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Trade Credit, Business Group Affiliation, and Cash Holdings: Evidence from Bangladesh

This paper investigates the impact of trade credit on corporate cash holding. Based on the precautionary theory this study argues that firms with higher trade credit are likely to have greater cash holdings. Secondly, this study tests whether the nexus of trade credit and corporate cash holding varies between business group affiliated firms and standalone firms. To test the hypotheses, this study used a sample of 1002 firm-year observations for the period of 2011-2019. Ordinary Least Square (OLS) regression model is used to examine the hypotheses. Further, the two-step system Generalized Method of Moments (GMM) and Heckman two-stage self-selection are used to address possible endogeneity in our analysis. Consistent with the arguments this study finds that trade credit is positively and significantly associated with corporate cash holding. Second, cash holding is significantly lower for firms affiliated with business groups compared to standalone firms. The finding of the present study has important implications for working capital management in emerging markets where family firms and business group affiliated firms are dominant over standalone firms. Moreover, this study presents a unique feature of a developing market where trade credit financing is playing a significant role compared to external debt financing.

1. Introduction

The main impetus of this study lies in the fact that holding a large amount of unprofitable cash remains one of the major concerns for companies irrespective of the types of economies or market it functions (Nakajima and Sasaki 2020). Some studies have associated the large amount of cash holding with cash tunneling and agency problem of the management (Amess, Banerji, and Lampousis, 2015; Dittman and Mahrt-Smith, 2007), whilst other studies have shown increased cash holding to be attributed to the transaction cost and precautionary motives of the firm (Ozkan and Ozkan. 2004; Wu et al., 2012). An alternative to keeping a large amount of cash holding is to allow trade credit. Trade credit is increasingly being considered as a crucial source of finance and has the potential to address the large cash holding concern (Paul & Boden 2008; Ferrando & Mulier 2013; Cao et al., 2022). According to literature, firms in developed countries heavily use trade credit for short-term finance rather than holding large amounts of cash and institutional loan (e.g., Bartholdy and Mateus, 2008; Ranjan and Zingles, 1995; Petersen and Rajan, 1997).

The extant literature has investigated cash holding behavior in different institutional contexts examining the reasons, motives, theories, and institutional antecedents have been investigated heavily (La Rocca, Cambrea, & Cariola, 2017; Ozkan & Ozkan, 2004; Wang, 2012; Wasiuzzaman, 2014; Xiong, Zheng, An, & Xu, 2021). However, research on different types of organizational forms on firm's liquidity and trade credit policies remains limited (Nakajima and Sasaki, 2020). Previous literature suggests two contrasting views of the impact of firms' group affiliation on corporate cash holdings. The predominant view in corporate finance argues on the basis of agency cost. It suggests that group-affiliated firms holding more cash provide the managers (agents) with the opportunity to use it for their personal benefits at the cost of shareholders which is known as empire building. Moreover, the ownership structure in diversified firms results in a high level of information asymmetry between principal and agent which requires the company to hold more cash than the standalone firms to meet the agency cost (for detail see Jensen, 1986; Cai et al., 2016). In sharp contrast to this argument, the literature based on the precautionary view posits that diversified firms hold on average significantly lower cash than non-diversified firms. This allows firms to mitigate financing constraints (Cai et al., 2016; Duchin 2010; Nakajima & Sasaki 2020; Almeida et al., 2015; Buchuk et al., 2014). Thus, this study aims to address these research gaps by exploring the relationship between cash holdings and trade credit in a developing country context, with a focus on Bangladesh. It further examines the moderating role of business group affiliation in this relationship.

Emerging economies like Bangladesh offer a worthy research setting to study the nexus of trade credit and corporate cash holdings, as well as the moderating effect of business groups on this relationship, for two specific reasons. Firstly, prior literature shows that corporations are incentivized to hold cash in countries with weaker governance, weaker investor protection, and fewer opportunities for investment. Publicly listed firms in Bangladesh are characterized by family-dominated business groups, with more than fifty percent affiliated with such groups (Sobhan, Bose, Miah, & Razzaque, 2024). Recently, the Bangladesh Anti-Corruption Commission has investigated several allegations involving financial mismanagement, unreported earnings, and tax evasion against large business groups. This has raised question about the liquidity management and financing behavior the of large business-groups of Bangladesh.[1] Secondly, previous literature shows that cash holding motive is critical in emerging economies characterized by weaker regulatory environment. Existing literature does not hold conclusive evidence of the direction of association between cash holding and trade credit in developing and emerging economies (Cai et al., 2016; Mahmud et al., 2022). Thus, this study aspires to address the research gap by providing empirical evidence of the mentioned relationship.

Using data from the listed firms of Bangladesh over the period from 2011 to 2019 this study, finds that corporate cash holding is positively and significantly associated with trade credit. However, cash holding is significantly lower for firms associated with any of the business group compared to standalone firms. Next, to rule out such possibility of reverse causality between trade credit and cash holding we run Heckman two stage self-selection model, and our results remain hold after controlling self-selection bias. Our results do not vary either with the substitute measure of trade credit or with the alternative measure of cash holding.

This study has several theoretical and practical contributions. First, the evidence of this study contributes to the trade credit, liquidity policy, and business group

1. https://www.thedailystar.net/news/bangladesh/news/7-corporate-giants-barred-share-transfer- 3718446 [Accessed on 19 February 2025]

policy literature. The study provides evidence from the emerging economy, which offers a transitional and complicated institutional setting. The companies in Bangladesh cannot afford to step back from grabbing any opportunity to get back the growth momentum; cannot afford to take inefficient cash policies either. Very few studies have analyzed the relationship between trade credit and cash holding taking the case of developing and emerging countries. For instance, Cai, Zeng, Lee, and Ozkan (2016) analyzed business groups' influence on cash holding taking the case of a transitional economy but did not consider trade credit which is the most promising source of finance in countries with underdeveloped financial markets. Moreover, unlike prior studies, this study exclusively focuses on an interesting institutional setting where opportunity and challenges co-exist. Corruption, lack of infrastructural support, and a series of business scandals that have shaken the financial market wobbly for a nation, cash-holding trade credit, and internal capital market created by group affiliation can come as a point of rescue. This situation in Bangladesh is not unique, but rather common to many developing and emerging nations. Thus, the empirical evidence of this study does not only fill up the research gap but also serves as policy guidelines for those with similar institutional setups.

We structure our paper as follows. We present a review of relevant literature in Section 2. We demonstrate our research methods in Section 3. We display our results in section 4. Section 5 presents sensitivity analysis with alternative measures of trade credit and alternative measure of cash holding along with Heckman two stage self-selection analysis. Finally, we conclude our paper in Section 6.

2. Review of Relevant Literature and the Development of Hypotheses

2.1 Corporate Cash Holding

The amount of corporate cash holding is widely acknowledged as one of the most important working capital management decisions. Holding excess cash for suppliers may result in foregoing profitable investment and growth opportunities. Yet again, cash shortage may result in reputational damage, information asymmetry, and may increase default risk. Thus, the managers have to trade-off between excess cash holding and cash shortage and estimate an optimal level of cash needed in a certain period. An analysis by Deloitte LLP (2013) find that the S&P Global 1200 public non-financial companies held $ 3.53 trillion cash reserves.[2] Bates, Kahle and Stulz (2009) also documented a sharp rise of average cash-to-assets ratio for U.S. industrial firms from 1980-2006. Researchers have also documented macro-level and firm-level determinants of corporate cash holding behavior (Bagh, et al., 2021; Chen, Ye, Jebran, Majeed, 2020; Chang and Noorbakhsh, 2009).

