

## **Behind the Veil: Unveiling the Mysteries of Net Trade Credit Determinants in the Cement Sector**

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### **Abstract**

This study presents a comprehensive investigation into the determinants of net trade credit within Pakistan's cement industry. It highlights the significance of net trade credit as a vital source of short-term external financing and explores various influencing factors. These factors include firm size, age, operating cash flow, export propensity, market share, liquidity, financial distress, inventories, bank finance, and sales growth. To investigate the determinants of net trade credit, this study employs data from the cement sector spanning from 2010 to 2021. Utilizing generalized least squares, fixed-effect, and random-effect model; the study identifies the fixed-effect model as the most appropriate. Notably, result reveals that smaller firms, those with lower market share, and newly established entities tend to invest less in trade credit. Conversely, higher levels of operating cash flow, liquidity, financial stability, export propensity, sales growth, bank finance, and inventory are associated with increased investment in trade receivables. These findings underscore the crucial role of these factors in shaping firms' financing strategies within Pakistan's cement industry.

**Keywords:** Net trade credit, External financing, Trade receivable, Firms competitiveness, Cement sectors

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## 1. Introduction

Finance is the lifeblood of any business organization, essential for its operations. Without adequate financial resources, businesses cannot function effectively. Firms have a variety of financing options available to them, which they choose based on their specific needs. These options include both external sources, such as bank credit, and internal sources, like retained earnings (Brealey et al., 2008). However, small firms often struggle to secure bank loans due to strict bank policies, especially regarding collateral. This challenge is particularly pronounced for non-financial firms. To address liquidity issues, companies often shift from loan to net trade credit (NTC) as an external source of financing (Chen et al., 2023; Pike et al., 2005). Trade credit, where suppliers extend credit to buyers facing financial difficulties, emerges as a convenient and efficient option. Small firms, in particular, rely on trade credit to meet their current asset and short-term financing needs. In trade credit arrangements, suppliers provide short-term loans to buyers, effectively serving as a current liability for the firm (Summers & Wilson, 2002; Huyghebaert, 2006).

Over the past few years, there has been a tendency among researchers to overlook the significance of trade credit. Nonetheless, trade credit plays a crucial role in helping firms mitigate financial distress, particularly when credit from traditional financial institutions is unavailable (Elliehausen & Wolken, 1993). Additionally, trade credit enables firms to reduce transaction costs associated with invoice processing (Ferris, 1981; Emery, 1987) and allows buyers to assess product quality before payment (Smith, 1987).

Pakistan, as a developing economy, faces numerous challenges. In Pakistan, many firms rely heavily on net trade credit, wherein a significant portion of transactions occurs on credit terms. Firms often purchase goods on credit from suppliers and settle payments after selling or deriving benefits from the goods. The demand for net trade credit surpasses that of other forms of short-term or long-term loans from banks in Pakistan. Consequently, net trade credit is widely regarded as a standard external financing mechanism for firms in the country, owing to its prevalent use in the business sector. Pakistan's cement industry stands as a cornerstone of the national economy, making substantial contributions to both exports and employment. Pakistan exports approximately 11 million tons of cement.

In light of this economic backdrop, net trade credit emerges as a vital resource for addressing the working capital and short-term financing needs of firms within the industry (Asif & Nisar 2023). The study explores the determinants of net trade credit (NTC) in Pakistan's cement industry, focusing on factors influencing short-term external financing. Factors such as firm-specific characteristics, financial indicators, inventory management, bank finance, and sales growth are examined. While numerous studies have delved into the determinants of net trade credit, the majority have been confined to developed countries. Understanding NTC provides insights into financing strategies, supplier relationships, and customer relationships. This research fills a gap in existing literature and contributes to a deeper understanding of trade credit dynamics within the Pakistani cement industry. Recognizing this gap, our study endeavors to shed light on the factors influencing net trade credit in developing countries. Moreover, our research aims to uncover the pivotal elements that drive net trade credit, including firms' access to external financing and their capacity to generate internal resources. By doing so, we seek to offer valuable insights into how firms in developing economies can effectively manage their net trade credit and bolster their financial resilience.

