

# Credit Redistribution by Listed Manufacturing Firms in Pakistan and the Moderating Role of Financial Depth

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## Abstract

An enhancement in the financial depth increases the availability of formal credit to firms. Resultantly credit redistribution by firms is likely to be reduced as they require less trade credit. To provide evidence, how do managers respond to changes in financial depth while making adjustments in their trade credit policy, this paper aims to study the impact of financial depth on credit redistribution by listed manufacturing firms (LMFs). For the firm-level variables, we used a data set of 327 firms listed on PSX for the period 2005 to 2018. Private credit to GDP ratio and market capitalization to GDP ratio are used as proxies for financial depth. Unlike earlier studies, we applied a two-step System GMM estimator to control the endogeneity. The results of the regression analysis display a positive relationship between the use and the supply of trade credit by LMFs. It reveals that LMFs redistribute credit to their customers through trade credit channel. We found a significant and negative impact of financial depth on the supply of trade credit by LMFs. Further, we established that financial depth as a moderator has a buffering impact on the credit redistribution by listed firms. The study highlights the moderating role of financial depth and suggests the financial policymakers of firms to modify their credit policies in response to changes in financial depth. For future research, we suggest the investigation of the effect of financial policy interventions on credit redistribution by small and non-listed firms.

**Keywords:** Financial depth, credit redistribution by LMFs, and two-step system GMM estimation.

**JEL-Classification:** C51, E51, G39

## 1. Introduction

Financial development in a country plays a vital role in the efficient allocation

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of funds in the economy. An enhanced financial depth (FD) increases the supply of bank credit and market credit to firms. Consequently, their dependence on trade credit (TC) is reduced. Further, the availability of formal credit to firms enhances their potential to redistribute credit via trade credit channel to the customers. It implies that changes in FD are likely to affect the credit redistribution (CR) by the firms. In developed countries, the more liberal and developed financial system facilitates the firms' access to equity and debt markets. While, in developing countries, most of the firms are credit rationed due to less developed financial intermediaries and financial markets (Fisman & Love 2003). Similarly, Rajan and Zingales (1998) reported that the supply of external finance to firms is scarce in these countries. These firms depend more on their suppliers in fulfilling their short-term financing needs.

Listed companies receive funds from multiple sources and are in an advantageous position to supply credit to their customers by selling products on credit. Credit redistribution by Listed Manufacturing Firms (LMFs) is very common in all countries, particularly where financial intermediaries are less developed. Moreover, these firms supply TC to their credit-rationed customers and make-up the deficiency of bank credit (Deloof & Van-Overfelt, 2011). Statistics of industrial countries indicates that the median value of TC varies from 15% to 40% of sales (Seifert, Seifert & Proto-pappa-Sieke, 2013).

In the existing literature on TC, we found a little number of studies that established the relationship of macroeconomic variables with CR by listed companies. For instance, Meltzer (1960), and later Nilsen (2002) studied the impact of monetary policy; Niskanen and Niskanen (2006) investigated the effect of market interest rate; Garcia - Teruel and Marteniz- Solano (2010b) examined the impact of economic environment (defined by GDP); Jain (2001) studied the effect of industry; Andrieua, Staglianoa and Zwanb (2015) and later, Bussoli and Marino (2018) studied the effect of financial developments on trade credit. Most of these studies are conducted in the context of developed credit markets. Seifert, et al. (2013) reported a significant difference in the supply of TC across countries as well as across industries. Moreover, CR by firms is likely to be influenced by the level of FD, economic conditions and legal system (Bussoli & Marino, 2018). Therefore, on account of significant differences among the countries regarding the supply of TC, economic conditions, legal system and financial development (Deloof & La Rocca, 2015); Ahmad, Nazir and Nafees (2018); Kumar and Vashishtha (2020) recommended country case studies particularly in the context of emerging economies with less developed financial markets.

Pakistan is an emerging economy and has experienced significant developments in the financial sector during the last couple of decades (Ahmad, et al., 2018). The stock market of Pakistan has been reported as the best performing market in devel-

oping economies. In Pakistan, LMFs can finance their capital expenditures by issuing securities in the capital market. More than 50 % of the bank credit is received by these firms (Ahmad et al., 2018). The suppliers of these firms also provide them more TC due to their market power. All this indicates that short-term credit is available to LMFs from multiple sources of funds in Pakistan and thus these firms are relatively less financially constrained. Moreover, the credit distribution by these firms has grown up on average by 13.30 percent over the last two decades. Therefore, on account of significant financial developments in Pakistan and due to the pivotal role of LMFs in credit redistribution, we aimed to investigate the impact of FD on the supply of trade credit. Based on the above-highlighted research gap and a unique case of the emerging economy of Pakistan, this study adds value to the existing literature in the following stances:

