	-0.001 (-0.62)	0.740	251
4-factor model								
Low-Low	0.714 (15.93)***	-0.020 (-0.31)	-0.059 (-1.38)	-0.071 (-2.23)**	-0.005 (-1.25)	-0.007 (-6.51)***	0.552	251
Low-High	1.059 (36.35)***	0.016 (0.39)	-0.015 (-0.55)	-0.057 (-2.77)***	0.001 (0.46)	0.001 (1.90)*	0.852	251
High-Low	0.596 (11.21)***	-0.629 (-8.37)***	-1.543 (-30.28)***	-0.068 (-1.82)*	-0.026 (-5.09)***	-0.007 (-5.52)***	0.969	251
High-High	0.982 (25.81)***	0.164 (3.05)***	-0.120 (-3.30)***	0.016 (0.60)	0.001 (0.25)	-0.001 (-0.68)	0.739	251

Table 5 (Continued)

Panel C: Size and accounts receivable portfolio (2*2 portfolio)								
3-factor model								
Low-Low	0.790 (13.22)***	0.659 (7.86)***	-0.453 (-7.96)***		0.001 (0.24)	-0.005 (-3.83)***	0.465	251
Low-High	0.540 (9.74)***	-0.284 (-3.64)***	-1.765 (-33.41)***		-0.019 (-3.64)***	-0.008 (-6.82)***	0.966	251
High-Low	0.948 (34.83)***	-0.051 (-1.33)	0.001 (0.05)		-0.002 (-0.66)	-0.001 (-2.17)**	0.845	251
High-High	0.972 (25.57)***	0.105 (1.97)**	-0.077 (-2.12)**		-0.005 (-1.46)	-0.001 (-0.87)	0.740	251
4-factor model								
Low-Low	0.791 (13.17)***	0.663 (7.81)***	-0.455 (-7.90)***	-0.013 (-0.30)	0.001 (0.25)	-0.005 (-3.77)***	0.463	251
Low-High	0.542 (9.71)***	-0.280 (-3.55)***	-1.768 (-33.05)***	-0.013 (-0.33)	-0.019 (-3.61)***	-0.008 (-6.73)***	0.966	251
High-Low	0.956 (35.89)***	-0.030 (-0.79)	-0.012 (-0.48)	-0.069 (-3.68)***	-0.001 (-0.48)	-0.001 (-1.84)*	0.853	251
High-High	0.980 (25.96)***	0.125 (2.34)**	-0.090 (-2.48)**	-0.066 (-2.48)**	-0.005 (-1.34)	-0.001 (-0.62)	0.746	251
Panel D: Leverage and accounts receivable portfolio (2*2 portfolio)								
3-factor model								
Low-Low	0.926 (27.97)***	-0.078 (-1.67)***	0.048 (1.51)		-0.000 (-0.06)	-0.002 (-2.44)**	0.778	251
Low-High	0.934 (22.14)***	0.339 (5.72)***	-0.256 (-6.38)***		-0.003 (-0.65)	-0.001 (-1.54)	0.682	251
High-Low	0.942 (23.50)***	0.004 (0.08)	-0.041 (-1.07)		-0.005 (-1.37)	-0.001 (-1.66)*	0.714	251
High-High	0.614 (11.80)***	-0.606 (-8.29)***	-1.557 (-31.40)***		-0.025 (-5.07)***	-0.006 (-5.25)***	0.970	251
4-factor model								
Low-Low	0.928 (27.89)***	-0.073 (-1.56)	0.045 (1.40)	-0.015 (-0.64)	-0.000 (-0.03)	-0.002 (-2.36)**	0.777	251
Low-High	0.935 (22.03)***	0.341 (5.68)***	-0.258 (-6.33)***	-0.007 (-0.22)	-0.003 (-0.64)	-0.001 (-1.50)	0.681	251
High-Low	0.955 (24.35)***	0.036 (0.64)	-0.061 (-1.63)	-0.104 (-3.75)***	-0.004 (-1.20)	-0.001 (-1.30)	0.728	251
High-High	0.622 (11.95)***	-0.587 (-7.97)***	-1.570 (-31.45)***	-0.064 (-1.74)*	-0.024 (-4.99)***	-0.006 (-5.06)***	0.971	251

***: Significant at the 1% level; **: Significant at the 5% level; *: Significant at the 10% level

Table 6

Calendar time portfolio regression: Portfolios by subsidiary variables

This table presents calendar-time portfolio regression results for 2*2 portfolios. Firms in our dataset are divided into 2 portfolios based on investments over assets (Panel A), the number of subsidiaries (Panel B), and minority interests over assets (Panel C) at the end of June 2009 and 2010, respectively. Then, the each portfolio is further divided into two portfolios based on accounts receivable over assets. Those firms are included in the assigned portfolio from the July to June of next year. Year 2008 (2009) accounting information is used for portfolio construction at June 2009 (2010). The regression uses portfolio data during the period from November 25, 2009 and November 25, 2010 (251 trading days). Each panel includes the results from Fama and French 3-factor model and Fama-French-Carhart 4-factor models, with event dummy (EVENTD). EVENTD takes a value of one for the three trading days from May 20 to May 25, 2010, and 0 for all other dates. T-statistics are reported in parentheses.

