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# Financial Development and Trade Credit: Moderating Role of Corruption

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*ABSTRACT*

There exists extensive literature on trade credit as secondary source of financing, but few studies have found that how financial development change the preference of trade credit financing specifically in high corruption environment. The objective of this study is to examines this relationship because substitution theory vows that trade credit assists the firms to mitigates the challenges of low financial development. Ten years data ranging from 2007 to 2016 of non-financial sector firms from three countries (Pakistan, China, and India) were used and GMM (generalized method of moments) fixed effect model employed for regressing analysis. Results first reveal that if a country has low financial development, companies can arrange their financing needs through secondary source of financing i.e. trade credit. Trade credit is an alternative source of financing during low financial development. It then suggests that high corruption hampers the option of trade credit financing as it creates the more uncertainty for business. In high corruption situation, companies use more bank financing. But this effect become positive when corruption interacts with financial development and collectively effect the trade credit. High corruption and high financial development mitigate each other effect and thus companies go towards more trade credit financing. Overall, evidence suggests that the trade credit is a substitute source of low financial development. Corporate managers can reduce the probability of adverse effects of low financial development by utilizing the more financing through trade credit.

## INTRODUCTION

The main objective of this study is to finds out the impact of financial development on trade credit financing. In emerging economies such as Pakistan, China and India, financial sector is not such capable to fully respond the funding needs of firms (Yano & Shiraishi, 2014). A country in which financial sector does not perform well or less developed, corporate sector acquired most of the funds from secondary sources. Moreover, trade credit financing is an emanating source of financing for those firms which have limited access to bank financing (Özlü, 2012). Either a country's financial sector has potential to encounter the financing needs of corporate sector but some adverse factors such as high corruption discourages the effective mobilization of funds and create the situation of high uncertainty. Development

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of financial sector severely curtailed due to high corruption. In such situation, trade credit is a substitute option for firm financing (Love & Preve and Allende, 2007). The high corruption index with its companion effects i.e. weak legal rights and bad implication of rules deteriorate bank confidence for lending (Weill, 2011). In such consequences, the corporate firms divert their financing option towards trade credit. This study explores the relationship between financial development and trade credit in the presence of corruption. Study is innovative because it is an early attempt which consider financial development, corruption and combined effect on trade credit.

Mainly, this study discusses the financial sector development, corruption and trade credit. According to The World Bank, developed financial sector paves the economic growth by offering the more funds to different economic sectors. Developed financial sector perform their operations efficiently and enable the smooth flow of funds. Secondly, transparency International defines the corruption as "*corruption is the abuse of entrusted power for private gain. It can be classified as grand, petty and political, depending on the amounts of money lost and the sector where it occurs". Next,* trade credit is an amount extended by supplier on sale of goods under specific credit and monetary terms. It specifies the volume of sale offered on credit (Dary, 2019).

The industrialization provides the significant contribution in overall stability of economy. It promotes the employment level and other economic activities. The deliberate development of this sector fuel the depressed economic system (Cheremukhin, Golosov and Tsyvinski., 2016). But there exist the certain factors which destroy the growth of this sector. The low financial development and high corruption level are some common factors which retreated the growth of this sector. In this situation, the corporate firms try to establish their activities on their own and seek the alternate source of financing like trade credit. Trade credit is a short-term source of financing which fulfill the instant needs of financing on comparatively low cost (Zhang, 2011). Corporate firms boost their sale volume by relaxing the credit conditions. This increase in sale volume enhances their revenue. Trade credit has some costs such as opportunity cost, risk of default and delay of payment. But these costs comprised on instant need of financing specifically in the period of non-availability of bank loans and financial distressed. The exploration of trade credit also stimulates the other activities of companies which results in reduction of per unit cost. Moreover, the bank loans are more costly and enhance the volatility of firms. Due to enormous benefits of trade credit as secondary source of financing, this study considers the instant need

to do the research on trade credit and found that how financial development effect trade credit in the presence of corruption.

Trade credit and bank loans are two sources of financing which use in different conditions. There exists the trade-off between these two sources of financing. The cost of bank financing is high in a country which has low financial sector development. In this situation, a firm may altitude their financing needs with informal financing i.e. trade credit (Ferrando & Mulier, 2013). The firms widen their business opportunities by extending their trade credit volume. Moreover, high corruption also discouraged the banks confidence to enhance the loan volume (Weill, 2011). In this case, the firms must boost their trade credit volume. But in individual effect, corruption discourages the trade credit financing as it creates the situation of uncertainty for business. Corporate firms limited their business in high corruption situation which ultimately reduces the trade volume (Yano, 2014). This dual effect of corruption raises an interesting question that how companies formulate their trade credit pattern in the presence of corruption and financial development. Moreover, it's still ambiguous that whether high financial development curbed the influence of severe corruption effect (and vice versa) on trade credit.