*First*, by testing the credit redistribution hypothesis in the context of an emerging economy this study provides an insight into the most practiced CR channel by LMFs in a financially less developed country. *Second*, the CR by LMFs might be sensitive to FD in a country. A handful of studies in the existing literature (Andrieua, Staglianoa, & Zwanb, 2015; Bussoli & Marino, 2018) emphasized only the direct relationship between FD and CR. Therefore, due to little empirical evidence about the moderating effect of FD on CR, this study establishes the direct and moderating effect of FD. Moreover, this study provides evidence of the aberration of CR by LMFs in response to an increase in FD. *Third*, endogeneity bias has been well recognized in the empirical corporate finance literature and is not addressed by most of the earlier studies in corporate finance (Ullah, Akhtar, & Zaefarian, 2018). Earlier studies on trade credit ignored this problem, hence their results are biased and inconsistent. We used the system GMM (two-step) estimator to control this problem and present more efficient and consistent estimates of parameters. Last but not least, the findings of this study would be useful for the credit managers and financial policymakers in understanding the effect of FD on CR by firms. Further, this study calls upon credit managers to respond to improvements in FD by modifying their credit policies. Similarly, financial policymakers need to emphasize the financial developments for optimal allocation of formal credit.

After describing the motivation for the study and its objective in the introduction section, hypotheses are narrated in section two. Data and methods used to estimate the impact of financial depth on redistribution of credit by firms are explained in section three. Discussion of results is presented in section four. At the last, the findings of the study are summarized along with implications for policymakers and academics alike.

## 2. Literature Review and Hypotheses

### 2.1. Credit redistribution by listed firms.

In less developed financial markets it is the common practice of listed firms to redistribute short-term funds to their credit rationed firms via TC. Availability of short-term credit from the banks and suppliers to these firms increases their potential to extend more trade credit (Schwartz, 1974). Later, Kohler, Britton and Yates (2000) reported similar findings. Biais and Gollier (1997) established that these firms act as a second layer intermediary and transmit institutional finance to their customers. A similar explanation for the redistribution of short-term credit was extended by Deloof and Van Overfelt in 2011. They emphasized the financial intermediary role of listed firms. It is the advantage of these firms that receive short-term credit from their suppliers as well as from banks. Resultantly, these firms can transfer short-term funds to their small customers through TC and alleviate the deficiency of bank credit (Demirguc-Kunt & Maksimovic, 2001).

Recently, Santos and Silva (2014) also highlighted that listed companies use their position to assist their financially constrained customers via trade credit channel. According to the maturity matching principle, trade receivables are financed by trade payables (Diamond, 1991; Kwenda & Holden, 2014). Furthermore, as per the trade customs of industry, firms that are required to sell on credit, prefer to purchase on credit from their suppliers (Burkart & Ellingsen, 2004). Despite the varying degree of financial developments across the countries firms simultaneously demand and supply TC (Niskanen & Niskanen, 2006). Later, a study conducted by Garcia-Teruel and Martinez-Solano (2010b) reported a positive relationship between the trade credit supplied and trade credit demanded by listed companies. Trade credit redistribution is also consistent with the argument of McMillan and Woodruff (2002) i.e. firms delay in payment to their suppliers due to delayed receipts from their customers. In most industries, CR is spontaneous. Moreover, demand for TC and supply of TC are simultaneously determined (Yang, 2011). Similarly Gibilaro and Mattarocci (2011) reported that the choice of firms to demand TC is influenced by their supply of TC. Later, Al Dohaiman (2013) presented a similar explanation. Murfin and Njoroge (2015) emphasized the collateral attribute of TC extended by firms. They presented that firms treat trade receivables as collateral for the trade payables. Thus, the collection policy and payment policy of firms are influenced by each other (Kiyotaki & Moore, 1997). Some recent empirical studies, for instance, Ferrando and Mulier (2013), Casey and O'Toole (2014), McGuinness, Hogan and Powell (2018) established that the use of TC is an important determinant of TC provided by firms to their customers. The above discussion conjectures the following hypothesis, for testing the

credit redistribution hypothesis.

$H_{a1}$ : Trade credit received by LMFs has a positive effect on the supply TC.