In the last two decades numerous literatures explored and investigated the reason, motives, and theories behind why firms hold cash in a local, regional, and global context (e.g., La Rocca, Cambrea, & Cariola, 2017; Ozkan & Ozkan, 2004; Wang, 2012; Wasiuzzaman, 2014; Xiong, Zheng, An, & Xu, 2021; Miah & Bhuiyan, 2022; Khurana, Sharma, & Miah, 2024). A review of those literature reveals that among the various motives which drives companies to hold more cash under different institutional and cultural context,[3] the agency, precautionary, and transaction motives have been cited the most. Agency motive argues the potential misuse of holding excess cash by self-interested managers for their own private benefits, which is not aligned with the firm's interest (Amess et al., 2015). Whereas agency motive emphasizes the cost of holding excess liquid, transaction motive and precautionary motive advocates for holding more liquid. Transaction

2. The Cash Paradox: How record cash reserves are influencing corporate behavior" at https://www2.deloitte.com/us/en/pages/finance/articles/cfo-insights-cash-paradox-corporate-behavior.html

3. The agency motive, the transaction cost motive, the precautionary motive, tax motive, financial constraint motive, diversification motive, and the product market competitiveness motive (Amess, Banerji, and Lampousis, 2015; Dittmar, 2003; Keynes 1936, Jensen 1986; Almeida, 2004; Chen et al., 2014; Duchin, 2010).

motive from a financing lens addresses that in case of cash shortage from internal finding sources, firms can avail external sources which involves higher transaction costs (Ozkan and Ozkan. 2004; Wu et al., 2012; Islam, Miah, & Fakir, 2015), thus firms should hold more cash to avoid the higher transaction cost involved with external financing. The precautionary motive states that firms hold more cash to avoid uncertainty, disruption, and external shocks to their future finances. According to this approach, the existence of information asymmetry between firms and its stakeholders makes external funding more expensive compared to internal funding. Therefore, firms accumulate more cash to avoid the cost of information asymmetry, the risk of default and uncertainties surrounding the timely payment to suppliers as well as to finance growing investment opportunities in case of rising cost of external funding (e.g., Opler, Pinkowitz, Stulz, and Wlliamson, 1999).

2.2 Trade Credit and Corporate Cash Holding

According to World Bank around 80% to 90% of the global trade occurs on credit.[4] Globally, trade credit is an important source of short-term financing for small and large firms (Peterson and Rajan, 1997). Barrot (2016) documented that the aggregate amount of trade credit is thrice the amount of bank loan and 15 times the amount of financial credit. Trade credit allows the firms to sell on credit to its customers (accounts receivables) and purchase on credit (accounts payable), where firms do not require to make immediate payments. Trade credit mutually benefits customers and suppliers in a supply chain through the benefits of forward and backward linkage financing. According to Chittender and Bragg (1997), the economic benefits for using trade credit occurs through minimizing the cost of holding excess working capital and minimizing cost of financing through external sources; and the administrative reasons for offering trade credit provisions aims at minimizing risk and subsequent cost of default through assurance of repayment. Similar to corporate cash holding discussed in section 2.1, trade credit also accounts for a significant portion of firm's working capital and financing decision. Though cash and trade credit both complement each other and they jointly determine the liquidity position and internal financing options for firms, there is only few studies examining the relationship between cash holding and trade credit.

Zhang (2020) explores the cash flow sensitivity and trade credit over a period of four decades (1971-2014) on 76,860 firm-year observations from U.S listed firms. Drawing on the existing theories Zhang (2020) conducted OLS panel regression on trade credit and cash holding. The results find a strong positive effect of cash on annual changes in trade credit which supports their argument that trade credit and corporate cash holding decisions complement each other. Additional evidence suggests that product market competition measured by financial strength, market power, and relationship specific investments moderates this sensitivity.

In the same strand, Wu, Rui, and Wu (2012) investigates the effect of financial deepening on the cash holding and trade credit relationship in 1626 Chinese listed firms between 1999-2009. They differentiated the effect of accounts receivable and accounts payable on cash holding behavior of the firm. Wu et al., (2012) finds that asymmetric information between suppliers and firm insiders causes the firm to hold more cash when trade credit increases. However, additional analysis finds that in a strong financial market with easier access to finance, shorter fund processing time and lower financial costs firms reduce their cash holding with increased substitution with trade credit.

4. The Challenges of Trade Financing", World Trade Organization, at https://www.wto.org/english/thewto_e/coher_e/challenges_e.htm

Based on the extant literature examining the link between trade credit and cash holdings, this study argues that a positive relationship exists between trade credit and cash holdings. According to the transaction cost theory and precautionary theory, firms operating in countries with weak governance, underdeveloped capital markets, and high information asymmetry between insiders and external stakeholders face higher costs of external financing. To mitigate transaction costs arising from information asymmetry, firms tend to hold higher levels of cash and rely on trade credit to meet working capital obligations. Furthermore, firms in Bangladesh mitigate information asymmetry risks by maintaining precautionary cash reserves. Given that Bangladesh's corporate structure is dominated by family-owned firms, features weak capital markets, and exhibits significant information asymmetry (Batten et al., 2014; Mahmud et al., 2022), this study concludes that firms are likely to hold more cash as trade credit increases to avoid rising external financing costs and cash shortages.

Hypothesis 1: ***Trade credit is positively associated with the corporate cash holdings.***

2.3 Business Group Affiliation, Trade Credit, and Cash Holding

Extant literature argues that due to several advantages, primarily, financing advantage as well as transaction cost advantage, firms prefer to finance from backward or forward linkages (Peterson and Rajan, 1999). This argument has stimulated a number of studies on the impact of business group affiliation on different business decisions expanding from developed to developing countries (Cai, Zheng, Lee, and Ozkan, 2016; Khanna and Palepu, 2000a; Khanna and Rivkin, 2001). Firms affiliated with business groups may exercise comparative advantage over non-business group affiliated firms. Literature suggests that business group affiliated firms can influence firms' liquidity strategy within the affiliated groups in multiple ways. First, Business groups can benefit from internal sourcing of funds rather than using external sources. Second, business groups can pool funds from their affiliated firms and relocate funds to profitable projects. Third, business groups can benefit from shared risk within its affiliated groups (Cai et al., 2016; Khanna, and Yafeh, 2005). Fourth, business groups develop extended networks and forward and backward business ties which helps them mitigate the precautionary demand for cash and permits them to hold less cash on hand (Nakajima and Sasaki, 2020). In addition to providing internal funding through affiliated firms', business groups can also enjoy higher credit worthiness and reputation to external fund providers (Locorotondo, et al., 2014).

Deloof and Jegers (1995), using a sample of 946 large non-financial firms, also find that holding groups extend their trade credit more to their affiliated firms. Deloof and Jegers (1996) find significant effects of group membership on the trade policy in Belgium. They found that firms that are members of a business group enjoy the privilege to extend credit for a longer time within their member firms. Nakajima and Sasaki (2014) investigated the effect of horizontal business group affiliation in cash holding. Based on Japanese firms listed between 2004 and 2014, they find that business group affiliated firms can efficiently mitigate uncertainties surrounding their future cashflows through extending business ties with their suppliers. Therefore, Japanese business group affiliated firms hold less cash. Building on the trade credit and cash holding theories and evidence from existing literature we argue that business affiliated firms will have the ability to extend trade credit and hold less cash. Considering the above literature we estimate the following hypothesis.

Hypothesis 2: ***The nexus of trade credit and corporate cash holding is moderated by the firm's affiliation with business group.***

3. Research Methods

3.1 Sample, and data

Our sample consists of all non-financial listed companies in Bangladesh. Our data sample covers the period of 2011 to 2019. We started in 2011 as Bangladesh Securities and Exchange Commission (BSEC) institutionalized corporate governance code compliance from 2011. Moreover, several companies were not publishing their annual reports on public outlets (e.g., websites) that could limit our sample. Considering the corporate governance (CG) guidelines and data availability we started from 2011, and we cover periods up to before COVID-19 to have finer impacts between trade credit and corporate cash holdings as prior research shows that the global pandemic has affected liquidity position of the publicly listed companies (e.g., Chung, Jhang and Ryu, 2023). We collect data from multiple sources. For instance, governance and board data are manually collected from the annual reports of the sample companies. Initially we collect firm fundamentals from COMPUSTAT, and missing data, for sample companies in COMPUSTAT, are collected from the annual reports. We keep observations for which data are available to compute both trade credits and corporate cash holdings. Our final sample consists of 1002 firm-year observations spanning the 2011 to 2019 period. To reduce the impact of outliers we winsorise all continuous variables at 1 and 99 percent. Table 1 shows the detailed sample derivation procedure.