The study enriches the understanding on following questions

- How financial development effect the trade credit strategy of firms?
- Whether high corruption increases or decreases the financing through trade credit?
- How companies adjust their trade credit volume when there is high financial development but also high corruption which mitigates the effectiveness of each other.

There exists the enormous discussion on routine determinants of trade credit in literature but the studies on macro-economic determinants are very scarce specifically in the context of developing economies. Most of studies suggest the line determinants i.e. profitability, growth, leverage and size etc. which effect the trade credit strategies. The study of Deloof (2015) found the financial sector development as determinant of trade credit but his study missing of corruption effect. Hence, this study adds a new concept in emerging literature of corporate finance and financial economics that how macro-economic factors i.e. financial development and corruption determine the trade credit pattern. Moreover, this study synergetic with those studies who discussed the firm specific determinants and robust their findings in collective analysis of financial sector development, corruption and trade credit in case of three developing economies.

Empirically, this study unfolds the role of corruption and quantifies its possible effect in between financial development and trade credit. Before this analysis, it was the words of mouth that corruption has effect on business community. Its role was still ambiguous, but this study clarifies this ambiguity and significantly gratified that the corruption has important role even in determining the trade credit. Practically, the respective analysis offered the policy guidance both for corporate managers and policy makers. The corporate managers can extract the advantage in financing options. They can put more focus on trade credit in the period of financial distress. The policy makers should appendage their effort on more financial development and turmoil condition of corruption because these factors permeate the corporate sector.

The study comprises of five sections. The section one introduces the main theme of study, section 2 review the previous discussion which were made by previous studies on financial development, corruption and trade credit and derive the hypotheses. In section 3, we have tested these hypotheses in case of Pakistan, China and India by implying the suitable regression model. The section 4 presents the output of this regression model in addition with statistical summary named descriptive stats and correlation analysis. The section 5 summarized the whole discussion. It concluded that what was the end findings, either objective of study fulfilled and whether the questions were answered or not. The reference detail has place at end.

## REVIEW OF LITERATURE

The use of trade credit financing by the corporate firms is common especially in emerging economies where the low financial development hinders the firm financing options (Cosh, 2009). In this case, firms adjust their financing needs through other sources of financing including the cash reserves, family loans and business credit options. The terms of these options specifically terms of trade credit are negotiable in between supplier and buyers upon the new financing conditions (Garcia-Appendini & Montoriol-Garriga, 2013). This factor urged the small and debt constraints firms towards more trade credit financing in era of financial distressed ( Petersen & Rajan, 1994). But this financing become more offensive in high uncertain condition (D'Mello & Toscano, 2019) created by high corruption in specific country (Shleifer, 1993). The extensive strand of studies discussed the traditional and firm level determinants of trade credit i.e. growth, profitability, leverage and firm size etc. (García-Teruel, 2010; Ahmed *et al.*, 2014; Afrifa, 2017). But, the studies on how corruption and financial development effect

the trade credit were scarce (Yano, 2014). By involving the both firm level and macro-economic factors (GDP growth rate, inflation rate, interest rate and ease of doing business index), this study extend the existing literature by analyzing the corruption and financial sector development as important determinants of trade credit. Furthermore, to the best of our knowledge no study was found in literature which analyzed how financial development and corruption compensate each other to determine the trade credit strategy of firms.

According to substitute hypothesis of trade credit, trade credit financing helps those firms which stuck in financial distress in the period of low financial development. It states that trade credit financing substitutes the adverse effects of low financial development. Trade credit is alternate source of financing when banks did not respond effectively. Firms can delay the payment or hasten the inward cash flow by offering the more trade credit (Danielson and Scott, 2003). Similarly, according to information asymmetric theory, firms prefer more bank financing in high corruption environment. High corruption creates the situation of business uncertainty and problem of information asymmetric due to low enforcement of rules and regulations. In such condition, corporate firms preferred the secured financing i.e. bank loans instead of trade credit financing. They feel hesitation to enhance the financing through trade credit (Yano, 2014).