In addition to the availability of TC, the availability of short-term bank loans to firms also influences their CR behavior. In the existing literature, a complementary hypothesis is presented to justify the link between the short-term bank loans (SBL) used by firms and the TC supplied by them to their customers. This hypothesis is based on a presumption that firms use SBL to finance their operating activities. Listed manufacturing firms are more creditworthy and are more transparent. Schwartz (1974) highlighted that listed firms could raise short-term funds by borrowing from banks as well as from the credit market. Moreover, these firms use their borrowing ability in the favour of their credit rationed customers (Emery, 1984). Similarly, Kohler et al. (2000) reported the redistribution of bank credit by firms to their credit-rationed customers via the TC channel. Later, Bougheas, Mateut and Mizen (2009) found a positive relationship between SBL used by firms and TC supplied by them. A current study conducted by Ghosh (2015) established that firms borrow SBL to partially finance the TC supplied. The above discussion on the relationship between short-term bank loans and the supply of TC by firms, leads to the following hypothesis.

$H_{a2}$ : The availability of SBL to LMFs has positive effect on the TC supplied by them to their customers.

## 2.2. Financial depth and credit redistribution

Like financial attributes of firms, the financial environment also affects the CR behavior of firms. Positive growth of FD enhances the supply of formal funds to firms. Resultantly, firms needless to depend on informal and costly TC. Couppey-Soubeyran and Hericourt (2013) established a negative effect of FD on the credit redistribution by firms. They explicated that an increase in FD reduces the credit rationing and resultantly firms use less TC. Later, Andrieua, Stagliano and Van Der Zwan (2015) also found a negative association between FD and the CR by LMFs. Recently, Bussoli and Marino (2018) reported that an increase in FD leads to a decrease in the use of TC. If LMFs supply TC in response to the demand of TC from their customers, then an increase in FD results decrease in the CR by LMFs. Thus, for examining the direct effect of FD on CR by LMFs, we proposed the following hypothesis.

$H_{a3}$ : *There is a negative effect of FD and TC supplied by LMFs.*

In addition to the direct relationship between FD and TC supplied by LMFs, FD also likely to moderate the CR by LMFs. The supply of funds to firms increases due to an increase in FD and consequently, the demand for trade credit is reduced.

On the other hand, FD increases the ability of firms to provide more TC (Deloof & Rocca, 2015). Thus, FD may debilitate the CR hypothesis. An empirical study conducted by Cull, Xu and Zhu (2009) reported the negative impact of FD on the CR by firms. Later, Couppey-Soubeyran and Hericourt (2013) highlighted that with an increase in FD, the direction of the relationship of both TC used and short term bank borrowing with TC supplied by LMFs is reversed. Thus, for the investigation of moderating effect of FD on CR by LMFs, we proposed the following hypothesis.

$H_{a4}$ : Financial depth moderates the CR by LMFs.

### 3. Data and Method

#### 3.1. Sample

For investigating the impact of FD on the CR by manufacturing firms listed on PSX, we used a data set of 320 LMFs for the period from 2005 to 2018. The choice of LMFs is consistent with Ahmad and Afza (2018). For the selection of sample and the choice of the study period, we followed the scheme of our earlier study (Ahmad, Afza & Nafees, 2017).

#### 3.2. Variables and data sources

For describing the trade credit supplied (TCS) by LMFs, the trade debtor to sales ratio is used as a dependent (outcome) variable. To study the redistribution of credit by LMFs and moderating role of FD, trade credit received (TCR) and short-term bank loans (SBL) are used as focal variables and FD is used as a moderator variable. For controlling the effect of financial characteristics of LMFs on TCS, we used market power, sales growth, and profitability, size, inventory and the short term liquidity position of LMFs. Our choice of using these characteristics of LMFs as control variables is influenced by the empirical shreds of evidence about their significant impact on TC supplied by firms to their customers (Vaidya, 2011; Murfin & Njoroge, 2015; Ahmad et al., 2017). We retrieved the data of the firm's level variables from the balance sheet analysis (BSA) reports published by SBP in 2010, 2015 and 2019. Following the studies conducted by Andrieua et al. (2015); Ahmad et al. (2018), we used two measures of FD namely private credit supplied by banks (PC) and market capitalization (MC) of PSX. We preferred PC and MC over other measures of FD due to their close and direct effect on TC supplied by LMFs to their customers. The data about the indicators of FD was extracted from the economic surveys of Pakistan.

