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Determinants of Trade Credit Supply and Shareholders' Return in Developed and Developing Countries

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Abstract

This study analyzed the relationship between firm-specific determinants and trade credit supply. Unlike past studies, average collection period is used as a proxy of trade credit supply. Further, impact of trade credit supply on shareholder return is examined in the study. This study compared the results among different income groups consisting of developing and developed countries (lower-middle income, upper-middle income, and high income). Data of six countries is collected from DataStream for the period 2002-2018. Kruskal Wallis test revealed that firms of lower-middle income developing countries collected receivables early as compared to other countries. Generalized method of moments (GMM) is applied to test the relationship between determinants and trade credit supply. The findings of the study showed that for all firms, average payment period, inventory conversion period and net profit margin of supplier significantly increase while cash flow volatility and leverage significantly decrease the trade credit supply. The relationships are similar across different group of countries except net profit margin. However, the impact of determinants on trade credit supply is different in different groups. In addition, an optimal period of trade credit supply is found. Longer average collection period beyond optimal period decreases shareholder returns. In each income group, optimal period of trade credit supply is different. These results have implications for managers across developed and developing countries to optimize trade credit supply policies.

Keywords: Trade credit supply, shareholder return, GMM, average collection period, optimal average collection period

1. Introduction

In most economies, firms grant credit to their customers by generating accounts receivable and such informal credit transactions exist as long as trade. This phenomenon is known as trade credit supply (Tan *et al*. 2021). In developed and developing countries, accounts receivable has become one of the largest and important assets of firms, comprising approximately 41% of current assets. Mismanagement of the receivables represents the lack of proper credit control and lead to greater allocation of funds which may increase the cost of capital and give rise to the chance of irrecoverable bad debts (Abor, 2017; Zeidan & Shapir, 2017). Receivables collection periods varies among firms within an industry, among different industries, and among different countries (Fisman & Love, 2003; Ghoul & Zheng, 2016). For instance, 90% of companies in Europe allow 60 days while firms in Denmark and Sweden, do not allow beyond 30 days (Intrum, 2016). It is unlikely that two firms will define receivable collection period in a similar manner. However, regardless of firm size, profitability and product nature, receivable collection periods have similar consequences (i.e., may good enough to bring profits or bad enough to bring losses) (Ojeka, 2011). Therefore, it is important to understand the factors which determine the length of period in the trade credit supply because it significantly influence the shareholder returns (Altaf & Shah, 2018; Hill *et al*., 2012).

The decision to extend trade credit offers multiple benefits to the seller firms (Peterson & Rajan, 1997; Milina & Preve, 2009) therefore they often allow their customers longer period for repayment against credit sales. In a recent working capital report, the high average collection period identified main cause of deterioration in net working capital among companies (PWC, 2021). Allowing longer period to customers may cause firms to incur expensive short-term debt and buy insurance products to protect themselves against customer default, which could adversely affect the shareholder returns (Altaf and Shah, 2018; Osiichuk and Wnuczak, 2021). On the other hand, shorter collection period may adversely affect firm sales as customers would not be able to verify product quality (Deloof and Jegers, 1996). A good receivable collection policy will always result in optimal collection period with increased sales and contribute in increased shareholder wealth (Jr & Hausman, 1970; Loo & Lau, 2019). Thus, firm managers must foresee average collection period as a strategic resource while extending trade credit to customers.

2. Literature review and hypotheses development

Trade credit management starts with the credit sales and ends with the receipt of final payment. The interval between the date of credit sale and collection of receivables against those sales is important aspect since it imposes the firm to borrow funds from banks or other sources. Therefore,

sooner collections of trade debtors, a complex decision in credit management, lowers cash-flow risks and helps to ensure the availability of cash for investment opportunities; ultimately increases firm profitability (García-Teruel & Martínez-Solano, 2007; Pais & Gama, 2015). Sellers offer trade credit due to various reasons. The financial benefit arises from the fact that buyer firm's inventory is financed by the seller (Paul & Boden, 2014; Paul & Wilson, 2007). The relationship of suppliers and customers also effect the length of average collection period as it involves high switching costs associated with changing suppliers (Dass *et al.*, 2014; Giannetti *et al.*, 2011).

Nadiri (1969) and Osiichuk*et al.* (2021) emphasized the trade credit supply generates high yields over time through gains in market share. Although Kim and Atkins (1978) and Sartoris and Hill (1981, 1983) demonstrate theoretically the impact of receivable collection policies on suppliers' firm value, the literature lacks an empirical examination of this impact. Studies often used the traditional accounting-based and market-based measures of firm performance such as return on assets, return on equity, earning per share, and Tobin's q (Hill *et al*., 2012; Osiichuk*et al.*, 2021). None of these measures include the effect of dividends to shareholder. The adequate working capital policies help in generating high returns and thus enable firms to pay more dividends (Yakubu, 2021). Offering the trade credit can increase the shareholder return thus managers must consider trade-off between the length of average collection period and shareholder returns.