**Financial Development and Trade Credit**

The discussion on financial sector development as a determinant of trade credit was first made by Meltzer (1960). He has argued that the corporate firms may substitute their financing with more trade in tight monetary conditions. After this study, another study arranged by Jaffe & Russell, (1976) has also explained the same notion. They have noted that the firms made the pervasive trade credit financing in tight banks credit condition. Similarly, the study of Nilsen (2002) noted that the both small and large firms widen their trade credit activities in fierce credit situation. Firms acquired more financing by offering more trade credit when they have less access to financial institutions. According to agency cost theory, trade credit is more appropriate option to solve the agency problem between lender and borrower. Supplier firms have more advantage to reduce the agency problem by assessing the financial soundness of borrower firms. This stem to more trade credit (Cuñat, 2007). Another study made by Coulibaly, Sapriza, & Zlate, (2013) has documented that the firm relied more on trade credit financing in severe

economic contraction during 2008-09. During the global financial crisis (2008-09), an intensive attention was made by the corporate firms on trade credits financing due to lack of external financing. Despite of these, an array of studies which were made on corporate financing choices have suggested the trade credit as alternative source of financing in case of limited bank financing or less financial development (Atanasova, 2007; Molina & Preve, 2012; Levine & Xie, 2018). By following the outcomes of these studies, it can be argued that

***$H_1$: There exists the negative relationship between financial sector development and trade credit financing.***

**Corruption and Trade Credit**

Corruption can be defined as the *abuse of public or corporate office for private gain* (Toader *et al.*, 2018). Corruption is another important macro-economic factor which adhered with number of business strategies. It corroborates the firm cash holding decision (Thakur & Kannadhasan, 2018), firm financing decision (Wei, 2017) and even the growth of firms (Ayaydın & Hayaloglu , 2014). The growing literature on corruption and its decisional role in business world suggest to further analysis on trade credit. In their empirical analysis, Yano and Shiraishi (2014) have examined the negative role of corruption in trade credit specifically in account receivable. They have documented that the high corruption leads to more uncertain condition and unsecure property rights which depressed the firm confidence towards trade credit. They have made their analysis at province level in China. The literature has controversial arguments on corruption effects. Some studies argued that high corruption level induced the favourable business environment (Svensson, 2003; Mongay & Filipescu, 2012) but others reported that high corruption deteriorates the business activities by creating the more uncertainty (Breen, 2012). The studies of Fan (2012) and Fungáčová *et al.* (2015) found that there exists positive relationship between corruption and bank credit receipts. They have analyzed the vast data of 39 and 14transition economies relatively. They have noted that in high corruption environment, firms preferred to secured financing i.e. bank financing. More preference for bank financing alternately reduced the trade credit financing. In view of these outcomes, it can be hypothesized that

***$H_2$: The high corruption level has negative effect on financing through trade credit volume.***

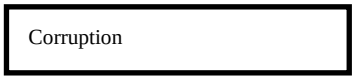
**Financial Development, Corruption and Trade Credit**

According to the *International Monetary Fund* country wise financial development report (IMF, 2016), Pakistan, China and India have low financial development. IMF has assessed the financial status of these countries and reported that these countries have 0.242, 0.567 and 0.421 relatively which are explicitly low from bench mark i.e. 0.60 for financial development. Instead of this, these countries have also worst condition in term of corruption level as compared to developed economies*. In this situation, its really complex to built the uni-sided argument. The study of Wang and You (2012) has documented that the corruption subsitutes the financial development to some extent. But, even if financial sector have high development index, but due to lack of transperency and regulatory check, the banks can't performed lending functions efficiently. In this situation, the bank managers obtain the rebates under the banner of markitlization and advanced the loans on unfavorable loan terms which deteriorates the distibution of funds (Guo, 2014).

Small firms which do not have direct access to upper management in banks will not be able to obtain the funds. Thus these firms preferred to more trade credit financing. Morover, the corruption could leave the other facts which have indirect relationship with trade credit. Such as, in severe corruption condition, the prospective firms scared to enter into regular market i.e. banking for financing. Furthermore, high corruption disturb the whole system and firm feel unsecured in contracting with banks and preferred to built the good relationship with their customers (Yano, 2014). Above of these, high corruption level hinders the banks lending behavior which causes the discrepency of loans for overall market (Weill, 2011). In this situation, firms have to search out the alternative source of financing i.e. trade credit financing. These factors encourged the corporate firms to built the new trade credit contracts. So, it can be supposed that

***$H_3$: There exists the positive relationship between financial sector development and trade credit when there is high corruption***.