#### 3.3. Regression model and measurement of variables

To examine the CR by LMFs in Pakistan and the moderating role of FD, we

followed a framework for moderation analysis suggested by Sharma, Durand and Gur-Arie (1981). Further to control the multicollinearity between the focal variables (FVs) and the moderator (FD) we used centered interaction terms as suggested by Aldwin, Levenson and Spiro (1994). For developing the centered interaction terms we proceeded as follows:

First, we calculated the sample mean of each moderating variable (MV) and focal variable (FV) then computed the mean deviation (difference) by subtracting the sample mean from each observation of  $MV_t$  and  $FVs_{it}$ , respectively. In the second step, we multiplied the deviations of MV with the deviations of FV. In this study,  $TCR_{it}$  and  $SBL_{it}$  are used as FVs while  $FD_t$  is used as MV.  $TCR$  with bar,  $SBL$  with bar and  $FD$  with bar in the interaction terms expressed in Equations 3 & 4 are the sample average of  $TCR$ ,  $SBL$  and  $FD$  respectively. These averages remain constant over time for the entire sample. While centered interaction terms vary both across firms and time. So subscript ( $it$ ) is added to the interaction terms For MRA we specified the following regression models.

Equation 1 is used as a baseline model to study the effect of financial characteristics of firms on the TCS by LMFs to their customers.

$$TCS_{it} = \alpha_0 + \beta_1 TCR_{it} + \beta_2 SBL_{it} \sum_{j=1}^N \gamma_j X_{j,it} + \mu_{it} \quad (1)$$

For the examination of direct effect of  $FD$  on  $TCS$ , we developed the Equation 2..

$$TCS_{it} = \alpha_0 + \beta_1 TCR_{it} + \beta_2 SBL_{it} \sum_{j=1}^N \gamma_j X_{j,it} + \phi FD_t + \mu_{it} \quad (2)$$

For the investigation of moderating effect of  $FD$  we used Equation 3 and 4.

$$TCS_{it} = \alpha_0 + \beta_1 TCR_{it} + \beta_2 SBL_{it} \sum_{j=1}^N \gamma_j X_{j,it} + \phi FD_t + \omega \{ (TCR_{it} - \overline{TCR})_it \times (FD_t - \overline{FD})_t \} + \mu_{it} \quad (3)$$

$$TCS_{it} = \alpha_0 + \beta_1 TCR_{it} + \beta_2 SBL_{it} + \sum_{j=1}^N \gamma_j X_{j,it} + \phi FD_t + \varepsilon \{ (SBL_{it} - \overline{SBL})_it \times (FD_t - \overline{FD})_t \} + \mu_{it} \quad (4)$$

According to Sharma et al. (1981), if Equation 2, is not significantly different from Equations 3 and 4 ( $\omega = 0$ ;  $\varepsilon = 0$ , but  $\phi \neq 0$ ), then  $FD$  is an independent variable and does not have a moderating effect. In the case of Equations, 1 and 2 are not different from each other but both are different from Equations 3 and 4 ( $\phi = 0$ ; but  $\omega \neq 0$  and  $\varepsilon \neq 0$ ), then  $FD$  is a pure moderator. For  $FD$  to be categorized as a quasi-moderator, Equations 1, 2, 3 and 4 should be different from each other ( $\phi \neq \omega \neq 0$  and  $\varepsilon \neq 0$ ).

Where;  $i = 1, \dots, N$  firms and  $t = 1, \dots, T$  (Year);  $\alpha_0$  = it is an intercept of the model.

$TCS_{it}$  = . The ratio of trade debtors to sales describes the TC supplied by LMFs to their customers.

$TCR_{it}$  = The ratio of trade creditors to sales which indicates the TCR received by LMFs from their suppliers.

$SBL_{it}$  = The ratio of short-term bank loans to sales.

In all the above equations,  $X_j$  is a vector of LMFs' financial characteristics which includes

$GPM_{it}$  = Gross profit margin ratio is used as a proxy for the market power of a firm.

$SG_{it}$  = Sales growth rate.

$PR_{it}$  = Net operating profit + depreciation + interest / sales ratio.

$SIZE_{it}$  = Natural log of total assets of a LMF.

$INV_{it}$  = Inventory (stock-in-trade) to sales ratio.

$LIQ_{it}$  = Current ratio used as a measure of short-term liquidity position.

$FD_t$  = It is the financial depth at time  $t$  in Pakistan. Consistent with Bussoli and Marino, 2018, we used two proxies for financial depth namely private credit to GDP ratio (PC) and market capitalization to GDP ratio (MC).

Centered Trade Credit Received ( $CTCR_{it}$ ) =  $(TCR_{it} - \overline{TCR})_{it}$

Centered Short-term Bank Loans Used ( $CSBL_{it}$ ) =  $(SBL_{it} - \overline{SBL})_{it}$

Centered Financial Depth ( $CFD_t$ ) =  $(FD_t - \overline{FD})_t$

$\mu_{it}$  = Residual term for a firm  $i$  at time  $t$ .