## 2. Literature Review

### 2.1. Theoretical Literature

A range of theories has emerged to explore the significance of net trade credit as a vital source of short-term financing. Among these theories, two prominent perspectives have been extensively discussed: the transactional cost theory and the financing advantage theory of trade credit. For instance, Mike Burkart and Tore Ellingsen introduced the In-Kind Finance theory in 2004 and the finance advantage theory, each offering distinct insights into the role of trade credit in corporate finance. The In-Kind Finance theory suggests that trade credit serves as a permanent form of finance, particularly crucial in emerging economies. It argues that suppliers may extend credit more liberally than banks due to the lower profitability of diverting inputs compared to cash. This perspective implies that trade credit and bank credit can either complement or substitute each other.

In contrast, the Financing Advantage theory posits that trade credit arises from financial market imperfections, such as information asymmetry, liquidity constraints, and financial distress. This theory suggests that suppliers may possess a relative advantage in obtaining evidence about buyers and efficiently liquidating assets (Asif & Nisar 2023). Consequently, it provides a comprehensive understanding of the motivations driving trade credit activity and its significance in corporate finance. Furthermore, the transaction cost theory (TCT), initially proposed by Ronald Coase in 1937 and refined by Oliver Williamson, emphasizes the role of trade credit in reducing transaction costs (Hazlett, 2009). Overall, these interconnected theories contribute to a comprehensive understanding of the drivers behind trade credit activity and its importance in corporate finance, that is visually illustrated in figure 1.