	Rm –Rf	SMB	HML	Mom	EVENTD	Alpha	R2	N
Panel A: Investments and accounts receivable portfolio (2*2 portfolio)								
3-factor model								
Low-Low	0.910 (35.68)***	-0.001 (-0.03)	-0.012 (-0.48)		-0.001 (-0.33)	-0.001 (-2.58)**	0.848	251
Low-High	0.977 (26.83)***	0.164 (3.20)***	-0.130 (-3.75)***		-0.005 (-1.58)	0.000 (0.09)	0.759	251
High-Low	0.962 (22.00)***	-0.041 (-0.66)	-0.010 (-0.24)		-0.001 (-0.36)	-0.001 (-1.51)	0.685	251
High-High	0.590 (10.98)***	-0.619 (-8.21)***	-1.548 (-30.24)***		-0.026 (-5.03)***	-0.007 (-5.51)***	0.968	251
4-factor model								
Low-Low	0.906 (35.60)***	-0.012 (-0.34)	-0.004 (-0.17)	0.0378 (2.10)**	-0.001 (-0.44)	-0.002 (-2.80)***	0.850	251
Low-High	0.980 (26.80)***	0.171 (3.30)***	-0.135 (-3.85)***	-0.024 (-0.93)	-0.005 (-1.53)	0.000 (0.19)	0.759	251
High-Low	0.977 (23.00)***	-0.003 (-0.05)	-0.035 (-0.85)	-0.125 (-4.18)***	-0.001 (-0.15)	-0.001 (-1.12)	0.704	251
High-High	0.597 (11.10)***	-0.602 (-7.91)***	-1.560 (-30.22)***	-0.058 (-1.52)	-0.025 (-4.95)***	-0.006 (-5.34)***	0.969	251
Panel B: The number of subsidiaries and accounts receivable portfolio (2*2 portfolio)								
3-factor model								
Low-Low	0.734 (11.40)***	0.495 (5.48)***	-0.328 (-5.36)***		0.002 (0.39)	-0.006 (-4.39)***	0.367	251
Low-High	0.963 (30.24)***	0.794 (17.76)***	-0.539 (-17.78)***		-0.004 (-1.25)	-0.001 (-1.46)	0.826	251
High-Low	0.951 (37.58)***	-0.032 (-0.90)	-0.007 (-0.28)		-0.001 (-0.56)	-0.001 (-2.14)**	0.863	251
High-High	0.630 (13.77)***	-0.656 (-10.22)***	-1.530 (-35.11)***		-0.026 (-5.91)***	-0.006 (-5.67)***	0.977	251
4-factor model								
Low-Low	0.734 (11.34)***	0.495 (5.41)***	-0.329 (-5.29)***	-0.001 (-0.02)	0.002 (0.39)	-0.006 (-4.35)***	0.364	251
Low-High	0.967 (30.31)***	0.803 (17.81)***	-0.545 (-17.83)***	-0.032 (-1.41)	-0.004 (-1.17)	-0.001 (-1.31)	0.826	251
High-Low	0.959 (38.64)***	-0.013 (-0.38)	-0.019 (-0.80)	-0.063 (-3.58)***	-0.001 (-0.39)	-0.001 (-1.81)*	0.870	251
High-High	0.634 (13.81)***	-0.646 (-9.95)***	-1.536 (-34.88)***	-0.032 (-1.00)	-0.025 (-5.85)***	-0.006 (-5.53)***	0.977	251

Table 6 (Continued)

Panel C: Minority interests and accounts receivable portfolio(2*2 portfolio)								
3-factor model								
Low-Low	0.787 (22.92)***	0.385 (7.98)***	-0.272 (-8.33)***		-0.001 (-0.22)	-0.005 (-6.14)***	0.697	251
Low-High	0.833 (21.33)***	0.502 (9.15)***	-0.322 (-8.65)***		-0.004 (-1.09)	-0.004 (-4.94)***	0.677	251
High-Low	0.960 (33.59)***	-0.067 (-1.67)*	0.012 (0.42)		-0.002 (-0.64)	-0.001 (-1.68)*	0.836	251
High-High	0.640 (13.91)***	-0.676 (-10.48)***	-1.517 (-34.64)***		-0.026 (-5.95)***	-0.006 (-5.38)***	0.977	251
4-factor model								
Low-Low	0.793 (23.10)***	0.398 (8.20)***	-0.281 (-8.55)***	-0.044 (-1.82)	-0.000 (-0.12)	-0.005 (-5.95)***	0.702	251
Low-High	0.841 (21.65)***	0.521 (9.48)***	-0.334 (-8.98)***	-0.064 (-2.34)**	-0.004 (-0.98)	-0.004 (-4.72)***	0.682	251
High-Low	0.969 (34.60)***	-0.046 (-1.15)	-0.003 (-0.10)	-0.072 (-3.63)***	-0.001 (-0.46)	-0.001 (-1.34)	0.844	251
High-High	0.643 (13.92)***	-0.668 (-10.23)***	-1.523 (-34.37)***	-0.027 (-0.83)	-0.026 (-5.89)***	-0.005 (-5.27)***	0.977	251