### 3.4. Estimation method

In corporate finance research, endogeneity is a common problem that arises due to the existence of unobserved heterogeneity, omitted variables bias and simultaneity bias (Ullah et al., 2018). Pooled OLS, FE, and RE and the first difference GMM estimation techniques produce inconsistent and biased estimates in the presence of endogeneity (Murfin & Njoroge, 2015; Ullah et al., 2018). The first difference GMM estimator has poor finite sample properties and produces downward biased coefficients in the presence of heteroskedasticity (Blundell & Bond, 1998). In the presence of endogeneity, the system GMM two-step estimator produces more reliable estimates (Ahmad & Afza, 2018; Bussoli & Marino, 2018; Li, Zhou, Du & Zhao, 2018). Some earlier studies, for example, Davidson and MacKinnon (2004); Antoniou, Guney and Paudyal (2008) also established the superiority of the two-step version of system GMM



over the one-step. We suspected the existence of endogeneity due to the existence of unobserved heterogeneity of firms, omitted variables bias and simultaneity bias (Ahmad et al., 2017). Thus, due to the existence of causality between dependent and independent variables and peculiarity of the data set (Ahmad et al., 2017; Ahmad et al., 2018) we preferred the use of system GMM two-step. However, the standard errors produced by this estimator are biased downward. To overcome this problem we used a robust option while estimating Equations 1 to 4. Our scheme of regression analysis is consistent with one proposed by Ullah et al. (2018). We used 18 instruments including the first lag to eighth lag of trade payables and short-term bank loans used by LMFs.

## 4. Results and Discussion

Before estimating the regression models, we performed Cook's D test which showed that outliers are present in the data series. For reducing the effect of outliers in regression estimation, we winsorized the firm-level variables at 10 percentile at the lower end and by 90 percentile at the upper end. Further, to check the stationarity of the data series Harris-Tzavalis panel unit root test was performed and its results are reported in Table 1. We found that all variables are found stationary at the level.

### 4.1 Correlation analysis

For examining the strength of the relationship of TCS with financial characteristics of LMFs and FD, we performed Pearson pairwise correlation analysis. The results of correlation analysis reported in Table 2, show that firms' characteristics and financial depth are significantly associated with the trade credit distributed by LMFs to their customers. Coefficients of correlation of TCR and SBL with TCS are positive. It indicates that LMFs which use more TC and short term bank loans supply more TC to their customers. Further, the positive association of size, liquidity position and the level of inventory with trade credit distribution imply that large LMFs that have a good liquidity positions and a large stock of goods extend more TC to their customers. Whereas a negative association of sales growth and profitability with TCS establishes that growing and profitable LMFs supply less TC to their customers. Similarly, LMFs are found to use their market power in their favor and provide less TC.

Indicators of FD are negatively associated with TCS which establishes that the availability formal credit to customers of LMFs reduces the demand for TC. Correlation analysis also shows a weak association between independent variables except for GPM, PR and the indicators of FD. To confirm the degree of multicollinearity, we performed VIF analysis and its results are reported in Table 2. We suspected the problem of multicollinearity between GPM and PR due to the high correlation between them. We performed VIF test to check the severity of this problem and found

**Table 1:** Results of Harris-Tzavalis Panel Unit Root Test

Variable	Rho Statistics	Z	Order of Integration
TCS	0.5065	-14.1031***	0
TCR	0.3015	-13.2492***	0
SBL	0.6042	-6.3625***	0
GPM	0.5212	-5.4527***	0
SG	-0.0409	-44.0210***	0
PR	0.3010	-25.0108***	0
SIZE (Thousands Rs.)	0.4021	-17.9810***	0
INV	0.4678	-15.0231***	0
LIQ	0.3301	-21.9739***	0
PC	0.7405	-6.9906***	0
MC	0.9010	-12.0450***	0

\*\*\* Significant at 0.01 level, \*\* Significant at 0.05 level; \* Significant at 0.10 level. N= 4480

Source: Author's computation.

TCS, trade credit supplied; TCR, trade credit received; SBL, short-term bank loan used; GPM, gross profit margin; SG, sales growth rate; PR, profitability; SIZE, size of a firm; INV, stock-in-trade; LIQ, liquidity; PC, private credit to GDP ratio; MC, market capitalization to GDP ratio

VIF value for these variables less than 4. It allows that the use of both variables in a single regression will not create a severe multicollinearity issue. Thus, Similar to Niskanen, and Niskanen (2006) and, Khan, Tagar and Bhutto (2012) we used GPM as a proxy for the market power of LMFs and Net operating profit before interest & depreciation minus taxes as a measure of profitability (PR) that also shows the ability of a firm to generate surplus operating cash flows.