Empirical studies have examined different determinants of trade credit in different contexts. For example, liquidity (Ojeka, 2011) bank credit (Fisman & Love, 2003; Lin and Qiao, 2020; Niskanen & Niskanen, 2006), customer relationship (Dass *et al*., 2014; Summers & Wilson, 2003) and political affiliation (Guariglia & Mateut, 2013) bargaining/ market power (Fabbri & Klapper, 2016; Fisman & Raturi, 2004; Hermes*et al*., 2016) are commonly found by researchers in relationship with trade credit supply. These above-mentioned studies have developed relationship for these determinants and trade credit supply in almost major developed and developing countries around the world. In recent studies, Lin and Qiao (2020) and Osiichuk and Wnuczak (2021) considered bank loan, size, age, profitability, and cash flow as determinants of trade credit supply for Chinese firms. These studies did not observe the influence of determinants on average collection period. Moreover, there is limited evidence about differences for determinants and trade credit supply relationship among developed and developing countries. Firms in different industries and different countries adopt different working capital management practices thus determinants could have different impact on trade credit supply. Therefore, this study examines determinants of trade credit supply in developed and developing countries. Moreover, this study is going to focus on the determinants which are often not investigated with trade credit supply equally for firms in developed and developing economies. Based on the gaps in above-mentioned studies, average payment period, inventory conversion period, leverage, and profitability are considered to investigate their relationship with ACP in developed and developing countries.

Sellers receive and extend trade credit simultaneously (Bougheas*et al*., 2009). Sellers use their suppliers' liquidity to support customers. They demand credit from suppliers for longer period and further offer to customers for longer period. In this way suppliers try to match the maturity of both (Fabbri & Klapper, 2008; Molina & Preve, 2009). This redistribution role of trade credit is often less focused by empirical studies. Long *et al.* (1993) considered 3999 industrial firms and Deloof and Jegers (1996) focusing 761 non-financial Belgian firms to observe effect of average payment period on average collection period. Results showed a significant and positive association. In the perspective of the redistribution theory, these results imply that firms redistributed the trade credit which they receive from their suppliers. Harris *et al.* (2019) also found that sellers' average payment period is positively associated with trade credit supply. In contrast, Bogaerd and Aerts (2014) found no relationship between average payment period and average collection period among the all public firms in the UK from 2001 to 2005. Thus, below hypothesis is developed;

H1: The relationship between average payment period and average collection period is significant and positive.

Inventory and trade credit supply often revealed a negative relationship indicating that inventory and trade credit supply play substitute role (Choi & Kim, 2005). Kestens *et al.* (2011) in their study on 15,440 Belgian firms find a negative relationship between inventory and trade credit supply. Findings indicate that inventory and account receivables act as a substitute in support of the asset management perspective provided by Choi and Kim (2005). Similarly, In China, Lin and Chou (2014) find negative relationship found between inventory and trade credit supply in private firms, while positive in public firms in line with both perspectives of inventory management. Aggarwal and Tyagi (2013) suggest that firms with larger inventories should follow strict credit collection policies. It entails a view that firm can either hold inventory balances, bearing holding cost or extend the average collection period and stay out of liquidity. Thus, there is a trade-off exist between holding inventories and offering more trade credit (Emery, 1987; Guariglia & Mateut, 2013). Thus, below hypothesis is developed;

H2: The relationship between inventory conversion period and average collection period is significant and negative.

Cash flow volatility is another determinant less focused by the trade credit literature. Firms with larger cash flows have greater incentive to offer trade credit for longer periods (Horng *et al.*, 2014; Meltzer, 1960). Firms may shorten the length of trade credit when they have insufficient cash flow (Molina & Preve, 2009; Wilson & Summers, 2002). According to Petersen and Rajan (1997), selling firms with extra liquidity or with greater advantage in obtaining bank credit will be able to pass this advantage down to their credit constrained buyers. High cash flow volatility indicates that firm is more prone to experience internal cash flow shortfalls (Minton & Schrand, 1999). Firms may limit the period of trade credit they offer to clients if they are concerned that high cash flow risk may lead to constraints in capital access or reduction in liquidity. Harris and Roark (2017) investigated the influence of cash flow volatility on the trade credit supply of 17,000 US firms. Their study supported the above-mentioned theoretical relationships that higher cash flow volatility causes firms to reduce trade credit supply. In view of the above, hypothesis is developed as below;

H3: The relationship between cash flow volatility and average collection period is significant and negative.

The relationship between trade credit supply and bank loan, since long, has remained as the interest of researchers since both are considered alternative loans for buyers. In a study on determinants of trade credit supply in Finnish small firms, Niskanen and Niskanen (2006) found that firm's access to capital market is a strong determinant of trade credit supply since they supply more trade credit than other firms. However, in US during the period of 1978-2000, Molina and Preve (2009) found that financially distressed firms with high leverage supplied significantly less trade credit. It may be due to the decreased bank loans. Similarly, Tsuruta (2013) conducted a study on 7,381 Japanese SMEs found a significant negative relationship between leverage and trade credit supply. They reasoned that due to the high cost of debt, firms extended less trade credit. In contrast, studies by Harris *et al.* (2019) and Lin and Qiao (2020) reported positive relationship between leverage and trade credit supply which implies that suppliers pass their bank borrowings to customers by allowing them longer period for payment. This could result in high interest rates on bank loans and in case of customer's default sellers might get liquidation. Thus, below hypothesis is developed;

H4: The relationship between leverage and average collection period is significant and negative.

High-profit companies grow faster and have access to multichannel financing to meet the needs of their daily operations. (Lin and Qiao, 2020). Profitable firms increase their offer of trade credit for different motives such as, to increase sales, to build a long-term relationship and to support buyer firms facing financial difficulties (Meltzer, 1960; Petersen & Rajan, 1997). The rationale is that sellers with high margins will make a net profit on the additional units as long as the revenues from the additional sales outweigh the costs of providing subsidized trade credit to poor customers. When firms with high operating margins distribute their funds to other customers via trade credit, they might not be too worried about collecting receivables sooner (Guariglia & Mateut, 2013). While employing profitability as a control variable in 49 developed and developing countries over period of 21 years (1993-2013), Ghoul and Zheng (2016) reported that firms with high profits supplied more trade credit. Thus, below hypothesis is developed;

H5: The relationship between net profit margin and average collection period is significant and positive.