Table 1: Sample Distribution

Panel A: Sample selection

Initial firm -year observations	1902
Less: Observations under utilities and financial sectors	(720)
Less: Observations with lack of necessary data	(180)
Final sample for analysis	1002

Panel B: Sector-wise sample

Industry	N	%	Cumulative (%)
Ceramics and Cements	97	9.68	9.68%
Engineering	178	17.76	27.45%
Food and Allied	87	8.68	36.13%
Fuel and Power	106	10.58	46.71%
IT and Services	97	9.68	56.39%
Miscellaneous	70	6.99	63.37%
Pharmaceuticals	149	14.87	78.24%
Tannery	35	3.49	81.74%
Textile	183	18.26	100%
Total	**1002**	**100%**	

3.2 Research design

We estimate the following regression models to test our conjectures following prior research (e.g., Wu et al., 2012; Zhang, 2020)

$$CASH_{i,t} = \beta_0+\beta_1 TRADECREDIT_{i,t}+\beta_2 SIZE_{i,t} +\beta_3 LEV_{i,t}+\beta_4 NWC_{i,t}+\beta_5 MBRATIO_{i,t}+\beta_6 CAPEX_{i,t}+\beta_7 OCF_{i,t}+\beta_8 DIVIDEND_{i,t}+\beta_9 SPN\_OWN_{i,t}+\beta_{10} GOV\_OWN_{i,t}+\beta_{11} FIN\_DISTRESS_{i,t}+\beta_{12} SIZE\_BOD_{i,t} + \beta_{13} SIZE\_AC_{i,t} + \beta_{14} BIND_{i,t} + \beta_{15} DUALITY_{i,t} + \beta_{16} ROA_{i,t} + \beta_{17} RND_{i,t} +\beta_{18} GROWTH_{i,t}+\beta_{19} FAGE_{i,t} + INDUSTRY, YEAR\ Dummies_{i,t}+\varepsilon_{i,t} \quad \text{..... Eq. (1)}$$

To test our second hypothesis (H2) regarding the moderating effect of Business Group on the relationship between cash holdings and trade credit, the following regression model is estimated:

$$CASH_{i,t}=\beta_0+\beta_1 TRADECREDIT_{i,t}+\beta_2 BGRP_{i,t} + \beta_3 BGRP*TRADECREDIT_{i,t} + \beta_4 SIZE_{i,t} + \beta_5 LEV_{i,t} + \beta_6 NWC_{i,t} + \beta_7 MBRATIO_{i,t} + \beta_8 CAPEX_{i,t} + \beta_9 OCF_{i,t} + \beta_{10} DIVIDEND_{i,t}+ \beta_{11} SPN\_OWN_{i,t} + \beta_{12} GOV\_OWN_{i,t} + \beta_{13} FIN\_DISTRESS_{i,t} + \beta_{14} SIZE\_BOD_{i,t} + \beta_{15} SIZE\_AC_{i,t} + \beta_{16} BIND_{i,t} + \beta_{17} DUALITY_{i,t} + \beta_{18} ROA_{i,t} + \beta_{19} RND_{i,t} + \beta_{20} GROWTH_{i,t} + \beta_{21} FAGE_{i,t} + INDUSTRY, YEAR\ Dummies_{i,t} + \varepsilon_{i,t} \quad \text{......Eq. (2)}$$

Where CASHit is firm's level of corporate cash holding which is measured in three different ways following prior research (Marwick, Hasan, and Luo, 2020; Mahmud et al., 2022). The first measure of cash holdings such as, *CASHTA*, which is measured as the ratio of total cash and cash equivalents and short-term investment to total assets. The second measure of cash holding *(CASHNA)* which is measured as the ratio of total cash to net assets and third measure of cash holding which is measured as the natural log of total cash holding to net assets *(LnCASHNA)*. Our variable of interest is trade credit. We use three different measures of trade credit financing following prior research (Baker et al., 2020; Cao et al. 2022; Mahmud et al., 2022) and two additional measures to ensure robustness in our trade credit measures. Control variables are taken from prior relevant literature and definitions of all variables are given in appendix.

4. Results

4.1 Descriptive Statistics

Table 2 presents descriptive statistics. The mean (median) value of cash holding *(CASHTA)* is 0.092 (0.034) and the mean value of cash holding *(CASHNA)* is higher under second measure which is based on total net assets (with a mean of around 13.10%). Regarding trade credit measures, we find that, on average, the average trade credit proportion is more than 8 percent. More importantly, when we sum receivables with accounts payable, we find that more than 62 percent of firms have trade credit. 28.7 percent trade credit comes from accounts payable where more than 12 percent of trade credit comes from accounts receivable implies that greater level of trade credit generates from selling more products on credit. We also find that more than 50 percent firms are affiliated with any of the business groups in Bangladesh which is identical with prior research (Muttakin et al., 2017).

We present correlation statistics at Table 3. We find that cash holding (all three measures) is positively and significantly associated with trade credit (in all measures) which is consistent with our hypotheses. The results suggest that those firms finance through trade credit require a greater level of cash holding to extend their financing towards both suppliers (accounts payable) and their customers (account receivables). Next, we find that cash holding is negatively correlated with the measure of business group which indicates that firms associated with any of the business groups need lower cash holding consistent with prior business group literature (Locorotondo, Dewaelheyns & Hulle, 2014; Nakajima & Sasaki, 2020). Firm size (SIZE) is found to be positively connected with the corporate cash holding which implies that the larger organizations hold a greater level of cash to support their short-term and long-term financing needs or to support as working capital. We also find that firms with greater external debt - are more likely to hold a greater level of cash which may indicate the necessity of a greater cash level to pay their installments for both short-term and long-term loans. All other control variables are positively associated with cash holding measures. However, we find that corporate cash holding measures are negatively associated with the likelihood of financial distress which indicates that problematic firms will have lower cash holding as they struggle to survive in the market.

Table 2: Descriptive Statistics

Variables	N	Mean	Median	S.D.	p25	p75	p90	min	max
CASHTA	1002	0.092	0.034	0.125	0.009	0.124	0.283	0.000	0.534
CASHNA	1002	0.131	0.035	0.221	0.009	0.141	0.394	0.000	1.139
LNCASHNA	1002	0.108	0.035	0.162	0.009	0.132	0.332	0.000	0.760
TCREC	1002	0.121	0.064	0.130	0.018	0.199	0.389	0.002	0.389
TCRECR	1002	0.084	0.040	0.094	0.012	0.134	0.282	0.001	0.282
TCR_CHANNEL	1002	0.626	0.180	2.242	0.084	0.385	0.754	0.000	17.334
TCP	1002	0.287	0.165	0.438	0.081	0.326	0.562	0.000	2.909
BGRP	1002	0.569	1.000	0.495	0.000	1.000	1.000	0.000	1.000
SIZE	1002	8.029	7.971	1.670	6.942	9.115	10.275	4.524	11.835
LEV	1002	0.496	0.482	0.248	0.339	0.658	0.809	0.030	0.908
NWC	1002	0.040	0.042	0.216	-0.076	0.167	0.303	-0.565	0.533
MBRATIO	1002	3.854	1.841	6.276	0.917	3.801	8.606	-0.960	38.596
CAPEX	1002	0.046	0.021	0.062	0.002	0.065	0.130	0.000	0.312
OCF	1002	0.063	0.048	0.097	0.006	0.108	0.190	-0.168	0.373
DIVIDEND	1002	0.640	1.000	0.480	0.000	1.000	1.000	0.000	1.000
SPN_OWN	1002	39.902	42.565	20.176	26.000	54.730	70.590	4.770	70.590
GOV_OWN	1002	0.052	0.000	0.174	0.000	0.000	0.038	0.000	0.763
FIN_DISTRESS	1002	-4.065	-4.362	0.989	-4.597	-3.801	-2.989	-5.541	0.652
SIZE_BOD	1002	7.805	8.000	2.481	6.000	9.000	11.000	4.000	20.000
SIZE_AC	1002	3.755	4.000	0.941	3.000	4.000	5.000	2.000	9.000
BIND	1002	0.240	0.218	0.110	0.182	0.286	0.400	0.000	0.909
DUALITY	1002	0.023	0.000	0.150	0.000	0.000	0.000	0.000	1.000
ROA	1002	0.051	0.036	0.066	0.013	0.077	0.145	-0.123	0.280
RND	1002	0.000	0.000	0.002	0.000	0.000	0.000	0.000	0.013
GROWTH	1002	0.093	0.064	0.302	-0.033	0.168	0.355	-0.675	1.819
FAGE	1002	2.598	2.833	0.899	2.079	3.296	3.497	0.000	3.761

