Determinants of Corporate Trade Credit: An Empirical Study on Korean Firms

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ABSTRACT

This study is designed to determine the motives for trade credit in Korean firms. Based on data collected from 14,660 firm-year observations running from 1992 to 2011 on the Korean Stock Exchange, this paper finds strong evidence on determinants of trade credit based on financial characteristics. The principal result is that older firms with larger size, lower growth, and higher profits tend to extend accounts receivable. This evidence, while consistent with the access to financing hypothesis, is difficult to reconcile with the growth hypothesis and price discrimination hypothesis. Second, this paper provides evidence that firms with larger size and greater leverage, as well as young firms, appear to use accounts payable. This finding, while consistent with the financial constraint hypothesis, is difficult to harmonize with the financing and growth hypothesis. The paper contributes to the argument about trade credit motives. It may help managers in making financial policy concerning improving firm value in the Korean market.

Keywords: Trade Credit, Accounts Receivable, Accounts Payable
JEL Classifications: 30, 32

1. INTRODUCTION

Trade credit is a very important corporate finance issue. In general, trade credit is measured by accounts receivable (*AR*) and accounts payable (*AP*). Trade credit research has garnered little attention in corporate finance literature. According to Nadri (1969), one reason for this neglect is that trade credit is buried in the firm's distribution activity. Trade credit, like other working capital components, is related to short-term external finance. Moreover, trade credit makes up a large share of total assets in manufacturing companies. Mian and Smith (1992) document that *AR* are 21.0% of total assets in US manufacturing corporations, a substantial fraction of corporate assets. Likewise, *AR* are approximately 19% of total assets in Korea manufacturing companies. Specifically, trade credit management, such as *AR*, is one of the most important and time-consuming activities for a financial manager.

Why do firms then extend or use trade credit? Prior literature has many theoretical explanations for trade credit determinants. Interestingly, it is mixed with both financial and non-financial descriptions. First, the non-financial explanation suggests

that trade credit arises from price discrimination and acts as a warranty for product quality, and the persistence of long-term relationships with customers (Long et al., 1993; Shin and Soenen, 1998; Wilson and Summers, 2002; Deloof, 2003; Barine, 2012; Hill et al., 2012). Meanwhile, financial explanations highlight cost, monitoring, and informational advantages over banks (Biais and Gollier, 1997; Burkart and Ellingsen, 2004). Furthermore, prior studies empirically examine the determinants of trade credit concentrating on the preferences and expectations of both suppliers and buyers (Deloof and Jegers, 1996; Petersen and Rajan, 1997; Love et al., 2007; Giannetti et al. 2008; Bougheas et al., 2009; Molina and Preve, 2009; García-Teruel, and Martínez-Solano, 2010). More specifically, Ferrando and Mulier (2011) noted that companies that are more likely to be financially constrained are more dependent on the trade credit channel to finance growth.

The goal of this paper is to examine determinants of corporate trade credit in Korea. Empirical trade credit research has been applied mainly to developed countries. As with most emerging countries, for Korean companies, trade credit is an important source of

financing. However, empirically little attempt has been made to verify the effect of trade credit on the motives behind trade credit.

This paper tests our hypotheses using a sample of 14,660 firm-year data points across non-financial Korean companies for the period from 1992 to 2011. Methodologically, this paper adopts a large panel data set of trade credit for these firms, considering the fixed effects for each firm and each year (to consider unobserved relationships). This study groups corporate trade credit hypotheses into two categories: Account receivables and account payables. Our main results are as follows. First, this paper finds that firm size and age have a significantly positive impact on *AR*, whereas growth and profitability have a significantly negative effect on *AR*. Second, the results demonstrate that firm size and leverage are significantly positively related to *AP*, whereas firm age has a significantly negative effect on *AP*.

The paper contributes to the growing literature on corporate trade credit motives. The sample includes firms from emerging countries that prior literature has not widely studied. Moreover, the paper explains trade credit motives. It also may help managers, such as the chief financial officer, to make effective financial policy to improve firm performance on the Korean market.