***: Significant at the 1% level; **: Significant at the 5% level; *: Significant at the 10% level

Table 7

Calendar time portfolio regression: Portfolios with ownership structure

This table presents calendar-time portfolio regression results. In Panel A, firms in our dataset are divided into 2 portfolios based on the percentage ownership by largest shareholder, and the each portfolio is further divided into two portfolios based on accounts payable over assets at the end of June 2009 and 2010, respectively, and those firms are included in the assigned portfolio from the July to June of next year. Year 2008 (2009) accounting information is used for portfolio construction at June 2009 (2010). In Panel B, firms are divided into 3 portfolios based on the percentage ownership by largest shareholder. The regression uses portfolio data during the period from November 25, 2009 and November 25, 2010 (251 trading days).Each panel includes the results from Fama and French 3-factor model and Fama-French-Carhart 4-factor models, with event dummy (EVENTD). EVENTD takes a value of one for the three trading days from May 20 to May 25, 2010, and 0 for all other dates. Difference indicates the difference portfolio whose return is High portfolio return minus Low portfolio return. T-statistics are reported in parentheses.

	Rm –Rf	SMB	HML	Mom	Crisis	Alpha	R2	N
Panel A: Portfolio by ownership of largest shareholder and accounts payable(2*2 portfolio)								
3-factor model								
Low-Low	0.601 (13.03)***	-0.641 (-9.90)***	-1.542 (-35.10)***		-0.025 (-5.76)***	-0.007 (-6.72)***	0.977	251
Low-High	1.004 (18.90)***	0.0355 (0.48)	-0.033 (-0.64)		-0.002 (-0.41)	0.000 (0.30)	0.608	251
High-Low	0.838 (23.67)***	0.132 (2.66)***	-0.100 (-2.96)***		-0.000 (-0.03)	-0.003 (-4.28)***	0.704	251
High-High	1.031 (22.99)***	0.169 (2.68)***	-0.120 (-2.81)***		-0.008 (-1.82)*	0.000 (0.41)	0.699	251
4-factor model								
Low-Low	0.606 (13.11)***	-0.628 (-9.61)***	-1.550 (-34.98)***	-0.043 (-1.33)	-0.025 (-5.69)***	-0.007 (-6.56)***	0.977	251
Low-High	1.014 (19.15)***	0.059 (0.79)	-0.048 (-0.95)	-0.079 (-2.11)**	-0.002 (-0.30)	0.001 (0.52)	0.613	251
High-Low	0.844 (23.85)***	0.146 (2.91)***	-0.109 (-3.21)***	-0.046 (-1.83)*	0.000 (0.06)	-0.003 (-4.09)***	0.707	251
High-High	1.042 (23.52)***	0.197 (3.14)***	-0.138 (-3.25)***	-0.093 (-2.97)***	-0.007 (-1.68)*	0.001 (0.72)	0.708	251
Panel B: Portfolio by ownership of largest shareholder								
3-factor model								
Low	0.705 (4.24)***	-0.090 (-0.39)	-1.900 (-12.01)***		-0.013 (-0.84)	-0.005 (-1.28)	0.766	251
Middle	0.928 (22.15)***	0.093 (1.57)	-0.089 (-2.22)**		-0.008 (-1.92)*	-0.002 (-2.00)**	0.687	251
High	0.980 (38.18)***	0.167 (4.63)***	-0.105 (-4.31)***		-0.002 (-0.76)	-0.000 (-0.18)	0.861	251
Difference	0.275 (1.64)	0.257 (1.09)	1.794 (11.20)***		0.011 (0.72)	0.005 (1.24)	0.752	251
4-factor model								
Low	0.508 (5.95)***	-0.568 (-4.71)***	-1.587 (-19.41)***	1.589 (26.37)***	-0.025 (-3.05)***	-0.010 (-5.20)***	0.939	251
Middle	0.933 (22.18)***	0.103 (1.74)*	-0.096 (-2.38)**	-0.035 (-1.19)	-0.007 (-1.85)*	-0.002 (-1.86)*	0.687	251
High	0.985 (38.51)***	0.179 (4.94)***	-0.113 (-4.62)***	-0.039 (-2.18)**	-0.006 (-0.65)	0.000 (0.05)	0.863	251
Difference	0.478 (5.73)***	0.747 (6.33)***	1.474 (18.44)***	-1.629 (-27.65)***	0.023 (2.93)***	0.010 (5.33)***	0.940	251

***: Significant at the 1% level; **: Significant at the 5% level; *: Significant at the 10% level