Table 3: Correlation coefficients

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26
CASHTA	1	1																								
CASHNA	2	0.97	1.00																							
LNCASHNA	3	0.99	0.99	1.00																						
TCR_REC	**4**	**0.25**	**0.24**	**0.24**	**1.00**																					
TCR_RECR	**5**	**0.22**	**0.21**	**0.22**	**0.94**	**1.00**																				
TCR_CHANNEL	**6**	**0.17**	**0.15**	**0.16**	**0.27**	**0.25**	1.00																			
TCP	**7**	**0.07**	**0.06**	**0.07**	**0.25**	**0.22**	0.92	1.00																		
BGRP	8	-0.27	-0.28	-0.27	-0.09	-0.01	-0.16	-0.15	1.00																	
SIZE	9	0.16	0.14	0.15	0.15	0.10	0.22	0.21	-0.03	1.00																
LEV	10	0.02	0.03	0.02	0.27	0.34	0.15	0.07	0.06	0.04	1.00															
NWC	11	-0.29	-0.30	-0.29	-0.38	-0.39	-0.05	0.09	0.03	-0.08	-0.54	1.00														
MBRATIO	12	0.19	0.21	0.20	-0.01	-0.01	-0.06	-0.14	-0.09	-0.15	0.21	-0.17	1.00													
CAPEX	13	0.02	0.00	0.01	-0.05	-0.07	-0.12	-0.15	-0.06	0.15	-0.04	-0.13	0.00	1.00												
OCF	14	0.34	0.33	0.34	0.08	0.01	-0.06	-0.16	-0.23	0.09	-0.08	-0.16	0.25	0.14	1.00											
DIV	15	0.25	0.22	0.24	0.14	0.12	0.05	-0.02	0.01	0.26	0.00	-0.15	0.08	0.20	0.21	1.00										
SPN_OWN	16	0.06	0.05	0.05	-0.01	-0.02	-0.26	-0.33	0.18	0.04	0.10	-0.21	0.17	0.10	0.23	0.23	1.00									
GOV_OWN	17	0.25	0.23	0.24	0.26	0.23	0.36	0.35	-0.34	0.37	0.12	-0.06	-0.05	-0.06	0.00	0.15	-0.50	1.00								
FIN_DISTRESS	18	-0.19	-0.18	-0.19	0.05	0.02	-0.01	0.05	0.04	-0.04	0.37	-0.04	-0.12	0.00	-0.27	-0.17	-0.23	0.29	1.00							
SIZE_BOD	19	0.13	0.13	0.13	0.14	0.13	0.06	0.03	-0.19	0.37	0.15	-0.24	0.02	0.07	0.12	0.14	0.16	0.28	0.12	1.00						
SIZE_AC	20	0.08	0.09	0.09	0.02	0.01	0.00	-0.04	-0.07	0.21	0.04	-0.10	0.08	0.04	0.19	0.15	0.23	0.02	-0.10	0.24	1.00					
BIND	21	0.01	0.01	0.01	0.04	0.02	-0.01	0.03	-0.09	-0.06	0.03	0.00	-0.04	0.00	-0.01	-0.15	-0.11	0.02	0.02	-0.22	0.00	1.00				
DUALITY	22	-0.06	-0.05	-0.05	-0.05	-0.05	-0.03	-0.04	0.07	-0.04	0.05	-0.03	0.10	-0.05	-0.05	0.00	0.07	-0.05	0.04	-0.01	-0.09	-0.09	1.00			
ROA	23	0.39	0.38	0.39	-0.05	-0.15	-0.11	-0.17	-0.32	0.21	-0.27	0.04	0.31	0.17	0.61	0.24	0.25	-0.02	-0.53	0.09	0.18	-0.02	-0.07	1.00		
RND	24	0.02	0.00	0.01	-0.10	-0.11	-0.03	-0.03	0.02	0.04	-0.15	0.05	-0.07	0.14	0.02	0.10	-0.11	-0.04	-0.04	-0.06	-0.01	0.03	0.06	0.04	1.00	
GROWTH	25	0.00	0.00	0.01	-0.07	-0.07	-0.04	-0.07	-0.07	0.03	0.01	-0.01	0.02	0.12	0.06	0.03	-0.01	-0.02	0.01	0.01	-0.01	0.00	-0.01	0.12	0.00	1.00
FAGE	26	0.00	0.02	0.01	0.02	0.10	0.02	-0.06	-0.01	-0.19	0.25	-0.08	0.19	-0.20	-0.03	0.02	-0.01	-0.10	-0.06	0.00	0.01	-0.03	0.04	-0.06	0.00	-0.02	1.00

4.2 Main Test Results

We demonstrate our main test results regarding the link between credit and corporate cash holding in Table 4. We use three different measures of cash holding including *CASHTA, CASHNA, LNCASHNA* and three different measures of trade credit *(TCREC, TCRECR,* and *TCR_CHANNEL).* For example, the first measure of trade credit (TCREC) is the ratio of total accounts receivable to the firm's total sales revenue in the current period. To remove the possibility of outlier in data distribution we use second measure of trade credit *(TCRECR)* as natural logarithm of one plus the ratio of account receivables to total sales revenue following Cao et al., (2022). As prior research shows that only account receivables or only accounts payable can provide distorted results because a firm may enjoy trade credit financing from his suppliers (accounts payable), and he/she can extend trade credit financing to his/her customers (account receivables). To mitigate such limitations, we take our third measure *(TCR_CHANNEL)* where we combine both account receivables and accounts payable and then we compute its proportion to total sales revenue of the firm. We show the results of three measures of tread credit on first measure of cash holding *(CASHTA)* in the first three columns (1-3) of Table 4. We find that the coefficient of trade credit *(TCREC)* is positive and statistically significant with corporate cash holding, which implies that firms, financed through accounts receivables (with customers), are likely to hold a greater level of cash which is consistent with our hypothesis. We also find that our second measure of trade credit, with log transformation, also showing positive coefficient with the cash holding *(CASHTA)*. When we combine both accounts receivable and accounts payable, we also find that the coefficient is highly positive and statistically significant at 1 percent level. In sum, our results indicate that trade credit is positively associated with the firm's cash holding level. Columns 4-6 shows the regression results of trade credit (three measures) with the second measure of cash holding *(CASHNA)*. The coefficients of all three trade credit measures *(TCREC, TCRECR, TCR_CHANNEL)* are highly positive and statistically significant at 1 percent level with corporate cash holding (CASHNA) which suggests that alterative measure of cash holding does not change its relationship between trade credit and cash holding. Columns [7-9] show the results of trade credit with the third measure of cash holding and we find that the coefficients of all three measures of trade credit show positive signs with the cash holding and they are statistically significant at the 1 percent level. In sum, we can infer that the relationship between trade credit and corporate cash holding is direct, and it does not vary with alternative measure of either cash holding or trade credit. When we focus on control variables, we find that the firm size has less impact on cash holding. However, we find that cash holding is negatively associated with the proportion of long-term debt to total assets *(LEV)* in all models [col 1-9], and capital expenditure ratio *(CAPEX)*. However, cash holding is positively associated with the likelihood of paying cash dividend *(DIVIDEND)* in the current period implies that those firms paying higher dividend are more likely to hold more cash in the business. Surprisingly firms, with higher government ownership *(GOV_OWN),* are found to have more cash and cash equivalents which gives us further impetus to do another research on government owned organizations. In addition, cash holding is positively associated with the firm's profitability (measured through *ROA*), which suggests that highly profitable firms hold greater cash compared to less profitable firms. This is because profitable firms keep more cash to pay their debt on time and they can extend finance to their customers (account receivables). Moreover, profitable firms can distribute more dividends if they have sufficient liquid assets. We control year effects and industry effects in all models. To remove outlier all datasets are winsorised at 1% and 99% level.