The paper is organized as follows. In Section 2, this paper suggests the hypotheses to be tested. In Section 3, data description and methodologies are presented. Section 4 presents empirical results on reasons why firms extend trade credit. Section 5 summarizes and concludes the paper.

2. HYPOTHESIS

2.1. Determinants of *AR*
2.1.1. Access to financing hypothesis
In a capital system, larger firms are more creditworthy than other firms (Petersen and Rajan, 1997). Large established firms have better reputations on the capital markets (Diamond, 1991). Specifically, older firms may have more access to financial markets than younger firms. Well-established firms with better access to financial markets extend more trade credit than other firms (Niskanen and Niskanen, 2006; Baños-Caballero et al., 2010). Thus, firm size and age are positively related to the level of *AR*. This study tests the following hypotheses:

H1.1: Firm size is positively related with *AR*.

H1.2: Firm age is positively related with *AR*.

2.1.2. Growth hypothesis
A firm willing to grow may choose a strategy of extending trade credit with longer re-payment periods than its competitors (Niskanen and Niskanen, 2006). In general, firms may perform a growth strategy using trade credit terms, such as the credit period, which is the total length of time credit extended to the customer. For instance, a way to beat competitors may be to grant credit if the customer is expected to be a repeat customer. Therefore, this study tests the following hypothesis:

H.1.3: Firm growth is positively related with *AR*.

2.1.3. Price discrimination hypothesis
Trade credit may be offered even if the supplier does not have a financing advantage over financial institutions, because trade credit may be used for price discrimination (Mian and Smith, 1992; Petersen and Rajan, 1997). In particular, since firms with low credit quality have bad credit terms, trade credit lowers the effective price of goods and services. Thus, firms with larger operating margins have a larger incentive to generate additional cash flows by financing the sales of additional units to their poorer customers by extending trade credit (Niskanen and Niskanen, 2006). For example, wealthy customers pay early and get a discount. Monopolists can use trade credit as a price discrimination tool. Therefore, this study tests the following hypothesis:

H1.4: Profitability is positively related with *AR*.

2.2. Determinants of *AP*
2.2.1. Financing hypothesis
Large and old firms may have more collateral assets than small and young firms (Barclay et al., 2003). These firms are inclined to have more stable cash flows. Moreover, large and old firms may have a high incentive for *AP*, because of low information asymmetry compared with small and young firms. Hence, larger firms and older firms are positively related to the level of *AP*. Therefore, this study tests the following hypotheses:

H2.1: Firm size is positively related with *AP*.

H2.2: Firm age is positively related with *AP*.

2.2.2. Growth hypothesis
Suppliers appear to have some advantage in financing growing firms. That is, firms with high growth opportunity may be a source of future business to a supplier, and suppliers are more willing to provide credit in anticipation of capturing this future business. Theoretically, it may be argued that rapidly growing firms have better investment opportunities than other firms do, and are thus willing to use more trade credit as a partial financing source for their new investments (Niskanen and Niskanen, 2006). Therefore, firms with high growth have a greater possibility to increase *AP* (Howorth and Reber, 2003; Cunat, 2006). Therefore, this study tests the following hypothesis:

H.2.3: Firm growth is positively related with *AP*.

2.2.3. Financial constraint hypothesis
In general, firms facing financial distress have difficulty acquiring financing on the capital market. In other words, financially constrained firms have less access to capital and face more costly external financing, since they have a higher default risk and tighter monetary conditions. Firms under financial distress use a significantly larger amount of trade credit to substitute for alternative financing sources (Molina and Preve, 2012). This suggests a positive effect relative to equity and financial debt when firms are in financial distress. Accordingly, firms experiencing

financial distress may extend *AP* to avoid high equity costs of issuing stock and high debt costs. Therefore, this study tests the following hypothesis:

H2.4: Leverage is positively related with *AP*.

3. DATA AND METHODOLOGY

This paper is based on data collected from 763 non-financial firms listed on the Korean Stock Exchange for the period from 1992 to 2011. The panel data set is based on 14,660 firm-year data points across listed Korean non-financial firms. Sample data has been collected from the data analysis, retrieval and transfer System supplied by the Financial Supervisory Service and financial data obtained from KISVALUE, supplied by National Information and Credit Evaluation. We exclude issues offered by financial companies from our sample. This study performs a t-test to analyze firm specifics and industry characteristics for trade credit. Furthermore, the study uses the panel regression model to test the hypotheses. The advantage of panel data methodology allows us to control for unobservable heterogeneity.