## Theoretical Framework




*https://www.transparency.org/country/CHN

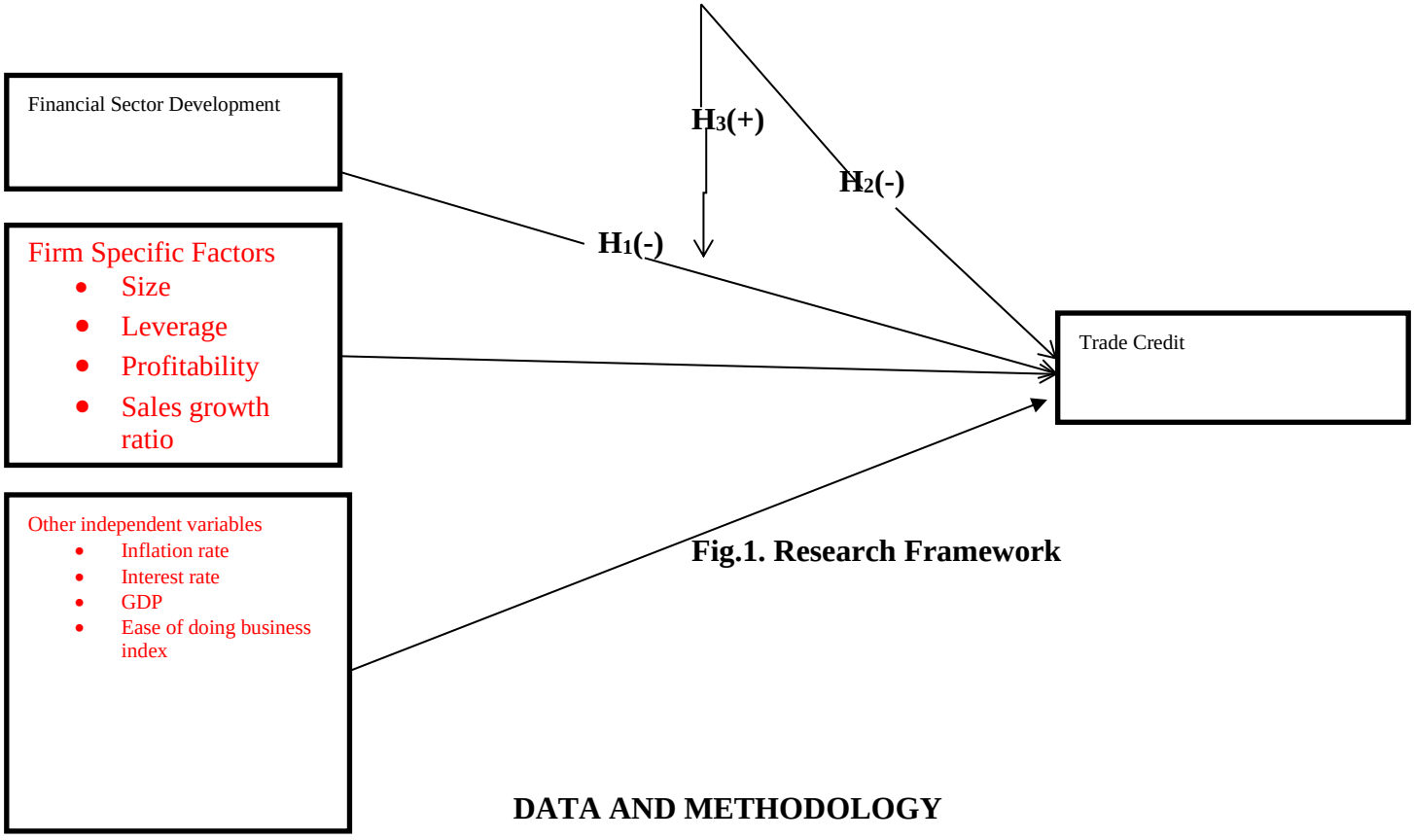



**Fig.1. Research Framework**

## DATA AND METHODOLOGY

In this study, a deductive approach of research was used. Population size consists of all the companies of specific country. But sample size consists of 2762 publicly listed firms (detail in Table A1). Random sampling technique was used for sample size selection. Ten years data ranging from 2007 to 2016 of Pakistan, India and China were analyzed. To make the data more results oriented, different filtering criteria were adopted. First, the firms which have less than 5 years observations of specific variable been excluded from sample so that it may not biased the results. Second, the firms which were from financial sector (SIC code range 6000-7000) were also discarded due to non-availability of trade credit in terms of financial sector and regulated financial policies. Finally, the data were perished by winsorizing at 5% on both ends to remove the outliers from data. This technique is line with Fan (2012).

As for concern data methodological discussion, In the area of corporate finance, firm effect and time effect is more pronounced to unbiased results. In addition, this technique further improved the efficiency of regression estimation by clustering the standard error of firm and year fixed effect (Petersen, 2009). So, to check the regression, following model was persuaded

$$Trade\ Credit_{it} = \beta_{\circ} + \beta_1 FSD_{it} + \beta_2 CI_{it} + \beta_3 FSD_{it} \times CI_{it} + \beta_4 Control\ Variables_{it} + \varepsilon_{it} \ldots\ldots\ldots (1)$$

Where $FSD_{it}$ represents the financial sector development and $CI_{it}$ is denoted for corruption index. The suffix I and t show the cross section and time effect. The $\beta_{\circ}$ is constant and $\beta_1$represents the coefficient. The $\varepsilon_{it}$ is error term which capture the residual.