4.3 Trade Credit and Cash Holdings: Moderating Role of Business Group Affiliation

Prior research shows that cash holding is lower for business group affiliated firms than independent firms (standalone firm) as they argue and find that business group affiliated firms use their sister concern(s) as alternative sources of financing. Moreover, affiliated organizations can get capital from other affiliated organizations with easier terms and conditions, thereby they are less likely to hold higher cash. Taking this tension prior research documents that cash holding is lower for group affiliated firms compared to independent organizations (Locorotondo, et al., 2014; Nakajima & Sasaki, 2020). We interact business group with trade credit to see the moderating effect of business group affiliation on corporate cash holding. Table 5 presents the results of analysis. Columns [1-3] show the results of moderating effect of business group affiliation on first measure of cash holding *(CASHTA)*, and columns [4-6] show the results of group affiliation on second measure of cash holding *(CASHNA)* and finally columns [7-9] show the results on third measure of cash holding *(LNCASHNA)*. Our results show that the coefficients of interaction of business group affiliation *(BGRP)* and trade credit *(TC) (BGRP*TC)* in all models are negative and statistically significant at 1 percent level (except interaction with trade credit channel) that implies that cash holding is significantly lower if the sample firms are affiliated with any of the business groups. We also find that the coefficients of trade credit are also significantly positive in all models which are consistent with our baseline regression (Deloof & Jergers, 2003; Khanna & Palepu, 2000). The coefficients of the business group **(BGRP)** are positive when we run our analysis based on only account receivables or taking a log transformed receivables. However, we find that the coefficient of the business group *(BGRP)* is significantly negative when we combined both account receivables and accounts payables which is in line with the notion that companies, in reality, are also customers to suppliers when they get trade credit facilities, and they become suppliers when they extend trade credit to their customers.

Regarding control variables we find similar directions to all control variables we get in our main analysis. For instance, we document that the highly levered firms are likely to hold lower cash as these firms have more debt obligations to fund providers and they are prone to hide their cash levels. Accordingly, we find the negative coefficient for leverage with corporate cash holding.

We also document that cash holding is negatively associated with net working capital and the proportion of capital expenditure to total assets and the coefficients are statistically significant and they are consistent with prior literature. Prior research shows that firms with higher government ownerships are more likely to hold greater cash as the management of these organizations are inclined to earnings manipulations or cash manipulations or they tunnel resources for their private interests (Alkhataybeh, AlSmadi, Shakhatreh, & Khataybeh, 2022; Dewenter & Malatesta, 2001). Consistently, we find, in our analysis, that corporate cash holding is significantly higher in organizations with greater government ownership. All other control variables show consistent signs and significant levels with respect to our dependent variable.

Table 4: Regression analysis of trade credit and corporate cash holdings (H1)

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
VARIABLES	CASHTA	CASHTA	CASHTA	CASHNA	CASHNA	CASHNA	LNCASHNA	LNCASHNA	LNCASHNA
TCREC	**0.108*** **			**0.167*** **			**0.129*** **		
	[3.30]			**[2.80]**			**[3.01]**		
TCRECR		**0.164*** **			**0.306*** **			**0.230*** **	
		[3.54]			**[3.69]**			**[3.88]**	
TCR_CHANNEL			**0.007*** **			**0.012*** **			**0.009*** **
			[4.97]			**[4.11]**			**[4.59]**
SIZE	-0.003	-0.003	-0.004*	-0.005	-0.004	-0.007*	-0.004	-0.003	-0.005*
	[-1.27]	[-1.10]	[-1.76]	[-1.23]	[-1.07]	[-1.67]	[-1.21]	[-1.05]	[-1.69]
LEV	-0.045**	-0.054***	-0.056***	-0.081**	-0.099***	-0.099***	-0.059**	-0.072***	-0.073***
	[-2.58]	[-3.00]	[-3.15]	[-2.52]	[-2.99]	[-3.02]	[-2.55]	[-3.04]	[-3.11]
NWC	-0.151***	-0.156***	-0.178***	-0.286***	-0.290***	-0.329***	-0.199***	-0.203***	-0.232***
	[-6.22]	[-6.35]	[-7.36]	[-6.27]	[-6.51]	[-7.32]	[-6.25]	[-6.51]	[-7.41]
MBRATIO	0.001	0.001	0.001	0.002*	0.002*	0.002*	0.001*	0.001*	0.001
	[1.40]	[1.45]	[1.16]	[1.86]	[1.96]	[1.68]	[1.68]	[1.77]	[1.47]
CAPEX	-0.162***	-0.166***	-0.156***	-0.344***	-0.347***	-0.334***	-0.231***	-0.233***	-0.222***
	[-2.80]	[-2.89]	[-2.72]	[-3.43]	[-3.50]	[-3.37]	[-3.09]	[-3.16]	[-3.01]
OCF	0.097**	0.096**	0.102**	0.14	0.134	0.147	0.114*	0.110*	0.119*
	[2.00]	[1.99]	[2.11]	[1.56]	[1.50]	[1.64]	[1.77]	[1.72]	[1.86]
DIVIDEND	0.021***	0.021***	0.023***	0.025*	0.024*	0.029**	0.023**	0.022**	0.026***
	[2.76]	[2.73]	[3.13]	[1.81]	[1.72]	[2.12]	[2.34]	[2.25]	[2.68]
SPN_OWN	0	0	0	0	0	0	0	0	0
	[0.92]	[0.93]	[1.40]	[0.49]	[0.49]	[0.90]	[0.63]	[0.63]	[1.08]
GOV_OWN	0.160***	0.156***	0.162***	0.267***	0.253***	0.268***	0.205***	0.196***	0.206***
	[4.74]	[4.67]	[4.63]	[4.38]	[4.21]	[4.15]	[4.61]	[4.45]	[4.41]
FIN_DISTRESS	-0.002	0.001	0.001	-0.003	0.003	0.002	-0.003	0.001	0.001
	[-0.40]	[0.12]	[0.20]	[-0.31]	[0.29]	[0.24]	[-0.50]	[0.10]	[0.10]
SIZE_BOD	-0.002	-0.002	-0.001	-0.002	-0.002	-0.001	-0.002	-0.002	-0.001
	[-1.03]	[-1.14]	[-0.75]	[-0.72]	[-0.83]	[-0.46]	[-0.82]	[-0.94]	[-0.55]
SIZE_AC	-0.005	-0.005	-0.006	-0.004	-0.004	-0.005	-0.004	-0.004	-0.005
	[-1.31]	[-1.30]	[-1.57]	[-0.58]	[-0.52]	[-0.79]	[-0.91]	[-0.86]	[-1.14]
BIND	0.013	0.016	0.028	0.015	0.017	0.039	0.007	0.009	0.025
	[0.39]	[0.45]	[0.84]	[0.25]	[0.29]	[0.65]	[0.16]	[0.21]	[0.59]
DUALITY	-0.032*	-0.03	-0.035*	-0.054*	-0.048*	-0.059**	-0.040*	-0.036	-0.045**
	[-1.72]	[-1.59]	[-1.93]	[-1.91]	[-1.68]	[-2.13]	[-1.80]	[-1.59]	[-2.00]
ROA	0.579***	0.614***	0.622***	1.017***	1.085***	1.087***	0.758***	0.809***	0.813***
	[5.78]	[6.24]	[6.12]	[5.42]	[5.89]	[5.69]	[5.68]	[6.18]	[5.98]
RND	2.155	2.062	1.724	0.343	0.352	-0.316	1.512	1.499	1.007
	[1.20]	[1.14]	[0.96]	[0.12]	[0.12]	[-0.11]	[0.67]	[0.66]	[0.45]
GROWTH	-0.011	-0.012	-0.013	-0.019	-0.02	-0.021	-0.011	-0.012	-0.013
	[-1.16]	[-1.25]	[-1.30]	[-1.15]	[-1.24]	[-1.30]	[-0.97]	[-1.07]	[-1.12]
FAGE	0.003	0.002	0.003	0.004	0.003	0.005	0.003	0.002	0.003
	[0.54]	[0.38]	[0.63]	[0.54]	[0.36]	[0.62]	[0.49]	[0.31]	[0.58]
Year effects	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Industry effects	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
CONSTANT	0.093**	0.104**	0.125***	0.123*	0.140*	0.174**	0.103*	0.116**	0.143***
	[2.18]	[2.49]	[2.94]	[1.65]	[1.94]	[2.34]	[1.87]	[2.17]	[2.60]
Observations	1002	1002	1002	1002	1002	1002	1002	1,002	1,002
R-squared	0.35	0.35	0.36	0.33	0.34	0.34	0.35	0.35	0.35
Adj. R-squared	0.33	0.33	0.33	0.31	0.31	0.31	0.32	0.33	0.33