To model trade credit determinants, the estimated equations take the following form.

$$Trade\ Credit_{it} = \beta_0 + \beta_1 LnSale_{it} + \beta_2 LnAge_{it} + \beta_3 AssetGr_{it} + \beta_4 Profit_{it} + \beta_5 Leverage_{it} + u_i + \lambda_t + e_{it} \quad (1)$$

Where, trade credit is *Accounts Receivable* and *Accounts Payable* for each firm. *AR* is defined as *AR* divided by the book value of total assets (Kestens et al., 2012). *AP* is defined as *AP* divided by the book value of total assets. *LnSale* is measured as the natural logarithm of the book value of total sales. *LnAge* is measured as the natural logarithm of the difference between year 2011 and the year when the firm was first established. Trade credit may be particularly important for firms with financial market imperfections, such as young or small firms. Asset growth rate (*AssetGR*) is measured by subtracting total assets in year $t{-}1$ from total assets in year t divided by total assets in year $t{-}1$ ([total assets in year t − total assets in year $t{-}1$]/total assets in year $t{-}1$). *Profit* is earnings before interest and tax divided by total assets, which is the profitability of assets-in-place. *Leverage* is measured by total debt divided by total assets. The study includes the fixed effects for each firm and each year to consider unobserved relationships. The parameter u_i is the firm's unobservable individual effects, so we can control for the unique characteristics of each firm. The parameter λ_t is a time dummy variable that aims to capture the influence of economic factors that may also affect corporate trade credit determinants and firm performance, but which firms cannot control. Furthermore, the parameter e_{it} is random disturbance. Table 1 presents a description of the variables.

4. EMPIRICAL RESULTS

4.1. Descriptive of Statistics

Table 2 provides descriptive statistics for sample data. The mean of *AR* is 0.181 (18.1%), indicating that *AR* is relatively higher than

Table 1: Description of variable

Variable name	Description	Expected sign coefficient	
		AR	*AP*
AR	Account receivable divided by the book value of total assets		
AP	Account payable divided by the book value of total assets		
LnSale	The natural logarithm of the book value of total sales	+	+
LnAge	Natural logarithm of the difference between year 2011 and the year when the firm had first been established	+	+
AssetGr	Subtracting total assets in year $t{-}1$ from total assets in year t divided by total assets in year $t{-}1$ ([total assets in year t−total assets in year $t{-}1$)/total assets in year $t{-}1$	+	+
Profit	EBIT divided by total assets which is the profitability of assets-in-place	+	
Leverage	Total debt divided by total assets		+

EBIT: Earnings before interest and tax

reported for a related U.S. study presented by Petersen and Rajan (1997) where the mean value is 11.6%. Additionally, the mean of *AP* is 0.115 (11.5%), suggesting that *AP* is slightly lower than reported in the previously mentioned work of Petersen and Rajan (1997) where it is documented as 18.5%. The mean of *AssetGr* is 0.126 (12.6%), which implies a relatively high firm performance of Korean companies. The means of the ratio of *LnSale* and *LnAge* are 25.473 and 3.283, respectively. The means of *Leverage* and *Profit* are 0.558 (55.8%) and 0.056 (5.6%).

4.2. Firm and Industry Characteristics for Trade Credit

Table 3 illustrates firm and industry characteristics for trade credit. The current study performs the t-tests to establish if there are differences in the mean values of comparing samples. In Panel A of Table 3, this paper have compared financial characteristics of firms ranging from large to small ones. The results show that there are significant differences in the mean values between the two groups for all the variables except *AssetGr* at 1% significant level. More precisely, the mean values of *AR* and *AP* are significantly higher for small firms than for large firms, indicating that trade credit plays a more important role for small firms than it does for large ones in short-term financing. On the other hand, the mean values of *Leverage* and *LnSale* and *Profit* and *LnAge* are significantly lower for small firms than they are for large ones at 1% significant level.