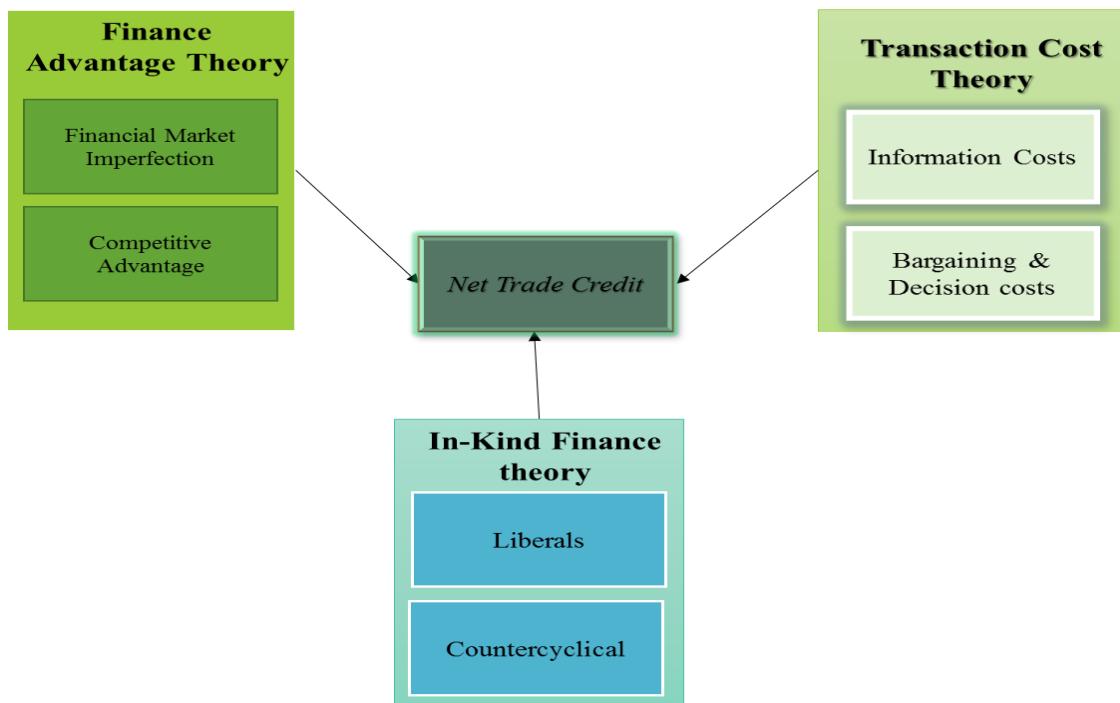


Figure 1: Conceptual Framework

## 2.2. Empirical Literature

Numerous researchers have explored the multifaceted determinants of trade credit, shedding light on the intricate dynamics that influence its allocation. For instance, Yazdanfar & Peter Öhman (2014) conducted the study reveals that NTC, firm size, age, and efficiency significantly impact sales growth, enhancing firm performance. Specifically, they observed a positive association between lagged firm sizes with sales growth, while firm age exhibited a

negative impact. By allowing consumers to buy products or services without immediate payment, trade credit considerably increases sales. This practice draws in more customers and encourages recurring business. This observation echoes Yazdanfar & Öhman (2016) discovery that higher accounts payable ratios are linked to reduced profitability in small & medium-sized enterprises (SMEs). Trade credit can boost sales income without requiring quick cash outflows. It can also draw in more customers and create demand, which can result in better sales volumes and possibly higher profitability (Chen et al., 2023). On the other hand, if accounts payable—the money a company owes suppliers for credit purchases—are not paid on time, they may incur interest or other fees. Lower profitability, decreased cash flow, and more expenses might result from misuse or poor management. Accounts payable must therefore be closely watched over and handled to prevent detrimental effects on profitability (Karakoç, 2023).

Building upon this research, Li (2011) delved into the determinants of trade credit, revealing a significant correlation between age and size of firm with NTC, alongside a direct relationship between profitability and trade payables levels. Concurrently, Pattnaik et al. (2020) ventured into investigating factors underpinning accounts receivable in the Malaysian manufacturing sector. Their findings illuminated a positive influence of firm size on trade credit, with larger enterprises displaying greater investment in accounts receivable compared to their smaller counterparts (Dohaiman, 2013).

The size of a company has a big influence on trade credit since bigger businesses can negotiate better terms with suppliers because they are more financially stable and have greater negotiating power (Zhou & Li, 2023). Their wide-ranging operations and clientele lead to increased sales figures and a stronger dependence on trade credit. Larger businesses are also able to invest more in accounts receivable management due to their more advanced credit management systems and resources, which improves cash flow, strengthens customer relationships, and improves financial performance.

Indeed, firm size emerges as a pivotal factor shaping access to short-term finance and the capacity to extend trade credit to clientele (Yazdanfar & Öhman, 2017). However, contrasting perspectives arise regarding the connection between firm size and trade credit. García & Solano (2010) & Arkink (2016) proposed a negative correlation, suggesting that larger firms may receive less trade credit due to their established credit capacity and reputation, other scholars argue for a positive association. Due to their established credit capacity and reputation - and because they can rely on internal finances or other funding sources - larger businesses may receive less trade credit. Nonetheless, other academics contend that there is a beneficial relationship between trade credit and business size, arguing that larger companies have greater negotiating power with suppliers and can use trade credit to improve their operational efficiency and financial situation.

Moreover, beyond firm size, nuanced considerations such as marketability and firm age intricately influence trade credit decisions (Petersen & Rajan 1997). Newer firms may leverage trade credit to establish market presence, whereas firms with entrenched market positions may exercise caution, extending less trade credit to customers (Tang & Moro 2020; Beuselinck & Deloof 2014). Additionally, factors such as profit, liquidity, and gross margin may exhibit minimal influence on trade credit allocation decisions (Paul & Boden 2014). Instead, broader contextual factors such as political influence, firm credit quality, and reputation emerge as key determinants shaping the creation of net trade credit (Yazdanfar & Öhman, 2017; Shiraishi and Yano, 2010).