While designing the trade credit policy, management wants to equal the marginal benefit with the marginal cost of extending credit. However, costs and benefits are uncertain. While offering trade credit, firm is perhaps expecting an increase in sales, hence, is also ready to undertake collection costs and bad debts losses. Thus, to bring investment in trade credit supply at an optimum level, management should seek a trade-off between cost and benefits (Srinivasan & Kim, 1987). Although debtors' levels are influenced to a great extent by external factors such as business activities, seasonal factors, industry norms, a lot of internal factors including credit standards, credit terms, credit limits and credit collection procedures, should all be well administered to optimize trade credit supply.

Supply of trade credit for longer period provides customers enough time to verify the product quality which reduces the level of information asymmetry between the buyer and seller (Smith, 1987). Hill *et al.* (2012), Akbar *et al*. (2021)and Osiichuk*et al*. (2021) found that trade credit supply for longer periods positively influence the market value and stock prices. Similarly, seller firm's trade credit policies has an influence on stock price (Liu & Hou, 2019). Longer collection period attracts the customers and build long-term relationship which eventually increases returns for shareholders. However, this policy may result in the opportunity cost of cash tied up in accounts receivables. Thus, longer collection period might influence shareholder returns inversely. Shorter receivable period will make more cash availability to the firm. When a firm is short of cash to meet its obligations, this extra cash serves as a safety net, potentially decreasing the financial troubles and increasing shareholder returns. The likelihood of bankruptcy reduces by increased availability of cash since a firm is in position to pay off its obligation. The few studies showed that reduction in receivable periods leads to the increase in firm profitability and firm value (Bhatia & Srivastava, 2016; Makarani & Bineshian, 2013). Altaf *et al*. (2018) and Braimah*et al*. (2021) found that average collection period and firm profitability are non-linear. Beyond optimal period, trade credit supply decreases the profitability. Based on the above discussion, it can be implied that there is non-linear relationship between trade credit supply and shareholder returns. Thus, below hypothesis is developed;

H6: The trade credit supply beyond optimal period reduces shareholder return.

3. Methodology

The empirical model of this study is based on the gap in the literature for missing determinants of trade credit supply proxied by average collection period. To account for the difference across high-income, middle income and lower-middle income groups, we additionally include control variables for gross domestic product (GDP), income level dummies and country dummies. The key variables used in the analysis are defined as Table 3.1 below;

Table 3.1 Variables measurement

Variable	Abbreviation	Measurement
Average Collection Period	ACP	$\frac{Accounts\ receivable}{Total\ annual\ sales}\ X\ 365$
Shareholder Return	SR	$\frac{(Fiscal\ year\ share\ price - past\ year\ share\ price) + dividend}{Past\ year\ share\ price}$
Average Payment Period	APP	$\frac{Accounts\ receivable}{Cost\ of\ goods\ sold}\ X\ 365$
Inventory Conversion Period	ICP	$\frac{Inventory}{Total\ annual\ sales}\ X\ 365$

Variable	Abbreviation	Measurement
Cash Flow Volatility	CFV	*Standard deviation of cash flow from operating activities (past 5 years) to mean of cash flow from operating activities (past 5 years)*
Leverage	LEV	$\frac{Total}{Total\ Assets}$
Profitability	NPM	$\frac{Net\ income}{Total\ annual\ sales}$
Cash Holdings	CH	$\frac{Cash}{Total\ assets - accounts\ receivables}$
Assets Turnover Ratio	ATO	$\frac{Total\ annual\ sales}{Total\ assets - accounts\ receivables}$
Sales growth	SG	$\frac{Total\ annual\ sales\ in\ year\ t - total\ annual\ sales\ in\ year\ t-1}{Total\ annual\ sales\ in\ year\ t-1}$
Firm age	FA	Number of years since firm incorporated
Firm size	FS	*The logarithm of total assets*
GDP	GDP	*The logarithm of GDP per capita*

The below two models are estimated to test the hypotheses;

$$ACP_{i,t} = \alpha_0 + \beta_1 ACP_{i,t-1} + \beta_2 APP_{i,t} + \beta_3 INV_{i,t} + \beta_4 CFV_{i,t} + \beta_5 LEV_{i,t} + \beta_6 NPM_{i,t} + \beta_7 CH_{i,t} + \beta_8 ATO_{i,t} + \beta_9 SG_{i,t} + \beta_{10} FA_{i,t} + \beta_{11} FS_{i,t} + \beta_{12} GDP_t + \varepsilon_{i,t} \quad \text{Model (1)}$$

In first model above, along with firm-specific factors such as LEV, NPM, CH, ATO, SG, and FS, GDP is added to control the influence of macroeconomic conditions which affected business operations during the period of the study. In addition, sector dummies are also included to control the effect of industries. In the second model above, we are interested to observe the influence of trade credit supply on shareholder return only therefore all other factors used in model 1 are considered as control.

$$SR_{i,t} = \alpha_0 + \beta_1 TSR_{i,t-1} + \beta_2 ACP_{i,t} + \beta_3 APP_{i,t} + \beta_4 INV_{i,t} + \beta_5 CFV_{i,t} + \beta_6 LEV_{i,t} + \beta_7 NPM_{i,t} + \beta_8 CH_{i,t} + \beta_9 ATO_{i,t} + \beta_{10} SG_{i,t} + \beta_{11} FA + \beta_{12} FS_{i,t} + \beta_{13} GDP_t + \varepsilon_{i,t} \quad \text{Model (2)}$$

This study uses panel data to analyse the determinants of trade credit supply and relationship between trade credit supply and shareholder return. Panel data allows to study the changes (i.e. in trade credit supply) over a period of time and ultimately gives the researcher more information, variability, greater degrees of freedom and efficient estimates. Most importantly, Panel data methodology is adopted because it assumes individual firms are heterogeneous and it gives "*more informative data, more variability, more degree of freedom and more efficiency with less collinearity among variables*" (Baltagi, 2008, p. 5). Panel data can minimize the bias that might arise when taking a large data set for several thousand units by aggregating firms into broad aggregates (Baltagi, 2008; Gujarati, 2008).