In Panel B of Table 3, the study compares financial characteristics of firms with high leverage to those of firms with low leverage. The results indicate that there are significant differences in mean values between the two groups for all variables except *AR* at 1% significant level. Moreover, the *AP* of firms with high financial distress is slightly higher than the *AP* of low-financial-distress companies. The mean value of *Profit is* significantly higher for firms with high leverage than it is for firms with low leverage. On the contrary, the mean values of *LnSale* and *AssetGr* and *LnAge*

Table 2: Descriptive statistics

Variable	Observations	Mean	Median	Maximum	Minimum	SD
AR	14,639	0.181	0.159	0.802	0.000	0.121
AP	14,639	0.115	0.086	1.334	0.000	0.101
AssetGr	13,927	0.126	0.081	31.212	−1.000	0.420
LnSale	14,635	25.473	25.329	32.425	17.263	1.582
LnAge	14,644	3.283	3.367	4.745	0.000	0.517
Leverage	14,660	0.558	0.557	26.477	0.000	0.417
Profit	14,639	0.056	0.055	0.550	−2.753	0.083

The sample consists of 14,660 firms-year observations from 1992 to 2011 excluding financial and regulated firms. All market and accounting data are for the end of the fiscal year to the issue, unless otherwise indicated. *AR* is defined as account receivable divided by the book value of total assets. And *AP* is defined as account payable divided by the book value of total assets. *Leverage* is measured by total debt divided by total assets. *LnSale* is measured as the natural logarithm of the book value of total sales. *Profit* is measured by EBIT divided by total assets which is the profitability of assets-in-place. *AssetGr* is measured by subtracting total assets in year *t*−1 from total assets in year *t* divided by total assets in year *t*−1 ([total assets in year *t*−total assets in year *t*−1]/total assets in year *t*−1. *LnAge* is measured by natural logarithm of the difference between year 2011 and the year when the firm had first been established. SD: Standard deviation

Table 3: Firm and industry characteristics of trade credit

Panel A: Large firms versus small firms							
Variables	Large firm		Small firm		Difference	t value	Significant
	Observations	Mean	Observations	Mean	(mean)		level
AR	1725	0.120	7157	0.186	−0.066***	−21.846	0.000
AP	1725	0.097	7157	0.104	−0.007***	−3.010	0.003
Leverage	1725	0.561	7157	0.487	0.074***	5.749	0.000
LnSale	1725	28.076	7157	25.237	2.839***	95.331	0.000
Profit	1725	0.056	7157	0.042	0.014***	5.991	0.000
AssetGr	1725	0.105	7157	0.094	0.011	1.340	0.180
LnAge	1725	3.637	7157	3.405	0.232***	−7.578	0.000
Panel B. High leverage firms vs. Low leverage firms							
Variables	High-leverage firm		Low leverage firm		Difference	t value	Significant
	Observations	Mean	Observations	Mean	(mean)		level
AR	7316	0.182	7323	0.18	0.002	0.748	0.455
AP	7316	0.144	7323	0.087	0.057***	35.297	0.000
LnSale	7316	0.05	7323	0.062	−0.012***	−8.597	0.000
Profit	7316	0.971	7344	0.922	0.049***	4.305	0.000
AssetGr	7302	3.178	7342	3.388	−0.21***	−25.12	0.000
LnAge	4935	31.511	6233	37.000	−5.489***	−14.73	0.000
Panel C: High-tech firms versus low-tech firms							
Variables	High-tech firms		Low-tech firms		Difference	t value	Significant
	Observations	Mean	Observations	Mean	(mean)		level
AR	8001	0.202	6638	0.155	0.047***	23.648	0.000
AP	8001	0.118	6638	0.112	0.006***	3.767	0.000
Leverage	8020	0.542	6640	0.577	−0.035***	−5.080	0.000
LnSale	7998	25.233	6637	25.762	−0.529***	−20.436	0.000
Profit	8001	0.059	6638	0.052	0.007***	5.278	0.000
AssetGr	7619	0.135	6308	0.116	0.020***	2.828	0.005
LnAge	8013	3.221	6631	3.358	−0.136***	−16.012	0.000
Panel D: Manufacturing firms versus service firms							
Variables	Manufacturing firms		Service firms		Difference	t value	Significant
	Observations	Mean	Observations	Mean	(mean)		level
AR	10,760	0.192	3879	0.151	0.040***	17.940	0.000
AP	10,760	0.110	3879	0.131	−0.021***	−10.904	0.000
Leverage	10,780	0.541	3880	0.604	−0.062***	−7.999	0.000
LnSale	10,759	25.282	3876	26.002	−0.720***	−24.794	0.000
Profit	10,760	0.058	3879	0.049	0.009***	5.909	0.000
AssetGr	10,241	0.125	3686	0.129	−0.004	−0.521	0.602
LnAge	10,764	3.277	3880	3.300	−0.022**	−2.314	0.021