Table 5: Regression analysis of trade credit on cash holdings-Moderating role of business group affiliation (H2)

VARIABLES	(1) CASHTA	(2) CASHTA	(3) CASHTA	(4) CASHNA	(5) CASHNA	(6) CASHNA	(7) LNCASHNA	(8) LNCASHNA	(9) LNCASHNA
TCREC	**0.317*** **			**0.512*** **			**0.385*** **		
	[5.51]			**[4.60]**			**[5.00]**		
TCRECR		**0.601*** **			**1.117*** **			**0.821*** **	
		[7.24]			**[6.78]**			**[7.34]**	
TCR_CHANNEL			**0.007*** **			**0.010*** **			**0.008*** **
			[4.12]			**[3.18]**			**[3.71]**
BGRP	0.016	0.025**	-0.020**	0.015	0.040**	-0.046***	0.016	0.033***	-0.028***
	[1.59]	[2.55]	[-2.34]	[0.83]	[2.36]	[-3.04]	[1.23]	[2.73]	[-2.58]
*BGRP*TC*	**-0.362*** **	**-0.658*** **	**-0.001**	**-0.599*** **	**-1.221*** **	**-0.006**	**-0.445*** **	**-0.891*** **	**-0.003**
	[-5.83]	**[-7.85]**	**[-0.25]**	**[-5.25]**	**[-7.46]**	**[-0.63]**	**[-5.51]**	**[-7.89]**	**[-0.45]**
SIZE	-0.003	-0.003	-0.003	-0.005	-0.006	-0.004	-0.004	-0.004	-0.003
	[-1.34]	[-1.49]	[-1.12]	[-1.11]	[-1.37]	[-0.91]	[-1.20]	[-1.44]	[-1.03]
LEV	-0.044**	-0.068***	-0.054***	-0.079**	-0.124***	-0.093***	-0.058**	-0.091***	-0.070***
	[-2.44]	[-3.61]	[-3.02]	[-2.38]	[-3.55]	[-2.87]	[-2.42]	[-3.65]	[-2.98]
NWC	-0.130***	-0.142***	-0.175***	-0.250***	-0.262***	-0.322***	-0.173***	-0.183***	-0.228***
	[-5.36]	[-5.86]	[-7.29]	[-5.45]	[-6.08]	[-7.24]	[-5.38]	[-6.04]	[-7.32]
MBRATIO	0.001*	0.001**	0.001	0.003**	0.003***	0.002*	0.002**	0.002**	0.001*
	[1.77]	[2.09]	[1.33]	[2.24]	[2.62]	[1.89]	[2.04]	[2.43]	[1.65]
CAPEX	-0.136**	-0.137**	-0.170***	-0.307***	-0.296***	-0.364***	-0.200***	-0.194***	-0.241***
	[-2.29]	[-2.39]	[-2.90]	[-2.97]	[-3.00]	[-3.59]	[-2.62]	[-2.64]	[-3.21]
OCF	0.081*	0.075*	0.100**	0.112	0.096	0.142	0.094	0.083	0.116*
	[1.70]	[1.65]	[2.08]	[1.28]	[1.14]	[1.61]	[1.49]	[1.37]	[1.83]
DIVIDEND	0.023***	0.022***	0.025***	0.030**	0.027*	0.034**	0.026**	0.024**	0.029***
	[2.95]	[2.89]	[3.32]	[2.07]	[1.93]	[2.44]	[2.55]	[2.42]	[2.91]
SPN_OWN	0	0	0	0	0	0	0	0	0
	[1.20]	[1.42]	[1.51]	[0.77]	[1.00]	[1.03]	[0.90]	[1.13]	[1.20]
GOV_OWN	0.106***	0.085**	0.144***	0.166**	0.114*	0.229***	0.135***	0.098**	0.181***
	[2.82]	[2.31]	[3.87]	[2.50]	[1.75]	[3.36]	[2.78]	[2.06]	[3.68]
FIN_DISTRESS	-0.002	0.008	0	-0.003	0.015*	0	-0.003	0.01	-0.001
	[-0.39]	[1.53]	[0.05]	[-0.33]	[1.79]	[0.03]	[-0.50]	[1.59]	[-0.07]
SIZE_BOD	-0.002	-0.003*	-0.002	-0.003	-0.004	-0.003	-0.002	-0.003	-0.002
	[-1.37]	[-1.74]	[-1.11]	[-1.15]	[-1.54]	[-0.94]	[-1.19]	[-1.59]	[-0.95]
SIZE_AC	-0.007*	-0.009**	-0.006	-0.008	-0.011	-0.006	-0.007	-0.009*	-0.006
	[-1.91]	[-2.37]	[-1.64]	[-1.13]	[-1.58]	[-0.89]	[-1.48]	[-1.95]	[-1.22]
BIND	0.009	0.014	0.022	0.006	0.013	0.026	0.002	0.007	0.017
	[0.30]	[0.46]	[0.68]	[0.11]	[0.25]	[0.44]	[0.04]	[0.18]	[0.41]
DUALITY	-0.039**	-0.038**	-0.037**	-0.066**	-0.063**	-0.062**	-0.049**	-0.047**	-0.047**
	[-2.14]	[-2.04]	[-1.98]	[-2.39]	[-2.25]	[-2.18]	[-2.23]	[-2.10]	[-2.05]
ROA	0.526***	0.636***	0.564***	0.897***	1.109***	0.957***	0.683***	0.838***	0.732***
	[5.22]	[6.76]	[5.53]	[4.89]	[6.54]	[5.10]	[5.16]	[6.88]	[5.45]
RND	1.969	1.707	1.988	0.169	-0.227	0.348	1.323	1.022	1.4
	[1.16]	[0.96]	[1.15]	[0.06]	[-0.08]	[0.13]	[0.62]	[0.45]	[0.65]
GROWTH	-0.008	-0.011	-0.014	-0.014	-0.017	-0.022	-0.008	-0.01	-0.014
	[-0.87]	[-1.11]	[-1.34]	[-0.87]	[-1.10]	[-1.33]	[-0.67]	[-0.91]	[-1.16]
FAGE	0.003	0.001	0.003	0.005	0.001	0.004	0.003	0.001	0.003
	[0.62]	[0.21]	[0.56]	[0.60]	[0.15]	[0.54]	[0.56]	[0.12]	[0.51]
YEAR EFFETS	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
INDUSTRY EFFECTS	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
CONSTANT	0.100**	0.146***	0.130***	0.139*	0.220***	0.186**	0.113**	0.173***	0.150***
	[2.34]	[3.62]	[3.08]	[1.84]	[3.16]	[2.52]	[2.04]	[3.36]	[2.76]
Observations	1002	1002	1002	1002	1002	1002	1002	1002	1002
R-squared	0.39	0.4	0.36	0.37	0.4	0.34	0.38	0.41	0.36
Adj. R-squared	0.36	0.38	0.33	0.34	0.37	0.32	0.36	0.38	0.33

5. Sensitivity Analyses

5.1 Cash Holdings: Alternative Measure

To ensure robustness of our corporate cash holdings measures we run our baseline regression with an alternate measure where we compute cash holdings based on total sales revenue. Following prior research (Mahmud, Miah, & Bhuiyan, 2022; Marwick, Hasan, & Luo, 2020) we scale our cash and cash equivalents to firm's total sales revenues. We use similar four different measures of trade credit. Following one of the reviewers' comments we place all our subsequent analyses in Appendix B to enhance readership of the paper. For instance, we display our results of the alternative measure of dependent variable (i.e., cash holdings) in Table 6. We find that all four measures of trade credit are positively and significantly associated with the corporate cash holdings, which supports our main test results regarding our first hypothesis on the nexus between trade credit and propensity to hold cash. In sum, we conclude that the alternative measures of cash holding do not alter our main findings in the present study. Later, we document that cash holdings are higher in bigger firms which may imply that they hold greater cash to support their growth and expansion compared to smaller companies. In line with our main analysis and moderating effect of business group we find that the coefficient of government ownership *(GOVT_OWN)* shows positive and highly significant at 1 percent level. We presented other control variables in our table.