The results show the presence of collinearity between the indicators of FD. Results of VIF analysis further strengthen the findings of correlation analysis. To control the multicollinearity problem we estimate regression models by considering one indicator of FD (depth financial institutions or depth of financial market) at a time.

## 4.2 Regression analysis and discussion

For the investigation of the relationship between CR and FD, we performed hierarchical multiple linear regressions analysis of Equations 1 to 4. The results of the two-step System GMM are reported in Table 3. Equation 1 is estimated to examine

Table 2: Results of Correlation Analysis

Variable	TCS	TCR	SBL	GPM	SG	PR	SIZE	INV	LIQ	PC	MC
TCS	1.000										
TCR	.305***	1.000									
SBL	.198***	.34***	1.000								
GPM	-.072**	-.218***	-.315***	1.000							
SG	-.160	-.246***	-.160***	.176***	1.000						
PR	-.151***	-.354***	-.354***	.692***	.164***	1.000					
SIZE	.295***	.232***	.518***	-.354***	-.225***	-.265***	1.000				
INV	.219***	.289***	.269***	-.124***	-.121***	-.160***	.279***	1.000			
LIQ	.282***	-.227***	-.240***	.282***	-.023***	.301***	-.016	-.140***	1.000		
PC	-.052***	.031	.024	.022	.122***	.055***	.002	.051***	-.006	1.000	
MC	-.061***	0.024	.013	.014	.130***	.071***	-.008	.036*	.005	0.901***	1.000
VIF		3.59	1.65	2.20	1.19	2.10	2.79	1.15	1.45	7.59	9.98
1/VIF		0.278	0.606	0.454	0.840	0.476	0.358	0.869	0.689	0.131	0.100
Mean VIF		1.89									

\*\*\*Significant at 1 %, \*\*Significant at 5 %, \*Significant at 10 %,

TCS, trade credit supplied; TCR, trade credit received; SBL, short-term bank loan used; GPM, gross profit margin; SG, sales growth rate; PR, profitability; SIZE, size of a firm; INV, stock-in-trade; LIQ, liquidity; PC, private credit to GDP ratio; MC, market capitalization to GDP ratio

the effect of TCR on TCS. Financial characteristics of LMFs, such as SBL, GPM, SG, PR, SIZE, INV and LIQ are included in the baseline model as control variables. To examine the direct effect of FD, we regressed Equation 2. For investigating the moderating role of FD we estimated Equations 3 and 4. For establishing the role of FD, this study used its two measures i.e. private credit to GDP ratio (PC) and market capitalization to GDP ratio (MC). The high degree of association between PC and MC and VIF test establishes that a multicollinearity problem is likely to arise if both PC and MC are regressed in a single model.

To control the problem of multicollinearity, we estimated the set of Equations 2, 3 and 4 first with PC and then with MC. Among the diagnostic tests, the results of the Wald test show that estimated coefficients are jointly significant at the 0.01 level. Hansen's  $J$ -statistic and absence of 2<sup>nd</sup> order serial correlation confirms the validity of instruments used in all models. The results of Eq.1 reported in Table 3 show a positive coefficient of TCR which is significant at 0.01 level. It implies that LMFs demand trade credit from the suppliers to finance their trade debtors.

The results support the hypothesis  $H_{a1}$  i.e. Trade credit received by LMFs has a positive effect on the TC supplied by them to their customers. Moreover, the findings are consistent with the maturity matching principle. Similar results were reported by some earlier studies (Ferrando & Mulier, 2013; Murfin & Njoroge, 2015). We found a positive but statistically insignificant relationship between SBL and TCS. It implies that SBL is not necessarily used by firms to finance their trade receivables. Thus, hypothesis  $H_{a2}$  is not accepted. The result reflects the reality of business practices of LMFs in Pakistan i.e. short-term bank loans are obtained by LMFs to finance their own operational needs rather than to finance their customers. Furthermore, as per trade customs in Pakistan, most of the firms buy and sell on credit. Alternatively, due to the slowdown of economic activity in Pakistan, firms facing liquidity constraints and are bound to buy and sell on credit. The results support the credit redistribution hypothesis which was presented by Meltzer (1960). Recently, Santos and Silva (2014) also established the credit redistribution by LMFs through trade credit. They reported that LMFs pass on a part of the trade credit to their customers.