In this study, we have used the Generalized Method of Moments (GMM) technique to solve the problem of potential endogeneity. The first lagged difference of all the independent variables were used as instrumental variables in GMM system technique. The evidences on this estimation technique has consistently found in literature when regression face the problem of endogeneity (Ferrando, 2013; Yano, 2014; Wei, 2017). Furthermore, in the literature of finance and economic, the problem of endogeneity is common when explanatory variables are not perfectly exogenous (Leary & Roberts, 2014). In this case, the application of GMM model is common in order to treat with endogeneity problem. Next, to enhance the validity of GMM model, cross-section fixed effect model was applied. The fixed effect model has simultaneous significance over random effect because it can counter the problem of reverse causality and biasness of omitted variables (Wei, 2017, p.301). Further, another statistical tool named Hausman test also favored the implication of fixed effect because the value of Chi-square was less than 0.05 (*shown in appendix B*) which accept the alternate hypothesis i.e. *fixed effect model is more appropriate*

***Table 1 Sources of Data***

| Sr. No. | Variables | Definition | Data Source | References |
|---|---|---|---|---|
| **1** | **TC** | Account receivable/total assets | Compustat | (Dary, 2019) |
| **2** | **ROA** | EBIT/Total assets | Compustat | (Ferrando, 2013) |
| **3** | **LVG** | Total debt/total assets | Compustat | (Ferrando, 2013) |
| **4** | **FS** | Log of sales | Compustat | (Ferrando, 2013) |
| **5** | **SGR** | C. year sales- L. year sales/last year sale | Compustat | (Ferrando, 2013) |
| **6** | **CI** | Corruption perception index (0 to 100) | Transparency International | (Thakur & Kannadhasan, 2018) |
| **7** | **IFR** | Consumer price index | The World Bank | (Afrifa, 2017) |
| **8** | **IR** | Annual real interest rate | The World Bank | (Afrifa, 2017) |
| **9** | **GDP** | Aggregates production rate by all the sources in a country | The World Bank | (Thakur, 2018) |
| **10** | **BI** | Ease of doing business index (0 to 10) | The World Bank | (Thakur, 2018) |
| **11** | **FSD** | Aggregate of systematic measurement by IMF | International Monetary Fund | (Thakur, 2018) |

**Note:** *TC=trade credit, ROA= profitability, LVG= leverage, FS= firm size, SGR= sales growth ratio CI= corruption index, IFR= inflation rate, IR= interest rate, GDP= GDP growth rate, BI=ease of doing business index, FSD= financial sector development*

**Variables of Study**

The study checks the relationship between financial sector development, corruption and trade credit. The financial sector development (FSD) used as explanatory variable. The measurement of financial sector development was derived from *International Monetary Fund (financial development index).* The IMF has quantified the financial sector development status of countries by simulation of different statistics on *depth, success and efficiency*. It has collected the data on these indices and formulated the end index known FSD. The financial sector development has widely used as explanatory variables in previous studies (Ge & Qiu, 2007; Coulibaly *et al.*, 2013;Deloof, 2015). Trade credit policy used as explained variable and measured as account receivable to total assets. This proxy has frequently used in prior literature (Muscettola, 2014; Kim, 2016; Dary, 2019). Next, the corruption index has been employed as moderating variable. It was measured by Transperency International's Corruptionn Perception Index. It indicates the level of corruption among public officials and politicians. It ranges from 0 to 100. The country which is more skewed towards 100 is considered more corrupt. The previous empirical studies have applied the same proxy to measure the country corruption level (Fan, 2012; Chen *et al.*, 2015; Thakur, 2018).

Furthermore, this study also derives some control variables from the existing literature both at firm level and country level which have coherence with trade credit (Ferrando, 2013; Ahmed, Xiaofeng, & Khalid, 2014; Thakur, 2018; Dary, 2019). The firm profitability measured as ratio of earnings before interest and tax (EBIT) to total assets, leverage was calculated as fraction between total debt to total assets, size of firm was determined by taking the log of total sales and growth of firm has formula as change in sales/previous year sales.These variables were controlled at firm level. Next, in order to assess the country level control variables, GDP growth rate (aggregate production by all the sources), inflation rate (change in average consumer price index), interest rate (annual real interest rate) and ease of doing business index (value ranges from 0 to 10: a country which has high value is considered more favourable for doing the business) were considered. These variables enhance both conceptual and empirical analysis on determination of trade credit. In addition, the past literature has strongly urged these determinants in dynamic studies on trade credit (García-Teruel, 2010; Ferrando, 2013; Afrifa, 2017).