Panel data are either pooled, run with fixed effects (FE) or with random effects. FE is used whenever the interest is on analyzing the impact of variables that vary overtime. important assumption of the FE model is that those time-invariant characteristics are unique to the individual and should not be correlated with other individual characteristics. Each entity is different, therefore the entity`s error term and the constant (which captures individual characteristics) should not be correlated with the others. The random effect model is also called random intercepts or partial pooling model. The rationale behind random effects model is that, unlike the fixed effects model, the variation across entities is assumed to be random and uncorrelated with the predictor or independent variables included in the model. To decide between fixed or random effects, the Hausman test is used, where the null hypothesis is that the preferred model is random effects versus the alternative, the fixed effects (Greene, 2008). It basically tests whether the unique errors ($\varepsilon_{i,t}$) are correlated with the regressors. The null hypothesis is they are not.

As time-series cross-section data produces incorrect results, to increase the efficiency of model, Wald test for group-wise heteroskedasticity and Wooldridge test for autocorrelation are conducted. Presence of heteroskedasticity, autocorrelation and cross-sectional dependence in our data led us to choose the generalized methods of moments (GMM).

The GMM estimation captures the effect of past year's dependent variables (trade credit supply and shareholder returns) on current year's dependent variables in this study. With the lag of the dependent variable as part of the regressors in the estimations, it lessens considerably the problem of autocorrelation typically linked with time-series regression analysis (Busse&Hefeker, 2007). In line with Roodman (2009), the lagged values of the dependent variables and firm-specific variables are treated as endogenous i.e., added as instruments in the regression estimations. Since GMM allows the use of instruments, the validity of these instruments is crucial for the consistency of the GMM outcomes (Luo, 2022; Yao *et al.*, 2019). The GMM calculates Hansen J statistics of the over-identifying restrictions under the null of joint validity of the instruments. It indicates that residuals and instruments are not correlated. Further, for the validity of instrument subsets, GMM also calculates the Hansen J statistics under the null of exogeneity of the instrument subset (Roodman, 2009).

The problems of Arellano and Bond (1991) serial correlations, i.e., first-order autocorrelation (AR-1) and second-order autocorrelation (AR-2), are also addressed by GMM under the null of no serial correlations. However, the absence of AR-2 indicates the validity of GMM even in the presence of AR-

1. Before presenting the estimated results of relationship between determinants and trade credit supply, it is important to run the standard diagnostic tests of all models. This is because the reliability and consistency of the GMM estimation procedures depend on the validity of the instruments and the absence of serial correlation in the residuals.

4. Data Summary

The financial data used in this study is retrieved from the Datastream database, offered by Thomson Reuters, that provides current and historical economic and financial data for all listed firms from the major world stock exchanges. This database contains a balance sheet, profit and loss as well as cash flow statement information for companies from the majority of countries. The uniformity of the data is expected to result in a reliable analysis. However, there is no database which guarantees that all the needed data are available for all companies. This study only relies on the available data. This study employs financial data regarding the variables for listed non-financial manufacturing firms. The structure of the financial statements of the firms in the financial industry is different from the non-financial firms (Chakraborty, 2010; Norvaisiene *et al.*, 2008). The services sector has no goods to store or sell, therefore; trade credit activity is rarely relevant in all such sectors (i.e., bank, insurance, real estate and services).[1]

The countries included in this study are selected on the basis of income classification by the World Bank. These economies are classified by the World Bank into four categories based on their income level as given in Table 3.2. The four categories are low-income economies, lower-middle income economies, upper middle-income economies, and higher income economies.

Table 3.2. Types of economies by World Bank, Atlas method 2023

Type of economies	**GNI per capita in USD**
Higher income economies	Greater than 13,205
Upper middle-income economies	between 4,256 and 13,205
Lower-middle income economies	between 1,086 and 4,255
Low-income economies	Less than or equal to 1,085

The current study does not include countries from low-income economies, as they do not tend to report the data on a regular basis. The data for non-financial firms is obtained, so, only for lower-middle income, upper-middle income, and high-income economies. The selection of the countries from each income level category is based on random sampling depending on the availability of the data. Furthermore, in each category, the two countries selected ought to have similar income levels. Moreover, in selecting the countries, the ease of data accessibility and availability on Datastream is considered.

Six countries are included in this study to observe the differences for relationship between determinants and trade credit supply. There are significant numbers of firms in the five subsectors from the manufacturing sector, namely, construction and materials, chemicals, food producers, industrial engineering, and personal goods, and in all the six countries. This study covers 2002 to 2018 period for the analysis. Firms with missing or negative values are excluded from the sample. Table 3.3 presents data sample of non-financial firms from each country. Six countries are grouped into 3 categories based on their income level. From the high-income level group, Germany and Sweden are selected because of a purely practical reason. Like other developed countries such a USA, UK, Ireland and Belgium, Germany and Sweden are not extensively investigated in the trade credit research. Similarly, Malaysia, Thailand, Pakistan, and Indonesia are selected due to lack of evidence about the trade credit supply in these countries.