Among the control variables GPM, PR, INV, and LIQ have a significant effect on TCS. The coefficient of GPM is positive but insignificant at 5%. It implies that LMFs which have the potential to earn more profit, allow more trade credit to their customers. An earlier study conducted by Niskanin and Niskanin (2006) also reported similar findings. The results support the price discrimination theory. This theory established that LMFs provide TC as a non-price competitive tool in a perfectly competitive market. The coefficient of sales growth is negative but insignificant at 5%. It implies that LMFs are not pursuing commercial motive through trade credit. Allen,

Table 3: Credit Redistribution and the Role of Financial Depth

Effect of Financial Depth									
Independent Variable Regression Equation	Exp. Sign	Baseline Model	Private Credit(PC)				Market Capitalization (MC)		
		Eq.1	Eq. 2	Eq.3	Eq.4	Eq. 2!	Eq.3!	Eq.4!	
TCR	+	0.186***	0.194***	0.173***	0.194***	0.197***	0.183***	0.197***	
		(0.062)	(0.063)	(0.061)	(0.063)	(0.064)	(0.062)	(0.064)	
SBL		0.013	0.014	0.012	0.013	0.013	0.012	0.013	
		(0.014)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	(0.013)	
GPM		0.105*	0.104*	0.098*	0.104*	0.101*	0.093*	0.101*	
		(0.057)	(0.056)	(0.055)	(0.057)	(0.057)	(0.054)	(0.058)	
SG		-0.012*	-0.009	-0.007	-0.009	-0.009	-0.006	-0.008	
		(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(0.006)	(.006)	
PR		-0.128***	-0.123***	-0.113***	-0.123***	-0.119***	-0.107***	-0.119***	
		(0.031)	(0.030)	(0.029)	(0.031)	(0.031)	(0.030)	(0.031)	
SIZE		0.004	0.003	0.005	0.003	0.003	0.004	0.003	
		(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	(0.007)	
INV		0.151***	0.161***	0.158***	0.161***	0.159***	0.156***	0.160***	
		(0.052)	(0.052)	(0.051)	(0.053)	(0.052)	(0.051)	(0.053)	
LIQ		0.063***	0.064***	0.062***	0.064***	0.064***	0.063***	0.064***	
		(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	
PC	-		-0.115***	-0.113***	-0.114***				
			(0.041)	(0.042)	(0.041)				
CTCR ×CPC	-			-1.015**					
				(0.437)					
CS- BL×CPC					-0.028				
					(0.167)				
MC						-0.075***	-0.076***	-0.075***	
						(0.024)	(0.024)	(0.024)	
CTCR ×CMC							-0.667***		
							(0.245)		

CSBL×C- MC								-0.021
								(0.094)
Constant		0.012	0.036***	0.037***	0.028***	0.028**	0.030**	0.028**
		(0.012)	(0.013)	(0.013)	(0.002)	(0.012)	(0.012)	(0.012)
AR(1) Serial correlation of 1st order		-4.48	-4.45	-4.32	-4.45	-4.47	-4.31	-4.46
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
AR(2) Serial correlation of 2nd order.		-0.94	-0.85	-0.74	-0.85	-0.75	-0.91	-0.75
		(0.349)	(0.397)	(0.459)	(0.396)	(0.450)	(0.364)	(0.450)
Hansen J statistic		313.14	318.22	315.78	317.69	317.26	313.45	316.83
		(0.424)	(0.332)	(0.353)	(0.325)	(0.346)	(0.388)	(0.337)
Wald chi2(9)		132.07	138.08	141.13	139.30	135.10	145.44	135.92
		(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

\*Significant at 10 %, \*\*Significant at 5%, \*\*\*Significant at 1 %

No. of Firms= 320; No. of observations= 4480; standard errors (robust to heteroskedasticity) are provided in parenthesis. Eq.2, Eq.3 and Eq.4, are estimated to examine the effect of PC. Eq.2! Eq.3! and Eq.4! are estimated to examine the effect of MC. TCS, trade credit supplied; TCR, trade credit received; SBL, short-term bank loan used; GPM, gross profit ratio; SG, annual growth rate of sales ; PR, profitability; SIZE, size of LMF; INV, inventory; LIQ, liquidity; PC, private credit to GDP ratio; MC, market capitalization to GDP ratio

Qian and Xie (2019) reported similar findings. The coefficient of PR is negative and significant at 1%. The findings establish that financially distressed companies supply more TC to their customers for increasing their sales. Similar findings are reported by Chod, Lyandres and Yang (2019).

The coefficient of inventory (INV) held by LMFs is positive and significant at 1 %. It shows that companies that have more inventory, provide more TC to their customers. Deloof and Rocca (2015) reported a similar relationship between INV and TCS. The results are supported by the complementary hypothesis of current assets. Further, a positive and significant coefficient for liquidity implies that highly liquid LMFs extend more TC to their customers. Due to a good liquidity position, these firms have lower liquidity risk and can afford to supply more credit to their customers. Similar findings were reported by Vaidya (2011).