5.2 Alternative Measure of Corporate Trade Credit

To ensure robustness of our trade credit measures we use alternative proxy by taking ratio of total accounts payables which is scaled to total sales *(TCP)* of the firms following Baker, Pattnaik, and Kumar (2022). We use four different cash holding measures (such as, *CASHTA, CASHNA, LNCASHNA,* and *CASH_SALES)* and similar set of control variables and we find that our results remain robust to alternate measure of trade credit (Table 7). We find similar results with all control variables consistent with our baseline regression analyses. Overall, we can claim that the nexus between corporate cash holding, and trade credit is not sensitive to the alternative measure of either trade credit or corporate cash holding.

5.3 Endogeneity test

Trade credit measures may be endogenous because firms with higher cash holdings can get trade credit easier as suppliers can rely more on their working capital. Hence, endogeneity results from reverse causality. We address such possible endogeneity through several measures including two-step system generalized method of moments (GMM) approach following prior research (such as, Arellano and Bober, 1995) and Heckman two stage estimation approach.

5.3.1 Two-step System GMM

Under GMM we add lagged value of dependent variable as independent variable along with variable of interest. In addition, we use the same set of control variables taken from our main equation. The following two equations are estimated to use system GMM:

$$CASH_{i,t} = \beta_0 + \beta_1 CASH\_LAG_{i,t} + \beta_2 TRADECREDIT_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 LEV_{i,t} + \beta_5 NWC_{i,t} + \beta_6 MBRATIO_{i,t} + \beta_7 CAPEX_{i,t} + \beta_8 OCF_{i,t} + \beta_9 DIVIDEND_{i,t} + \beta_{10} SPN\_OWN_{i,t} + \beta_{11} GOV\_OWN_{i,t} + \beta_{12} FIN\_DISTRESS_{i,t} + \beta_{13} SIZE\_BOD_{i,t} + \beta_{14} SIZE\_AC_{i,t} + \beta_{15} BIND_{i,t} + \beta_{16} DUALITY_{i,t} + \beta_{17} ROA_{i,t} + \beta_{18} RND_{i,t} + \beta_{19} GROWTH_{i,t} + \beta_{20} FAGE_{i,t} + INDUSTRY, YEAR Dummies_{i,t} + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{Eq. (3)}$$

$$CASH_{i,t} = \beta_0 + \beta_1 CASH\_LAG_{i,t} + \beta_2 RADECREDIT_{i,t} + \beta_3 BGRP_{i,t} + \beta_4 BGRP*TRADECREDIT_{i,t} + \beta_5 SIZE_{i,t} + \beta_6 LEV_{i,t} + \beta_7 WC_{i,t} + \beta_8 MBRATIO_{i,t} + \beta_9 CAPEX_{i,t} + \beta_{10} OCF_{i,t} + \beta_{11} DIVIDEND_{i,t} + \beta_{12} SPN\_OWN_{i,t} + \beta_{13} GOV\_OWN_{i,t} + \beta_{14} FIN\_DISTRESS_{i,t} + \beta_{15} SIZE\_BOD_{i,t} + \beta_{16} SIZE\_AC_{i,t} + \beta_{17} BIND_{i,t} + \beta_{18} DUALITY_{i,t} + \beta_{19} ROA_{i,t} + \beta_{20} RND_{i,t} + \beta_{21} GROWTH_{i,t} + \beta_{22} FAGE_{i,t} + INDUSTRY, YEAR Dummies_{i,t} + \varepsilon_{i,t} \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots \text{Eq. (4)}$$

The results of two step system GMM are presented in table 8. We use the first measure of trade credit, and we test the impact of trade credit on all three measures of cash holding. In all three models (GMM requires the first order serial correlation (i.e. AR1) to be significant but second order correlation denoted by AR2 to be insignificant. Consistently we find that the coefficients of trade credit are positive and statistically significant at 1 percent in all three models, which is consistent with our main results, and it ensures that our results are robust to endogeneity issues. Further, we test the impact of business group and trade credit interaction on cash holding. Results are reported in Columns (2), (4) and (6). In line with our baseline results it is found that the coefficient of interaction *(BGRP*TRADE CREDIT)* is negatively significant. In sum, our results prove that our inferences between trade credit, business group membership and corporate cash holding are robust. Finally, the value of Hansen J-statistics confirms that our instruments were valid to implement two step system GMM.

5.3.2 Heckman Two Stage Estimation

Next, we apply the Heckman two-stage estimation to control potential endogeneity between corporate cash holding and trade credit. There can be reverse causality between trade credit and corporate cash holding which can be caused due to unobserved firm characteristics and due to variable omission in the regression analysis (Cai, Cui, & Jo, 2016; Khanna & Palepu, 2000). First, we formulate and run a probit regression of trade credit on various firm characteristics, and we include a set of new control variables including firms' complexity variables (through receivables and inventories), audit opinion, firm market value *(TOBINQ)*, gender diversity *(GDIVERSITY),* and diversity in audit committee *(FEM_AC)* following trade credit and cash holding literature. We get lambda (inverse mills ratio-IMR) from our first stage probit regression. In the second stage of regression analysis, we use IMR as control variable in all models. Results are reported in Table 9. Columns [2-5] show the results of the second stage regression of Heckman Test. We find that the coefficients of all four measures of trade credit *(TCREC, TCRRERC, TC_CHANNEL* and *TCP)* are positive with corporate cash holdings and statistically significant (<0.0001). Overall, our results remain qualitatively the same after considering self-selection biasness issue.

$$Trade\ Credit_{i,t} = \beta_0 + \beta_1 SIZE_{i,t} + \beta_2 LEV_{i,t} + \beta_3 NWC_{i,t} + \beta_4 MBRATIO_{i,t} + \beta_5 CAPEX_{i,t} + \beta_6 OCF_{i,t} + \beta_7 DIVIDEND_{i,t} + \beta_8 SPN\_OWN_{i,t} + \beta_9 GOV\_OWN_{i,t} + \beta_{10} FIN\_DISTRESS_{i,t} + \beta_{11} SIZE\_BOD_{i,t} + \beta_{12} SIZE\_AC_{i,t} + \beta_{13} REC_{i,t} + \beta_{14} INV_{i,t} + \beta_{15} OPINION_{i,t} + \beta_{16} TOBINQ_{i,t} + \beta_{17} GDIVERSITY_{i,t} + \beta_{18} FEM\_AC_{i,t} + INDUSTRY, YEAR\ Dummies_{i,t} + \varepsilon_{i,t} \ldots\ldots\ldots\ Eq.\ (5)$$

6. Conclusion

This paper explores the impact of short-term financing (through trade credit) on firm liquid capital (through cash holding) and trade credit. We hypothesize that firms with higher trade credit businesses (either with their customers or with their suppliers) are likely to hold a greater level of cash holdings to ensure uninterrupted business operation. This is because businesses need more cash to extend finance (trade credit) to their customers in the form of credit sales and at the same time businesses enjoy delaying payment (trade credit) with their suppliers. Taking both perspectives, business organizations need more liquid assets to ensure smooth business operations. Secondly, we examine whether the relationship between cash holdings and trade credit varies between independent organization and firms affiliated with business groups. Prior research shows that affiliated firms hold less cash than independent firms as they can utilize their sister concerns as an alternative source of financing. Moreover, they can finance their organizations with lower interest cost and with easier terms and conditions compared to independent (standalone) organizations.

Using data from Bangladeshi public companies for a period 2011 to 2019, our study finds that trade credit is positively and significantly associated with the corporate cash holding which supports our hypothesis. This result suggests that firms with higher trade credit business (both from suppliers and customers end) are more likely to hold larger cash than firms with lower trade credit business transactions. Our results are complemented by the additional tests based on alternative measures of trade credit, alternative measure of cash holding, and Heckman two stage self-selection model (for endogeneity problem). Further, our results remain robust to alternative test two step system GMM. In addition, further analysis shows that the cash holding is significantly lower for business group affiliated firms compared to independent firms which are consistent with our hypothesis.