Empirical analysis starts with the descriptive statistics of the study. Table 3.3 presents descriptive statistics for key variables of the study. The mean value of ACP of 76 days suggest that it took an average of two months and 16 days for firms to collect the money owed by their customers after credit sales. The mean is consistent with studies by Harris *et al.* (2019) and Cao *et al.* (2022).

Table 3.3 Descriptive Statistics

Variables	**Obs.**	**Mean**	**Maximum**	**Minimum**	**Std. Dev.**	**Skewness**	**Kurtosis**
ACP	9163	76.261	999.081	0.024	75.977	4.134	30.056
SR	9163	2.168	22.732	-8.220	2.212	1.562	7.830
APP	9163	43.880	824.829	0.011	56.966	5.608	51.362
ICP	9163	78.621	947.865	0.122	73.103	4.456	35.287
CFV	9163	0.515	1.099	0.000	0.276	0.183	2.000
LEV	9163	0.480	0.999	0.001	0.223	-0.141	2.238
NPM	9163	0.100	0.999	0.003	0.129	3.365	17.037
CH	9163	0.094	1.535	0.000	0.115	2.476	12.748
TAT	9163	1.327	9.606	0.000	0.908	1.899	10.932
SG	9163	0.154	112.244	-1.000	1.412	58.086	4373.005
FS	9163	11.696	18.404	5.011	1.671	0.661	3.668

Source: Author's calculations

[1] Such sample filtration is commonly done by studies of trade credit supply (see for example; McGuinness *et al.* (2018)).

Shareholder return is showing maximum value of 22.732 and standard deviation of 2.212. The large variation for shareholder return could be due to the different share price growth of different firms. APP has a mean of 43 days with minimum and maximum days of 0.011 and 824, respectively. This reveals that firms, on average, took one month and 13 days to pay their suppliers. The mean value is consistent with the study by Altaf and Shah (2018) for Indian firms. ICP reveals a mean of 78 days for ICP with a minimum and a maximum of 0.122 and 947 days, respectively. This result shows that the listed firms in the six countries took on average, two months and 18 days to convert their inventory to sales. A similar number of ICP days (76) were reported by Altaf and Shah (2018). Large variations for standard deviation of ACP (75.977), APP (56.966) and ICP (73.103) due to the fact that firms across industries or countries adopted different working capital management practices (Deari*et al*., 2022). For the CFV, the mean is 0.515, with a standard deviation of 0.276. The variation in cash flow volatility can be explained by uncertainties in the business cycle operating environment. The variation in CFV across countries and income level is exhibited in the figure 3 and figure 4 in appendix A. The mean value of LEV is 0.480, with a standard deviation of 0.223. It implies that firms with 48% for firm assets were financed by debt. The mean of net profit margin (NPM) is 0.100 which implies that firms generated 10% profit from sales. This mean value is higher than 0.08 reported by Osiichuk and Wnuczak (2021).

The previous research reported different statistics of average collection period for different countries. The European Late Payment Directive stipulates 30–60 contractual days to payment in a business-to-business transaction, but deviations seem to be very common (Intrum, 2016). For instance, firms in developed economies have shorter average collection period compared to the firms in developing economies.[2] Developing economies like Malaysia and India have the longest average collection period (90 days) (Intrum, 2016; Paul *et al.*, 2012). However, our data provides different results for average collection period variations to the previous research studies. Table 3.4 shows the frequency distribution of average collection period across countries of different income levels. The frequency distribution has been grouped into the following five categories – less than 30 days, 31 to 90 days, 91 to 180 days, 181 to 360 days, and more than 360 days. The statistics indicated that firms' credit collection policies differ between countries of the same income group as well as different income groups. In high-income group, the majority of firms generally took 30 to 90 days to collect receivables. In upper-middle income group, firms' credit collection policies were different between countries. 47.54% of Malaysian firms and 63.87% of Thai firms took 30 to 90 days to collect receivables. Similar differences are observed between countries of lower-middle income group. 55.66% of Indonesian firms while 43.33% of Pakistani firms took 30 to 90 days to collect receivables. The lower average collection period for firms in high income countries is also reported by Deari*et al*., (2022). Overall, statistics suggested that majority of sampled firms collect receivables between 30 to 90 days followed by collection between 90 to 180 days.

Table 3.4 Distribution of average collection period across all income groups

	LMIN				UMIN				HIN			
	IND		PAK		MAL		THA		GER		SWE	
	N	%	N	%	N	%	N	%	N	%	N	%
Less than 30 days	329	24.19%	835	40.26%	226	10.99%	295	14.58%	80	7.35%	22	3.92%
Between 31 to 90 days	757	55.66%	906	43.68%	986	47.93%	1292	63.87%	787	72.33%	439	78.25%
Between 91 to 180 days	190	13.97%	229	11.04%	543	26.40%	379	18.73%	190	17.46%	93	16.58%
Between 181 to 360 days	79	5.81%	65	3.13%	232	11.28%	47	2.32%	29	2.67%	6	1.07%
More than 360 days	5	0.37%	39	1.88%	70	3.40%	10	0.49%	2	0.18%	1	0.18%
Total (N)	1360		2074		2057		2023		1088		561	

Source: Author's calculations

However, frequency distribution alone does not statistically indicate the significance of the difference in average collection period between these countries. For this purpose, the Kruskal-Wallis non-parametric test for comparison between countries for average collection period was applied. Results are presented in Table 3.5. In Kruskal-Wallis test, the null hypothesis is that the distribution of average collection periodis the same across countries of different income levels. The Kruskal-Wallis test statistic, significant at less than 1% significance level, *(p-value = 0.000)* means the null hypothesis cannot be accepted. Test results reveal that there are significant differences for firms' average collection periodacross countries. The mean values in the table indicate that firms in the lower-middle income countries, took longer to collect receivables compared to upper-middle income and high-income countries. Firms in upper-middle income countries collected receivables later than the other countries. This average collection perioddistribution is supported by the findings of previous studies like Akbar *et al*. (2021), Akbar *et al*. (2020) and Yegon*et al*. (2021).