The sample consists of 14,660 firm-year observations from 1992 to 2011 excluding financial and regulated firms. All market and accounting data are for the end of the fiscal year to the issue, unless otherwise indicated. *AR* is defined as account receivable divided by the book value of total assets. And *AP* is defined as account payable divided by the book value of total assets. *Leverage* is measured by total debt divided by total assets. *LnSale* is measured as the natural logarithm of the book value of total sales. *Profit* is measured by EBIT divided by total assets which is the profitability of assets-in-place. *AssetGr* is measured by subtracting total assets in year *t*−1 from total assets in year t divided by total assets in year *t*−1 ([total assets in year *t*−total assets in year *t*−1]/total assets in year *t*−1. *LnAge* is measured by natural logarithm of the difference between year 2011 and the year when the firm had first been established. ***,** and * represent 1%, 5% and 10% significance levels, respectively

are significantly higher for firms with low leverage than those of firms with high leverage.

In Panel C of Table 3, the study correlates the industry characteristics of high-tech firms to those of low-tech ones. The results reveal that there are significant differences in mean values between the two groups for all variables. This is especially valid for the mean values of *AR and AP*, which are substantially higher for high-tech firms than the ones of low-tech ones. The mean values of *Leverage* and *LnSale* and *LnAge* are considerably higher for low-tech firms than those for high-tech firms. Additionally, the mean values of *Profit* and *AssetGr* are way higher for high-tech firms than those of low-tech ones.

Finally, in Panel D of Table 3, the paper compares the industry characteristics of manufacturing firms to those of service firms. The results demonstrate significant distinction between the mean values of the two groups for all variables except *AssetGr* at 1% and 5% significance level. More specifically, the mean values of *AR* are quite higher for manufacturing firms than those for service firms; the mean values of *AP* are much higher for service firms than those for manufacturing firms. The mean values of *Leverage* and *LnSale* and *LnAge* are substantially higher for service firms than those for manufacturing ones. Also, the mean values of *Profit* are significantly lower for service firms than those of manufacturing ones.

4.3. Determinants of Corporate Trade Credit

The current study uses panel regressions to examine determinants of corporate trade credit. Table 3 shows the results of panel regression for the dependent variables *AR* and *AP*. Column (2) of Table 4 presents the results of the determinants of corporate

Table 4: Panel regression estimating determinants of corporate trade credit

Independent variable	Dependent variable	
	AR	*AP*
Intercept	−0.537***	−0.263***
	(−12.146)	(−7.491)
LnSale	0.024***	0.022***
	(19.022)	(33.923)
LnAge	0.028***	−0.071***
	(19.022)	(−8.922)
AssetGr	−0.007***	0.00009
	(−3.581)	(0.627)
Profit	−0.057***	
	(−6.184)	
Leverage		0.054***
		(42.309)
Fixed effects	Firm and time	Firm and time
Adjusted R²	0.694	0.676
F value	34.397***	32.711***