## RESULTS DESCRIPTION

***Table 2 Descriptive Statistics***

| Sr. No. | Variables | N | Mean | Std. | Skewness | Kurtosis |
|---|---|---|---|---|---|---|
| **1** | **Trade credit (TC)** | 10799 | 0.215 | 0.141 | 1.028 | 4.113 |
| **2** | **Firm size (FS)** | 10799 | 2.012 | 0.075 | 0.060 | 3.332 |
| **3** | **Profitability (ROA)** | 10799 | 0.076 | 0.100 | -0.948 | 4.680 |
| **4** | **Leverage (LVG)** | 10799 | 0.322 | 0.230 | 0.385 | 3.090 |
| **5** | **Growth (SGR)** | 10799 | 0.240 | 0.758 | 2.148 | 5.246 |
| **6** | **Corruption index (CI)** | 10799 | 39.961 | 0.254 | 0.446 | 7.772 |
| **7** | **Inflation rate (IFR)** | 10799 | 7.539 | 0.388 | 0.134 | 3.703 |
| **8** | **Interest rate (IR)** | 10799 | 3.565 | 0.015 | -0.783 | 2.861 |
| **9** | **GDP growth rate (GDP)** | 10799 | 6.899 | 0.137 | 0.006 | 4.343 |
| **10** | **Ease of Doing Business index (BI)** | 10799 | 6.933 | 0.485 | 1.421 | 3.334 |
| **11** | **Financial sector development (FSD)** | 10799 | 0.432 | 0.086 | -0.280 | 4.796 |

***Source**: Own calculation using the statistical software named EViews 9*

Table 2 shows the combined descriptive statistics of three countries i.e. Pakistan, China and India. The mean value of trade credit (TC) is 0.215 which describes the financing pattern of firms. The corporate firms acquire 21.5% of financing by trade credit. The standard deviation is 0.141 which indicates the degree of variance from mean. The skewness and kurtosis depict the data pattern. Both factors have normal values which strengthen the concept of data normality. Other variables of study have their corresponding values in the form of mean, standard deviation (std.), skewness and kurtosis. Out of these statistics, if we focus the value of financial sector development which is 0.432 then it's clear that this value is extremely low. According to IMF financial development scrutiny, a country which has financial development index below than 0.60 considered financially underdeveloped (IMF, 2016). So, the under-analysis countries are not financially developed, and firm should rely more on trade credit financing. In the same fashion, other tables are as well

***Table 3 Correlation Matrix***

| | TC | ROA | LVG | FS | GR | CI | IFR | IR | GDP | BI | FSD |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **TC** | 1.000 | | | | | | | | | | |
| **ROA** | 0.013 | 1.000 | | | | | | | | | |
| **LVG** | -0.042 | -0.274 | 1.000 | | | | | | | | |
| **FS** | -0.113 | 0.158 | -0.085 | 1.000 | | | | | | | |
| **SGR** | 0.004 | 0.052 | -0.012 | -0.010 | 1.000 | | | | | | |
| **CI** | 0.199 | -0.069 | 0.088 | -0.116 | -0.007 | 1.000 | | | | | |
| **IFR** | 0.082 | 0.056 | 0.148 | -0.265 | 0.060 | 0.014 | 1.000 | | | | |
| **IR** | 0.087 | -0.040 | 0.029 | -0.097 | -0.017 | 0.163 | -0.413 | 1.000 | | | |
| **GDP** | -0.034 | -0.104 | -0.056 | 0.137 | -0.016 | 0.302 | -0.405 | -0.016 | 1.000 | | |
| **BI** | -0.172 | -0.082 | -0.190 | 0.400 | -0.021 | -0.137 | -0.733 | -0.086 | 0.533 | 1.000 | |

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **FSD** | -0.030 | -0.052 | -0.118 | 0.271 | -0.019 | 0.416 | -0.469 | -0.114 | 0.483 | 0.702 | 1.000 |

***Source**: Own calculation **Note**: TC= trade credit, ROA= profitability, LVG= leverage, FS= firm size, GR=growth CI= corruption index, IFR= inflation rate, IR= interest rate, GDP= GDP growth rate, BI=ease of doing business index, FSD= financial sector development*

The column 2 of Table 3 expresses the main relationship between other variable of study and main variable of interest i.e. trade credit. The numeric values identify the strength of association and sign indicates their direction. Among the four firm specific variables i.e. ROA, LVG, FS and SGR which were used as control variables, the firm size (FS) has high degree of association as -0.113. similarly, among the macro variables, business index (BI) has most influential relationship with trade credit as -0.172. As for concern explanatory variables, FSD and corruption (CI) have negative and positive correlation values and their strength of association is 3 percent and 19.9 percent relatively. These values suggest that the corruption which also act as moderator has more strong influence on trade credit than financial development. When this contrasting relationship collectively integrate with trade credit then the strong influence of corruption mitigates the adverse effect of financial development and produced the positive relationship. The correlation values of other variables (shown in column,3, 4, 5 and so on of table 3) are quite moderate which attributed to no multicollinearity among the variables.