[2]Denmark, Sweden, Hong Kong and Singapore

Table 3.5. *Kruskal-Wallis non-parametric test for average collection period across countries*

	LMIN		**UMIN**		**HIN**	
	IND	**PAK**	**MAL**	**THA**	**GER**	**SWE**
Mean ranks	4134.35	3445.02	5589.14	4718.49	5007.49	5397.97
Mean	67	62	107	70	72	73
Income Group Mean	64		89		72	
K-W Statistics (P-value)	627.748 (0.000***)					

Note: H_0: The distribution of average collection periodis the same across countries of different income levels. The values in parentheses are *p-values*. ***, **, * indicate significance level at 1%, 5% and 10% respectively.

5. Empirical tests and results

In exploring the relationship between determinants and trade credit supply, we estimated our models using generalized methods of moments (GMM). Table 3.6 provides the regression results for determinants and trade credit supply together for all sample and different income groups.

Table 3.6. Determinants of Trade Credit Supply

	Model 1	**Model 2**	**Model 3**	**Model 4**
	All sample	**LMIN**	**UMIN**	**HIN**
Variables	**Coef. (P-value)**	**Coef. (P-value)**	**Coef. (P-value)**	**Coef. (P-value)**
Lag	0.442 (0.000)***	0.522 (0.000)***	0.423 (0.000)***	0.497 (0.000)***
APP	0.295 (0.000)***	0.095 (0.000)***	0.167 (0.000)***	0.632 (0.000)***
ICP	0.023 (0.000)***	0.066 (0.000)***	0.016 (0.000)***	0.141 (0.000)***
CFV	-1.030 (0.000)***	-11.348 (0.000)***	-13.723 (0.000)***	-3.943 (0.000)***
LEV	-15.267 (0.000)***	-28.594 (0.000)***	40.259 (0.000)***	-37.453 (0.000)***
NPM	4.294 (0.000)**	0.200 (0.898)	7.472 (0.000)***	17.210 (0.000)***
CH	107.446 (0.000)*	270.902 (0.000)***	39.400 (0.000)***	33.483 (0.000)***
TAT	-4.684 (0.000)***	-11.590 (0.000)***	-6.067 (0.000)***	-2.767 (0.000)***
FA	-0.725 (0.000)***	-0.979 (0.000)***	-0.278(0.000)***	-0.596 (0.000)***
FS	0.885 (0.021)**	2.777 (0.000)***	11.715 (0.000)***	0.590 (0.012)***
SG	-2.742 (0.000)***	-22.437 (0.000)***	-6.301 (0.000)***	-10.159 (0.000) **
GDP	2.879 (0.000)***	11.923 (0.000)***	-12.876 (0.000)***	-15.289 (0.000)***
Constant	-13.642 (0.037)**	-75.762 (0.000)***	-27.113 (0.081)*	163.951 (0.000) ***
AR1	-5.990 ***	-4.380 ***	-4.040***	-2.920***
AR2	0.490	0.340	-0.450	-0.280
Groups	543	203	241	99
Instruments	264	120	151	93
Hansen	96.960	78.010	70.500	55.16

Note: LMIN, lower-middle income countries group; UMIN, upper middle income countries group; HIN, high income countries group. The values in parentheses are *p-values*. ***, **, * indicate significance level at 1%, 5% and 10% respectively.

APP is positively associated with trade credit supply in all four models. The relationship is statistically significant at 1% for all estimations thus confirms hypothesis 1. This result supports the redistribution theory that states that firms that gain more trade credit from suppliers and extend more to their buyers simultaneously, and vice-versa (Bougheas*et al*., 2009). The positive relationship is stronger in high-income developed countries (coef. = 0.414). This finding is consistent with the studies by Bussoli and Marino (2018), Cao *et al*. (2022) and Dary and Jr (2018). These results confirm that the longer the firm delay payments to the suppliers, the more they offer more credit to their customers and vice versa.

The relationship between ICP and trade credit supply is significant and positive in all models. This result is opposite to the hypothesis 2, thus not supported. The significantly positive relationship implies that the firms in these countries that held more inventories had extended more trade credit to the customers. This result is consistent with the findings by Cao *et al*. (2022), where they reported positive relationship between inventory balances and trade receivable days (i.e., ACP). Horng*et al.* (2014) also found positive relationship between inventory and receivable for Japanese firms. The reason for positive relationship could be, when firms with high inventory balances face decline in product demand, they offer longer trade credit period as a tool to stimulate demand and shift inventories. This result also supports the argument provided by Bougheas*et al*. (2009) that in order to avoid high storage cost firms offer trade credit to customers. This result is opposite to the findings of Aggarwal and Tyagi (2013)that firms with longer ICP

followed stricter credit collection policies. CFV and trade credit supply relationship is significant and negative in all models. This result supports hypothesis 3. The significant negative result implies that when firms face high volatilities in cash flows, they tend to hold cash to counter the shortages thus extend trade credit for short periods. This result supports the findings by Harris and Roark (2017) and Harris *et al*. (2019).