The sample consists of 14,660 firm-year observations from 1992 to 2011 excluding financial and regulated firms. All market and accounting data are for the end of the fiscal year to the issue, unless otherwise indicated. *AR* is defined as account receivable divided by the book value of total assets. And *AP* is defined as account payable divided by the book value of total assets. *Leverage* is measured by total debt divided by total assets. *LnSale* is measured as the natural logarithm of the book value of total sales. *Profit* is measured by EBIT divided by total assets which is the profitability of assets-in-place. AssetGr is measured by subtracting total assets in year $t-1$ from total assets in year t divided by total assets in year $t-1$ ([total assets in year t - total assets in year $t-1$]/total assets in year $t-1$). *LnAge* is measured by natural logarithm of the difference between year 2011 and the year when the firm had first been established. ***,** and * represent 1%, 5% and 10% significance levels, respectively

trade credit dependent variable *AR*. The coefficient (0.024, 19.022 [t-statistics]) of *LnSale* is positive and statistically significant at 1% level, indicating that large firms tend to extend *AR*. This outcome strongly supports H1.1. The coefficient (0.028, 19.022 [t-statistics]) of *LnAge* is positive and statistically significant at 1% level, suggesting that older firms tend to increase their *AR* as this paper implied in H1.2. Meanwhile, the coefficient (−0.007, −3.581 [t-statistics]) of *AssetGr* is negative and statistically significant at 1% level, indicating that firms with growth are inclined to reduce their trade credit receivable. This result is inconsistent with H1.3. The coefficient of profitability (−0.057, −6.184 [t-statistics]) is negative and statistically significant at 1% level, which means that firms with high operating margin are likely to decrease their *AR*. This outcome is inconsistent with H1.4.

Column (3) of Table 4 presents the results for the dependent variable *AP*. The coefficient (0.022, 33.923 [t-statistics]) of *LnSale* is positive and statistically significant at 1% level, which is a sign that large firms tend to use *AP*. This result strongly supports H2.1. The coefficient (−0.071, −8.922 [t-statistics]) of *LnAge* is positive and statistically significant at 1% level, indicating that older firms are likely to decrease their *AP* as this paper hypothesized in H2.2. Meanwhile, the coefficient (0.00009, 0.627 [t-statistics]) of *AssetGr* is positive and statistically insignificant. This result is inconsistent with H2.3. The coefficient (0.054, 42.309 [t-statistics]) of *Leverage* is positive and statistically significant at 1% level, supporting the notion that firms with high financial stress are inclined to increase their AP. This result is consistent with H2.4. In short, hypotheses H1.1, H1.2, H2.1, and H2.4 are strongly supported by the panel regression results.

5. CONCLUSION

The general state of the determinants of corporate trade credit is still unresolved. The current paper examines the determinants of corporate trade credit in the Korea Stock Exchange Market. Based on a panel data set from 14,660 firms in Korea, this study provides strong evidence that financial characteristics affect trade credit policy. More specifically, it compares industry characteristics of high-tech firms to those of low-tech ones. The results indicate that *AR* and *AP* are higher for high-tech firms than those of low-tech firms, proving that firms requiring more time to observe product quality extend more trade credit that those where product quality is easy to observe (Long et al., 1993). This evidence implies that trade credit can reduce information asymmetry concerning product quality by allowing buyers to assess the quality of goods before remitting payment. It also correlates industry characteristics of manufacturing firms to those of service firms. The outcome shows that *AR* are higher for manufacturing firms than those for service firms, while the *AP* are higher for service firms compared to those for manufacturing firms.

First, the main results show that firms with larger size, lower growth, lower profit and longer corporate presence tend to extend *AR*. This evidence, while consistent with the access to financing hypothesis, is difficult to reconcile with the growth hypothesis and price discrimination hypothesis. Second, this paper provides evidence that firms with larger size, higher leverage and shorter

market presence appear to use *AP*. This finding, while consistent with the financial constraint hypothesis, does not correspond to the financing and growth hypothesis. Before all else, this finding suggests that trade credits do not act as an effective financial policy to firm growth in Korea. Moreover, these results indicate that trade credit is used as an alternative source of financing as well as an operational vehicle for marketing.

The paper contributes to the growing literature on motives of corporate trade credit. Additionally, the sample includes firms from emerging countries that prior literature has not studied thoroughly. It may also be useful to managers such as chief financial officers in developing financial policies toward improving firm performance in the Korean market.

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