***Table 4 Moderating Role of Corruption in the Relationship of Financial Sector Development and Trade Credit***

| **Variables** | ***Coefficients*** | ***t-value*** | ***Probability*** |
|---|---|---|---|
| **TC (-1)** | *0.940* | 128.767 | 0.000*** |
| ***Firm specific variables (use as control variables)*** | | | |
| ***ROA*** | -0.084 | -3.745 | 0.000*** |
| ***LVG*** | 0.005 | 1.288 | 0.197 |
| ***FS*** | 0.002 | 1.571 | 0.102* |
| ***SGR*** | 0.005 | 2.737 | 0.006*** |
| ***Macro-economic variables (use as control variables)*** | | | |
| ***IFR*** | -0.011 | -2.131 | 0.033*** |
| ***IR*** | -0.004 | -2.207 | 0.027*** |
| ***GDP*** | -0.025 | -1.862 | 0.062** |
| ***BI*** | 0.026 | 1.808 | 0.070** |
| ***Explanatory variables*** | | | |
| ***FSD*** | -0.597 | -1.885 | 0.059*** |
| ***CI*** | -0.120 | -1.866 | 0.062*** |
| ***Moderating effect*** | | | |
| ***FSD× CI*** | 0.479 | 1.881 | 0.060** |
| ***Adjusted R-square*** | | | *0.719* |
| ***S.E of regression*** | | | 0.074 |
| ***Durbin Watson*** | | | *2.241* |

| | |
|---|---|
| ***J-statistic*** | *16.545* |
| ***Prob. (J-statistic)*** | *0.16* |

***Note****: TC= trade credit, ROA= profitability, LVG= leverage, FS= firm size, GR=growth CI= corruption index, IFR= inflation rate, IR= interest rate, GDP= GDP growth rate, BI=ease of doing business index, FSD= financial sector development* ***Moreover****: * significance at 10% level, ** significance at 5% level and *** significance at 1%.*

Table 4 shows statistical relationship among the variables of study. TC (-1) which shows the lag difference of trade credit has significant t-statistics value as 128.767 which suggests that dependent variable depends upon its own lag. It validates the implication of GMM model. Firm profitability (ROA) has significant and negative t-stat value as -3.745. It is significant at 1%. Leverage (LVG) has insignificant t-stat value as 1.288. Firm size (FS) and sales growth ratio (SGR) have significant and positive t-stats values as 1.571 and 2.737 relatively. Similarly, all macro-economic variables i.e. inflation rate (IFR), interest rate (IR), gross domestic product (GDP) have significant and negative relationship except ease of doing business Index (BI) which has positive and significant relationship. Further, financial sector development (FSD) and corruption (CI) have negative and significant relationship. Their t-stat values are -1.885 and -1.866 relatively. At the end, moderating effect of CI with FSD have positive and significant t-stat value as 1.881. These statistics shows the significance or insignificance and direction of relationship.

## DISCUSSION OF RESULTS

Analysis consists of 10799 cross sections from three emerging economies i.e. Pakistan, China and India. The Generalized method of Moments (GMM) with first lag difference and year and cross section fixed effect was applied to obtain the results. The ROA has negative and significant t-stat value which implies the firms which are more financially constrained, or which have low profitability (opposite to high profitability) use the more trade credit. According to trade-off theory, the firms which are more financially constrained are unable to raise the funds due to high information asymmetric (Myers, 1984). The banks hesitate or demand the high interest rate on lending. In this situation, less profitable firms can fulfill their funding needs by widening their trade volume (Coulibaly *et al.*, 2013). The firm size (FS) has positive and significant relationship with trade credit financing which suggests that the bigger firms interested to get the financing through trade credit (Lawrenz & Oberndorfer, 2018). Moreover, trade credit is also advantageous due to carry the smooth business functioning. In addition of trade credit as cheap financing, the larger firms also extend their trade credit circle and attract the more customers to

achieve the scale of economy both in production cost and selling cost. Similarly, the growth has positive and significant relation with trade credit financing. To sustain the rapid growth, the firms interested in more trade credit financing. Bank credit with fixed burden of interest have adverse effect on firm innovation and growth behavior (McGuinness & Hogan, 2016). Thus, high growth firms interested in more trade credit financing instead of bank financing.