LEV and trade credit supply relationship is different across models. Model 1, model 2 and model 4 show significant negative relationship between LEV and trade credit supply. Result is significantly positive in model 3 only. Thus, hypothesis 4 is partially supported. Result in model 1 suggests that bank loan is negatively associated with trade credit supply for all sampled firms. The negative relationship for upper-middle income and high-income countries suggests that despite of greater indebtedness, firms extended trade credit for shorter period. Studies found that high leverage firms experience high cash flow issues which could increase the risk of bankruptcy (Yilmaz, 2022). In addition, trade credit suppliers play monitoring role by having more information about buyer's creditworthiness than banks (Costa & Habib, 2021; Fisman and Love, 2003; Petersen and Rajan, 1997). Supplier is well aware if the buyer is able to repay trade credit or not. In case of low creditworthiness buyer, supplier's repayment to the bank would be at risk which will raise the contagion effect of credit in supply chain (Xie *et al*., 2023). Thus, being aware regarding low creditworthiness of buyers and to reduce the risk of bankruptcy, firms extend trade credit for shorter period. This result opposes the findings of Haris*et al*. (2019) and supports the findings of Tsuruta (2013). On the other hand, positive result in model 3 implies that firms in upper-middle income countries with high borrowing capacity extended more trade credit. This result is in support of redistribution theory and findings by Haris*et al*. (2019), Hartsema*et al*. (2021), Lin and Qiao (2020), and Osiichuk and Wnuczak (2021), where they found positive relationship between access to bank loan and trade credit supply.

All models show significant and positive relationship between NPM and trade credit supply. This result confirms hypothesis 5 that more profitable firms extended more trade credit to their customers (García-Teruel & Martínez-Solano, 2010; Petersen &Rajan, 1997). This result implies that profitable firms allowed their customers longer period for payment. The relationship is strongest in high-income countries (coef. = 17.210), followed by upper-middle income (coef. = 7.472) and lower-middle income countries (coef. = 0.200). It could imply that firms in high-income country with higher profit margins on sales allowed their customers extended period more than firms in other countries. This result supports the findings of Guariglia and Mateut (2013) and Ghoul and Zheng (2016), while contradicts with the findings of Petersen and Rajan (1997) where they found high profit companies because of tax pressures often extend offer less trade credit. Moreover, results could also imply that profitable firms in lower-middle income country extend trade credit for shorter periods in comparison to other income groups. Thus, profitability and trade credit supply relationship increase with the increase in country's income level. Further, results for control variables show that cash holding and firm size increase while asset turnover, firm age and sales growth decrease trade credit supply. Higher GDP increases trade credit supply in lower-middle income countries only. This result implies that upper-middle income developing and high-income developed countries with growth of GDP reduce the average collection period in order to save the funds.

In addition, following studies of Hill *et al.* (2012), Kieschnick *et al.* (2013) and Kan (2016), we examined the influence of trade credit supply on shareholder return. The results in Table 3.7 show a significant positive influence of ACP on SR (Shareholder return) and inverse effect of ACP^2 on SR.

Table 3.7 Trade Credit supply and Shareholder Returns

	Model 1	**Model 2**	**Model 3**	**Model 4**
	All sample	**LMIN**	**UMIN**	**HIN**
Variables	**Coef. (-value)**	**Coef. (p-value)**	**Coef. (p-value)**	**Coef. (p-value)**
Lag	0.545 (0.000)***	0.538 (0.000)***	0.526 (0.000)***	0.586(0.000)***
ACP	0.008 (0.049)**	0.002 (0.000)***	0.002 (0.000)***	0.003 (0.026)**
ACP^2	-0.014 (0.006)***	-0.002 (0.000)***	-0.003 (0.000)***	-0.003 (0.000)***
APP	-0.001 (0.000)***	-0.001 (0.000)***	-0.002 (0.000)***	-0.002 (0.246)
ICP	0.001 (0.005)***	0.000 (0.000)***	-0.002 (0.000)***	-0.007 (0.000)***
CFV	-0.030 (0.000)***	-0.213 (0.000)***	0.012 (0.862)	-0.963 (0.000)***
LEV	0.697 (0.000)***	0.052 (0.006)***	-0.059 (0.636)	1.678 (0.000)***
NPM	-0.096 (0.401)	0.516 (0.000)***	1.668(0.000)***	1.741 (0.000)***
CH	1.450 (0.000)***	-0.098 (0.014)***	-0.396 (0.036)**	1.509 (0.000)***
TAT	-0.058 (0.057)	0.001 (0.917)	-0.083 (0.012)***	0.120 (0.000)***
FA	-0.009 (0.002)***	-0.069 (0.000)***	-0.041 (0.000)***	0.008 (0.000)***
FS	-0.250 (0.000)***	-0.047 (0.000)***	-0.097 (0.000)***	0.009 (0.522)
SG	-0.011 (0.446)	-0.048 (0.000)***	-0.080 (0.000)***	0.264 (0.000)***
GDP	0.190 (0.000)***	0.742 (0.000)***	0.039 (0.000)***	0.124 (0.022)**
Constant	-0.001 (0.000)***	-3.498 (0.000)***	-0.448 (0.334)	-2.407 (0.000)***
AR1	-7.210***	-5.220***	-5.100***	-3.630***
AR2	-0.810	-0.460	-0.560	-0.660
Groups	543	203	241	99
Instruments	173	183	115	94
Hansen	67.480	53.010	54.300	23.320

Note: LMIN, lower-middle income countries group; UMIN, upper middle income countries group; HIN, high income countries group. The values in parentheses are *p-values*. ***, **, * indicate significance level at 1%, 5% and 10% respectively.