#### 4.2.1 The direct effect of financial depth

The coefficients of both PC and MC in Equations 2 and 2<sup>1</sup> are negative and significant at 1%. It implies that with an increase in the FD, LMFs supply less TC to their customers. One possible explanation for the negative relationship of PC and

MC with TCS i.e. the growth in FD enhances the supply of formal credit to firms and consequently, they reduced the use of trade credit. Thus, findings support the hypothesis  $H_{3a}$  i.e. there is a negative effect of FD and TC supplied by LMFs. Results are consistent with the substitution hypothesis i.e. firms treat trade credit as a substitute for formal credit. Recently Andrieua et al. (2015); Bussoli and Marino (2018) also reported a negative relationship between FD and TCS.

#### 4.2.2 Moderating effect of financial depth

Equations 3 and 3' are estimated to investigate the moderating role of FD. The results show that the coefficients of interaction terms (CTCR  $\times$  CPC) and (CTCR  $\times$  CMC) are negative and significant at 1%. In the baseline model, the coefficient of TCR is positive which turns to negative after its interaction with PC and MC. It implies that an increase in FD reversed the direction of the relationship between TC received and TC supplied by LMFs. While the coefficients for the interaction terms (CSBC  $\times$  CPC) and (CSBL  $\times$  CMC) in Equations 4 & 4' are insignificant. The negative coefficients imply that the direction of the relationship between SBL and TCS is sensitive to the changes in FD. Thus, the findings support the hypothesis  $H_{a4}$  i.e. financial depth has a buffering impact on the CR by LMFs. However, for insignificant coefficients of interactions terms (CSBC  $\times$  CPC) and (CSBL  $\times$  CMC), we submit a clarification that firms use trade credit to finance their trading activities and raise SBL to finance their other operating activities. Overall findings of this study established the buffering effect FD on the CR by LMFs in Pakistan. Therefore, hypothesis  $H_{a4}$  is accepted. Moreover, our findings are consistent with the findings of earlier studies (Cull, Xu & Zhu, 2009; Couppey-Soubeyran & Hericourt, 2013; Andrieua et al., 2015; Bussoli & Marino, 2018).

## 5. Conclusion and Recommendations

Credit redistribution varies across the countries. It is more practiced by firms in countries that are less financially developed. Empirical evidence of the direct and moderating effect of FD on CR by firms is scarce. The purpose of this study is to provide evidence about the moderating role of FD in the redistribution of credit by listed firms in Pakistan. The results of the two-step System GMM estimator revealed that LMFs partially finance their trade receivables by trade payables. It implies that a part of TC received by LMFs from their suppliers is passed on to their customers. The results of moderating regression analysis show that FD is a quasi-moderator and buffer the CR by LMFs in Pakistan. It is established that the supply of private credit from financial institutions to firms, reduces their fiscal constrictions. Consequently, firms needless to depend on TC which is a costly source of short-term funds.

The findings of the study have implications for the credit manager of firms and financial policymakers countries that are financially less developed. The managers of firms should consider the impact of financial developments and revise their financial policies. Moreover, the monetary policymakers should take imitative for optimal credit distribution to large as well as small firms. For increasing the access of SMEs to the financial market, policymakers should develop a framework for their listing. Furthermore, to increase the demand for bank credit there is a need to reduce the transaction costs and undue formalities.

However, owing to some constraints and the limited scope of the study, we are afraid to generalize its findings and suggest the following questions for future research. *First*, on account of varying working capital requirements and financial constraints of small and non-listed firms, their trade credit redistribution behavior is likely to be different from the listed firms. For enhancing the understanding of the relationship between FD and CR by firms, future studies should emphasize small and non-listed firms. *Second*, instead of emphasizing the outcome indicators of financial policies, future studies should focus on the direct impact of financial policy interventions and financial reforms on the TC. *Third*, the use of TC is also observed in the service industry whose business dynamics are quite different from those of trading and manufacturing industries. With a due reservation, the findings of studies that focused on manufacturing and trading firms are not extendable to service firms Thus, there is a need to investigate the determinants of trade credit practices of service firms. *Fourth*, for developing a comprehensive understanding of differences in the dynamics of TC and consequences across industries, comparative studies should be conducted. *Fifth*, the business activities of firms across all countries are adversely affected by the global epidemic *i.e.* COVID 19. There is a need to investigate the effect of this global epidemic on operating, investing and financing activities of firms. Particularly, in the domain of trading activities, future studies should be designed to examine the effect of COVID 19 on the trade credit policies of firms.

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