### **2.3. Hypothesis Development**

This research endeavors to examine the factors that influence net trade credit (NTC) in the cement industry of Pakistan. Specifically, it focuses on variables like business age, size, market

share, investment, sales, and other control variables like bank finance and liquidity ratio. The analysis presented above serves as a foundation for this investigation. We put out the subsequent hypotheses:

$H_0$ : "The firm age, size, market share, investment and sale do not significantly determine the net trade credit of cement industry."

$H_1$ : "The firm age, size, market share, investment and sale significantly determine the net trade credit of cement industry."

### 3. Econometrics Technique

#### 3.1. Data Source

This study empirically explores the determinants of NTC within the cement industry listed on the Pakistan Stock Exchange (PSX). The data, sourced from annual financial reports spanning the period from 2010 to 2021, forms the basis of our analysis, shown in table 1.

**Table 1**  
**Variable's Description**

Variable	Variable Name	Variable Description
NTC	Net Trade Credit	Calculating by subtracting receivables and Payables
FA	Firm Age	Calculating by year of incorporation
FS	Firm Size	Calculating by subtracting assets and receivable
MKS	Market Share	Calculating by dividing firm sale over industry sale
INV	Investment	Calculating by dividing Inventories over assets
OCF	Operating Cash Flow	Calculating by subtracting depreciation and income tax from operating income over assets
SG	Sale Growth	Calculating by dividing current sale over minus previous sale over previous sale
EXPP	Export Propensity	1 = export; 0 = otherwise
DS	Firm Facing Distress	1 = Financial Distress ; 0 = otherwise
BF	Bank Finance	Calculating by additing short term and long term loan
LR	Liquidity Ratio	Calculating by dividing current assets over current liability

#### 3.2. Model Specification

In order to analyze the determinants of on the NTC we used the following model to estimate the results.

$$NTC_{it} = \beta_0 + \beta_1 Age_{it} + \beta_2 Size_{it} + \beta_3 MKS_{it} + \beta_4 INV_{it} + \beta_5 OCF_{it} + \beta_6 SG_{it} + \beta_7 EXPP_{it} + \beta_8 DS_{it} + \beta_9 BL_{it} + \beta_{10} LR_{it} + \varepsilon_{it} \quad (1)$$

In the equation provided, the dependent variable NTC signifies the net trade credit, computed as the disparity between receivables and payables. Age represents the number of years since the firm's incorporation, serving as an indicator of its longevity. Size denotes the firm's scale, typically measured by the number of employees. Market share (MSK) indicates the proportion of annual firm sales relative to industry-wide sales. INV illustrates the ratio of inventories to net assets. OCF denotes the ratio of operating income before depreciation and taxes to total assets. SG reflects the annual percentage change in sales. EXPP is a binary variable set to one for firms exporting products and zero otherwise. DS serves as a binary variable signifying financial distress.

BL represents the ratio of bank loans scaled by total assets. LR, measures the ratio of current assets to current liabilities.

### 3.3. Econometric Technique

#### 3.3.1. Cross-Sectional Dependence

The study uses four tests to examine the cross-sectional dependence of variables: Breusch and Pagan's LM, Pesaran's (2004; 2015), and Friedman's (1937). These tests ensure the reliability and validity of the results by detecting significant cross-sectional dependence. If significant dependence is detected, it suggests the observations are not independent across different units. If cross-sectional dependence is identified, the estimation can be obtained by using panel data techniques, such as fixed effects or random effects models.

$$CD = \sqrt{\frac{2T}{N(N-1)}} \sum_{i=1}^{N-1} \sum_{j=i+1}^N \hat{\delta}_{ij} \quad (2)$$

#### 3.3.2. Panel Heterogeneity

In panel data analysis, the presence of social and economic interconnections among firms can lead to cross-sectional dependence, potentially causing variations in slopes (Chen et al., 2022a; Musah et al., 2021). Subsequently, it becomes essential to ascertain whether the slope coefficient is uniform or varied, as overlooking this aspect could distort regression analysis and yield unreliable results. Hence, this study employs the homogeneity test of Pesaran & Yamagata (2008) to address this concern.