All models show significant positive relationship between ACP and SR. Moreover, the coefficient sign for ACP^2 is also different than ACP in all models. This confirms the quadratic relationship between trade credit supply and shareholder return. Thus, hypothesis 6 is supported. In model 1, model 2 and model 3, significant positive relation between ACP and SR implies that if firms increase their ACP, they will be able to generate more returns for shareholder. This positive relationship is supported by various theoretical arguments that longer period allows buyer to verify product quality (Smith, 1987), which eliminate the information asymmetries between buyers and customers. In addition, firms use longer ACP as a sales tool to differentiate their products from competitors (Altaf & Shah, 2018). This result is consistent with the findings by Hill *et al*., (2012) where they reported positive effect of investment in receivable on shareholder return.

On the other side, the negative relationship between ACP^2 and SR implies that after the optimal level ACP decreases shareholder return. Beyond the optimal level, shareholder returns will not remain positive. It seems that extending ACP beyond these days, customers with liquidity problems are attracted, which could lead to the appearance of defaulters and failures, and a consequent decline in shareholder returns. In model 1, results imply that all firms across three income level groups can generate positive returns for shareholders if they restrict their collection policies to 28 days (- 0.008/(2 x - 0.014)).[3] The adverse effect of ACP on shareholder return after optimal level is consistent with the studies by Altaf and Shah (2018), Ray-Ares *et al.* (2021) and Braimah *et al*.(2021) where they reported negative relationship between ACP^2 and firm performance. In model 2, results indicate that firms in lower-middle income countries can positively generate shareholder returns if their ACP is within 50 days (- 0.002/(2 x - 0.002)). In model 3, optimal ACP for firms in upper-middle income countries is 33 days (-0.002/(2 x - 0.003)). In model 4, optimal ACP for high income countries is 50 days (- 0.003/(2 x 0.003)). These variations of optimal APC indicate firms across all countries need to optimize their ACP in order to increase the profits for shareholders. Furthermore, these optimal days suggest that firms should restrict their ACP less than 60 days if they want to keep increasing the returns for shareholders. The longer period a firm allow customers to pay, less cash it has available to invest in profitable opportunities. Thus, tightening of credit extensions (reducing the ACP) positively increases firm value (Jory *et al*., 2020). This negative result is consistent with the findings of previous studies (Deloof, 2003; Bhatia & Srivastava, 2016; Singhania & Mehta, 2017). In control variables, FS and SG showed negative while GDP showed positive impact on shareholder return. CH and TAT produced mixed results.

6. Conclusion

Extant research on the redistribution of trade credit supply has theorized that the firms redistribute trade credit when they had better access to bank loans (Niskanen & Niskanen, 2006) and more were profitable (McGuinness *et al.*, 2018; Garcia-Appendini & Montoriol-Garriga, 2010) This study builds on this theory by providing a more nuanced understanding of the value of period arise due to the trade credit supply among countries and among different income groups. We have focused on the factors that may significantly impact the average collection period in developed and developing countries of three income groups. We have chosen this sample because trade receivables are different for different economies (Harris *et al*., 2019; Ghoul & Zhang, 2016; Machokoto*et al*., 2022). We considered average payment period, inventory conversion period, cash flow volatility, leverage and net profit margin. Our empirical findings strongly suggest that high average payment periods, high inventory conversion periods and net profit margins positively increase the average collection period in all countries. Cash flow volatility issues cause seller firms to reduce the average collection period. The relationships are similar across income groups however, the impact is different. High income developed countries show high sensitivity in terms of relationship between determinants and trade credit supply. These results suggest firm managers to consider these factors while formulating trade credit supply policies.

We further explored how length of average collection period influence shareholder return. our findings suggest that trade credit supply increases shareholder return in all countries, however, up to optimal level. These optimal days of collection are different for different income groups because of different industry practices. This result implies that ignoring the optimal period, causes outsized expansion of balance sheets, therefore, reduces shareholder return. Moreover, lengthy receivable collection time causes firms to incur short-term debt which may dent the margins. Beside the different of optimal period in income groups, firm managers in all countries should review receivable collection policies periodically to ensure that firm's operations are in line with prevailing policies in an industry. Firm managers in upper-middle income countries should manage average collection period by following high income developed countries. This is also suggested by the relationship between average collection period and shareholder return where optimal period was found 33 days less than those of firms in lower-middle income developing and high-income developed countries.

Findings of this study add to the trade-off theory by showing the relationship between trade credit supply and shareholder return (Frennea*et al*., 2019; Hill *et al*., 2012). Extant research has theorized that the trade credit supply of a firm (proxied by receivable balances in balance sheets) has a positive direct effect on its shareholder value. The findings of this study extended the research by theorizing that trade credit supply increases shareholder return to specific number of days (known as optimal period) after that decline starts. We recognize that this study did not consider the impact of crisis periods on the determinants and trade credit supply relationships. Future studies may consider the impact of economic conditions on trade credit supply and include other countries.

[3]The optimal number of days are calculated by using formula -β1/2xβ2, following Altaf and Shah (2018) and Singhania and Mehta (2017). β1 is coefficient value for simple variable while β2 is the coefficient value for squared variable.

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