There exist some macro-economic determinants of trade credit financing. Inflation rate and interest rate have negative and significant effect on trade credit financing. They are significant at 1 percent level and have t-statistics values as -2.131 and -2.207 relatively. The aggressive increasing in inflation rate and interest rate restricts the companies to get financing through trade credit. High inflation rate decreases the present value of future collections and high interest rate enhance the opportunity cost of trade credit financing (Onwe & Olarenwaju , 2014). The firms seek to be fixed rate of financing i.e. bank financing instead of trade credit financing in high inflation and interest rate period. Next, gross domestic product (GDP) growth rate has significant but opposite relationship with trade credit financing. In contrary to the common (Ahmed *et al.*, 2014; ), this relationship highlights the specific trend of firms in three emerging economies. Moreover, the study of Deloof and Rocca (2015) suggested the negative relationship between GDP growth rate and trade credit. They have vowed that high GDP growth rate induced the contraction of trade credit. The fourth macro-economic variable which was used as control variable is ease of doing business index (BI) which has significant and positive relationship with trade credit. The corporate firms from countries which have high BI preferred to involve in more business activities rather to shrink their activities in bank financing. The wide business activities attract the corporate managers to get the financing through trade credit.

Financial Sector Development (FSD) has significant and inverse relationship which suggest that the firms with less access to banks will substitute their financing with more trade credit. In low financial development, the firms typically divert their financing preferences towards secondary source of financing due to tough approach to primary source of financing (Levine, 2018). Moreover, the less developed financial sector charges the high interest rate on loans which change the financing preferences from primary to secondary source. Next, the high corruption index has negative effect on trade credit. High corruption environment not only creates the situation of uncertainty but also weaken the implication of rules and regulations (Breen, 2012) which adversely turnout the firm behavior from

expanding their trade volume. But, this adverse effect of both FSD and CI become positive when they collectively interact with trade credit. The t-statistic value of moderating relationship is 1.881 which is significant at 5 percent level. As aforementioned, both FSD and CI have negative relationship with trade credit but when there is high corruption and high financial development then both factors will substitute each other. The banks cannot perform well in high corruption due to lack of legislation. In such a situation, the corporate managers will colloquially get the financing through trade credit (Wang, 2012). This relationship can simply be pronounced as *high FD high TC* (positive relationship).

There are some other statistics which confirm the suitability of regression model i.e. adjusted R-square and F-stat (model significance) etc. Overall results are in line with previous studies.

## CONCLUSION

The main objective of this study was to assess the effect of financial development on trade credit in the presence of corruption. The non-financial sector firms from three economies i.e. Pakistan, China and India were used as sample and GMM model with first lag difference was applied to achieve the objective. The findings suggest that financial development and corruption has negative relationship, but this negative sign was transmitted to positive relationship when they collectively (may pronounce as moderation) adhered with trade credit policy. The findings argued that the when there is low financial development, the corporate firms use more trade credit financing due to non-availability of primary financing. Similarly, in high corruption environment, firms limited their trade credit options because corruption creates the situation of uncertainty. But this relationship become positive when they collectively interact with trade credit. The results of study efficiently respond to the research questions and research gap has appropriately incorporated.

Moreover, the findings of st udy suggest some practical policy implications

- Policy makers should do more focus on financial development, because low financial development limited the financing options.
- Similarly, the corruption should be minimized because it has adverse effect on trade credit.
- The corporate managers should exhaust their skills to numerate the trade credit financing specifically in adverse economic environment.

## Contribution of Study

The main contributions of study are as

- Highlights the combined effect of financial development and corruption on trade credit.
- Results strengthen the views of those researchers who considered the trade credit as secondary source of financing specifically when financial sector suffer from low development.
- Study adds the new idea in existing body of literature that corruption hampers the trade credit.
- This study discusses the wide range of determinants both at firm level and macro-level.

## Limitation and Future Recommendations

Our main limitation is combined analysis of three countries while nature of business, i.e. banking sector development and corruption level differ even in each country. In future, more comprehensive studies can conduct to see the individual effect of financial development and corruption on trade credit. Further, more countries which have more diverse nature of business environment and macro-economic condition can be added in analysis. This will give the concluding remarks about financial development and corruption as determinants of trade credit.

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## Appendices

### Appendix A

***Table A Country Wise Distribution of sample***

| Sr. No. | **No. of firms** | **Percentage** |
|---|---|---|
| **Pakistan** | 112 | 4.055% |
| **China** | 1503 | 54.417% |
| **India** | 1147 | 41.527% |
| **Total** | 2762 | 100 |

**Source**: Own calculation **Note:** This table enhance the understanding by presenting the country wise contribution of firms in total sample.

### Highlights

**Subject:** Financial Development, Corruption and Trade Credit: A Generalized Method of Moments (GMM) Approach

The study quantifies the combined effect of financial development and corruption on trade credit.
In low financial development, firms prefer more trade credit.
High corruption index has negative effect on trade credit financing.
There is positive relationship between trade credit and financial development when corruption moderates this relationship.