#### 3.3.3 Hausman test, Random and Fixed Effect Model

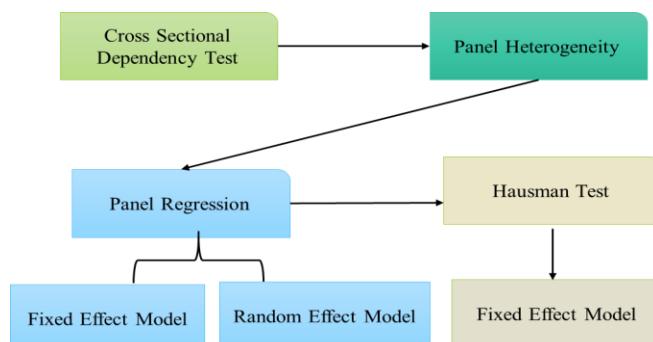
Random and fixed effect models are vital for estimating empirical relationships in panel data. Researchers favor these methods for their robustness against issues like heterogeneity, autocorrelation, and heteroscedasticity (Batrancea et al., 2022; Naqvi et al., 2023). In a fixed-effect model, varying intercepts are assumed across different groups or time periods, while a random effect model assumes differences in error variances. Determining the most suitable model between random and fixed effects can be challenging, but the Hausman test (1978) simplifies this process. The equations for FEM, REM, and the Hausman test (1978) are as follows:

$$Z_{it} = (\delta + \epsilon_i) + X_{it}'\eta + \varepsilon_{it} \quad (3)$$

$$Z_{it} = \delta + X_{it}'\eta + (\xi_i + \varepsilon_{it}) \quad (4)$$

$$LM = (\eta_{LSDV} - \eta_{RandomL}) W^{-1} (\eta_{LSDV} - \eta_{RandomL}) \sim \chi^2 (k) \quad (5)$$

The methodological flowchart of the study is illustrated in figure 2.



**Figure 2: Methodological flowchart.**

## 4. Results and Interpretation

### 4.1. Descriptive Statistics

The table 2 displays the descriptive statistics results for firms within Pakistan's cement sector from 2010 to 2021. These statistics provide detailed insights into the data, including mean values, standard deviations, as well as minimum and maximum values.

**Table 2**

**Descriptive Analysis**

<b>Variable</b>	<b>Mean</b>	<b>Std. Dev.</b>	<b>Min</b>	<b>Max</b>
NTC	0.0121	0.0837	-0.3286	0.2542
FA	8.2717	1.3288	6.1223	10.609
FS	0.0665	0.1421	6.2145	0.9061
MKS	0.8364	6.0867	-2.1263	87.602
INV	37.033	15.253	16.857	78.486
OCF	0.0806	0.1029	-0.1821	0.9331
SG	223.28	3503.1	-99.864	6068.7
EX	0.3039	0.1722	0.6554	0.8604
DS	1.1698	0.7949	0.1462	5.5173
BL	11.203	30.119	-29.117	220.171
LR	0.3203	0.2759	0.0123	1.3742

Note: "NTC is Net Trade Credit, FA is firm age, FS is Firm Size, MKS is market share, INV is investment, OCF is operating cash flow, SG is sale growth, EXPP is export, DS is financial distress, BL is bank loan; and LR is liquidity ratio".

The results of descriptive statistics indicate that NTC has a mean of 0.012 and a SD of 0.084, firm age is 8.272, with a SD of 1.329, firm size has a mean of 0.067 and a SD of 0.142. Similarly, market share mean is 0.836, with an SD of 6.087, investment has a mean of 37.033, operating cash flow with a mean of 0.08 and a SD of 0.109.

### 4.2. Panel Heterogeneity Tests

The study used panel heterogeneity tests, specifically Tilde and Adjusted Tilde, to assess the homogeneity or heterogeneity of our panel dataset, with significant test statistics indicating heterogeneity.

**Table 3**

**Panel Heterogeneity**

<b>Variables</b>	<b>Tilde (with delta)</b>	<b>Adjusted Tilde (with delta)</b>
NTC	6.245***	8.487***
FA	5.124***	6.759***
FS	7.519***	4.201***
MKS	5.165***	6.525***
INV	8.262***	8.173***
OCF	6.384***	6.674***
SG	7.472***	2.075***
EXPP	6.249***	6.127***

DS	8.128***	5.126***
BL	6.626***	8.458***
LR	5.286***	9.128***

Note: "NTC is Net Trade Credit, FA is firm age, FS is Firm Size, MKS is market share, INV is investment, OCF is operating cash flow, SG is sale growth, EXPP is export, DS is financial distress, BL is bank loan; and LR is liquidity ratio." \*, \*\* and \*\*\* shows the significance of results at 10%, 5% and 1%, respectively.

#### 4.3. Test of Cross-Sectional Dependency (CSD)

Cross-Sectional Dependence (CSD) was assessed using Breusch-Pagan (LM) and Pesaran (CD) tests, revealing significant statistical results. These tests suggest that outcomes within panel entities are not independently drawn but rather influence each other's outcomes, as shown in Table 4.

**Table 4**  
**Cross Sectional Dependency**

Variables	LM Test	CD Test
NTC	25.142***	23.421***
FA	21.124***	18.276***
FS	19.276***	19.248***
MKS	11.457***	19.746***
INV	17.215***	18.754***
OCF	12.865***	21.742***
SG	10.271***	21.299***
EXPP	10.634***	10.285***
DS	11.249***	11.127***
BL	14.587***	15.148***
LR	13.987***	17.165***

Note: "NTC is Net Trade Credit, FA is firm age, FS is Firm Size, MKS is market share, INV is investment, OCF is operating cash flow, SG is sale growth, EXPP is export, DS is financial distress, BL is bank loan; and LR is liquidity ratio." \*, \*\* and \*\*\* shows the significance of results at 10%, 5% and 1%, respectively.

#### 4.4. Interpretation of GLS, FEM and REM

The results of model are estimating using the generalized least squares (GLS) model, FEM and REM are presented in table 5. The Hausman test was utilized to determine the optimal model, considering both fixed and random effects. The fixed effect model was chosen when the null hypothesis was rejected, while researchers opted for the random effect model when the null hypothesis was accepted over the fixed effect model.

**Table 5**  
**Estimation Results**

NTC	Panel A		Panel B		Panel C	
	Generalized Least Square Coeff.	p-value	Fixed Effect Model Coeff.	p-value	Random Effect Model Coeff.	p-value
FA	-.00417	0.005	0.018	0.047	-0.073	0.062
FS	-0.012	0.084	-0.017	0.008	0.024	0.247
MKS	0.009	0.000	1.628	0.055	0.029	0.059

INV	-0.002	0.036	-0.041	0.000	-0.01	0.596
OCF	0.695	0.009	0.035	0.075	0.054	0.010
SG	1.396	0.000	1.526	0.089	1.586	0.379
EXPP	0.138	0.000	0.051	0.002	0.087	0.102
DS	0.027	0.000	0.017	0.001	0.018	0.000
BL	-0.002	0.087	-0.005	0.842	-0.010	0.003
LR	0.092	0.000	0.008	0.634	.0397	0.026
C	-0.060	0.120	0.031	0.773	.0219	0.059

Note: "NTC is Net Trade Credit, FA is firm age, FS is Firm Size, MKS is market share, INV is investment, OCF is operating cash flow, SG is sale growth, EXPP is export, DS is financial distress, BL is bank loan; and LR is liquidity ratio." \*, \*\* and \*\*\* shows the significance of results at 10%, 5% and 1%, respectively.

The table presents the results of Generalized Least Squares in panel A. Similarly, Panel B shows the results of Fixed Effect Model, and panel 3 shows the results of Random Effect Model regressions. Across all models, the coefficient of firm size indicates a significant but negative impact on net trade credit. This suggests that smaller firms, with limited access to bank loans, rely more on supplier credit as a financing source, as they invest less in trade credit. In the FEM, firm size is statistically positive but insignificantly correlated with net trade credit, echoing the argument by Antov & Atanasova (2012) regarding small firms' reliance on supplier credit due to restricted bank loan access. Similarly, the coefficient of market share exhibits a negative and insignificant impact on net trade credit, indicating that market share does not drive net trade credit increase (Zhou & Li, 2023). This preference for bank loans despite market share implies a lack of external financing reliance. Moreover, both GLS regression and FEM show insignificantly negative correlation between market share and net trade credit, in line with Asif & Nisar, (2023) findings on less profitable firms relying more on supplier credit. The coefficient of inventory shows a positive and significant impact on net trade credit, indicating increased trade credit investment with higher inventory levels due to various associated costs. Furthermore, firm age exhibits a significant negative effect on net trade credit, suggesting that older firms, with established relationships, invest more in trade credit compared to newly established ones (Deloof & Jegers, 1996). OCF demonstrates a positive significant impact on NTC, as firms with positive OCF invest more in trade receivables.

Sale growth also shows a positive impact on NTC, albeit with a weak relationship, implying that high-growth firms invest more in accounts receivable (Long et al., 1993). Bank finance exhibits a significant impact on net trade credit, indicating financially unconstrained firms' tendency to finance customers, supporting the financial motive behind granting trade credit (Tang & Moro 2020). Liquidity has a significant influence on net trade credit, indicating that firms with healthy liquidity tend to invest more in trade receivables (Chen et al., 2023). Financial distress has a significant but negative impact on NTC, as distressed firms use higher NTC amounts due to a adverse association between financial distress and NTC (Arkink 2016). Export propensity also shows a significant and positive correlation with net trade credit, suggesting higher receivables for exporting firms compared to non-exporting ones.

## 5. Conclusion and Policy Recommendation

### 5.1. Conclusion

In conclusion, this study offers comprehensive insights into the determinants of NTC within the cement industry of Pakistan from the period of 2010 to 2021. It underscores the significance of net trade credit as a crucial source of short-term external financing for firms. The analysis reveals numerous factors influencing net trade credit, including firm size, age, operating cash flow, export propensity, market share, liquidity, financial distress, inventories, bank finance, and sales

growth. Utilizing generalized least square, fixed effect, and random effect models, we determined that the fixed effect model is the most appropriate for our analysis. Interestingly, while small-sized firms, those with lower market share, and newly established entities invest less in NTC, those with higher OCF, liquidity, financial stability, export propensity, sales growth, bank finance, and inventory levels tend to invest more in trade receivables. Consequently, these factors exhibit a positive and significant relationship with net trade credit, highlighting their importance in shaping firms' financing strategies within the cement industry of Pakistan.

### **5.2. Policy Implications**

Based on the findings, several policy recommendations can be suggested for enhancing net trade credit (NTC) within Pakistan's cement industry. First, given that higher export propensity is associated with increased investment in trade receivables. The government can implement policies aimed at promoting exports by providing export incentives and improve infrastructure. Second, the government can facilitate easier access to bank finance for smaller and newly established firms. This can be achieved through initiatives such as providing subsidized loans, creating special financing programs tailored to the needs of small businesses, or encouraging banks to offer more favorable credit terms to these firms. Third, government efforts to improve overall financial stability, such as implementing sound macroeconomic policies, and enhancing investor confidence, this can positively impact firms' willingness to invest in trade receivables. Last, the government can support capacity-building initiatives to enhance firms' financial management skills, credit management and receivables financing. This could involve providing training programs, technical assistance, and access to financial advisory services. Hence, government plays a crucial role in fostering an environment conducive to increased investment in trade credit within the cement industry. By implementing policies and initiatives, the government can create incentives for firms to invest in trade receivables, thereby improving their access to short-term external financing. This can support industry growth and development.

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