Our research provides insights into the impact of trade credit impact on corporate cash holding in an emerging market. Moreover, more than fifty percent listed companies, in Bangladesh, are affiliated with any of the business group which provides a unique setting to test the association between trade credit and corporate cash holding. Our research extends prior trade credit literature by providing empirical evidence on firm's propensity to hold liquid assets which indicates their efficiency in managing and allocating resources. Moreover, our research will be a novel study in the sense that our research findings show the differences between standalone firms and group affiliated firms with respect to corporate cash holding where they involve with trade credit businesses.

However, readers should take some caution in generalizing our research findings. First, while suggesting the link our study does not establish a causal relationship between cash holdings and trade credit rather, we rely on the association between these two. Second, we do not explore the determinants or incentives for a firm to be affiliated with any of the business groups. Third and finally, we cannot ignore the possibility of some unknown factors or determinants that can influence or affect our empirical results. Despite these limitations, our study provides insights into the contemporary trade credit business scenario in a developing country and how such trade credit business relates to cash holding for publicly listed companies.

Authors' Contribution Statement

Dr. Muhammad Shahin Miah CPA: Conceptualization, research methodology including data collection, analysis, results writing, original draft preparation, supervision, responses to reviewer comments.

Dr. Aditi Shams: Writing literature review, contribution, review and editing, responses to reviewer comments.

Prof. Dr. Chowdhury Saima Ferdous: contribution write up, literature review, visualization, supervision, and administration.

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Appendix A

A. 1 Definitions of variables

Variables	Definition
CASH_TA	Cash and marketable securities scaled by total assets (Marwick et al., 2020).
CASH_NA	Cash and marketable securities scaled by total assets minus cash and marketable securities (Marwick et al., 2020).
LN_CASH_NA	The natural log of one plus cash and marketable securities scaled by total assets minus cash and marketable securities (Marwick et al., 2020)
CASH_SALE	Cash and marketable securities scaled by total sales (Marwick et al., 2020).
TCREC	-
TCRECR	Natural logarithm of one plus the ratio of account receivables to total sales (Cao et al., 2022).
TCR_CHANNEL	It is measured as the sum of total receivables and accounts payable and then scaled for the total sales revenue of the sample firm in the period.
TCP	It is measured as the ratio of payables to total sales revenue of the firm (Baker et al., 2020).
TCP_SQRAP	The square of total accounts payable following Baker, Pattnaik & Kumar (2020).
BGROUP	1 if the firm belongs to a group, and 0 for otherwise.
SIZE	The natural log of the total assets of the firm.
LEV	Measure as the ratio of total long-term debt to total assets of the firm.
NWC	Net working capital is measured as the ratio of current assets minus current liabilities minus cash and marketable securities to total assets.
MBRATIO	—
CAPEX	Capital expenditure, which is measured as the ratio of capital expenditure to total assets.
OCF	–
DIVIDEND	1 if the paid dividend in the current year, and 0 otherwise.
SPN_OWN	The percentage of shares held by sponsor shareholders.
GOV_OWN	The percentage of shares held by the Government.
FIN_DISTRESS	We used the measure of financial distress developed by Zmijewski (1984).
SIZE_BOD	The number of directors on the board.
SIZE_AC	
BIND	—
DUALITY	We assign 1 when the same individual holds both CEO and Chairman roles and otherwise 0.
ROA	The ratio of net income before tax to total assets.
RND	–
GROWTH	Percentage change in annual revenues.
FAGE	We compute as the natural log of the years between the year firm listed in DSE and current period of the company.

Appendix B

A. 2 Table 6: Regression analysis of trade credit and corporate cash holdings Alternative measure of cash holdings

VARIABLES	CASH_SALES	CASH_SALES	CASH_SALES	CASH_SALES
TCREC	2.149***			
	[5.91]			
TCRECR		2.669***		
		[5.71]		
TCR_CHANNEL			0.485***	
			[10.67]	
TCP				2.325***
				[10.38]
SIZE	0.164***	0.171***	0.074***	0.072***
	[5.28]	[5.44]	[3.71]	[3.14]
LEV	0.786***	0.664**	-0.15	0.038
	[2.84]	[2.44]	[-0.84]	[0.19]
NWC	-0.567**	-0.733***	-1.406***	-1.841***
	[-2.34]	[-3.03]	[-6.20]	[-7.85]
MBRATIO	0.005	0.005	0.001	0.004
	[1.10]	[1.08]	[0.57]	[1.35]
CAPEX	-2.285***	-2.403***	-1.214***	-1.099**
	[-3.75]	[-3.87]	[-2.65]	[-2.33]
OCF	0.294	0.313	0.09	0.643
	[0.43]	[0.46]	[0.15]	[1.11]
DIVIDEND	0.036	0.04	0.064	0.096
	[0.52]	[0.59]	[1.05]	[1.48]
SPN_OWN	-0.014***	-0.013***	-0.006***	-0.005**
	[-5.27]	[-5.26]	[-2.89]	[-2.15]
GOV_OWN	2.771***	2.776***	1.955***	2.291***
	[4.42]	[4.41]	[4.47]	[5.31]
FIN_DISTRESS	-0.502***	-0.461***	-0.238***	-0.299***
	[-5.61]	[-5.22]	[-3.40]	[-4.53]
SIZE_BOD	-0.047**	-0.050***	-0.013	-0.026**
	[-2.51]	[-2.65]	[-1.31]	[-2.07]
Size_AC	0.058*	0.056*	0.037	0.042
	[1.72]	[1.69]	[1.42]	[1.50]
BIND	0.732	0.792	1.424***	0.974*
	[0.93]	[1.00]	[2.72]	[1.92]
DUALITY	0.102	0.12	0.102	0.066
	[0.95]	[1.12]	[1.32]	[0.67]
ROA	-4.167***	-3.643***	-0.779	-1.07
	[-3.99]	[-3.50]	[-0.89]	[-1.27]
RND	5.065	1.531	2.766	13.968
	[0.41]	[0.13]	[0.38]	[1.27]
GROWTH	0.107	0.079	0.128	0.193*
	[0.92]	[0.69]	[1.16]	[1.72]
FAGE	0.023	0.01 3	0.033	0.107***
	[0.43]	[0.24]	[1.12]	[2.90]
Year effects	Controlled	Controlled	Controlled	Controlled
Industry effects	Controlled	Controlled	Controlled	Controlled
Constant	-3.182***	-2.965***	-1.545***	-2.310***
	[-5.40]	[-5.14]	[-3.37]	[-5.61]
Obse rvations	1,002	1,002	1,002	1,002
R-squared	0.46	0.46	0.72	0.68
Adj. R -squared	0.44	0.44	0.71	0.67

A.3 Table 7: Alternative measure of trade credit and regression on cash holdings

Variables	CASHTA	CASHNA	LNCASHNA	CASH_SALES
TCP	**0.031*** **	**0.055*** **	**0.041*** **	**2.325*** **
	[4.03]	**[3.97]**	**[4.07]**	**[10.38]**
SIZE	-0.004*	-0.007*	-0.005*	0.072***
	[-1.70]	[-1.67]	[-1.66]	[3.14]
LEV	-0.052***	-0.094***	-0.068***	0.038
	[-2.90]	[-2.87]	[-2.90]	[0.19]
NWC	-0.183***	-0.339***	-0.239***	-1.841***
	[-7.45]	[-7.42]	[-7.51]	[-7.85]
MBRATIO	0.001	0.002*	0.001	0.004
	[1.21]	[1.73]	[1.52]	[1.35]
CAPEX	-0.158***	-0.332***	-0.222***	-1.099**
	[-2.72]	[-3.35]	[-3.00]	[-2.33]
OCF	0.110**	0.160*	0.130**	0.643
	[2.28]	[1.80]	[2.03]	[1.11]
DIVIDEND	0.024***	0.029**	0.027***	0.096
	[3.18]	[2.17]	[2.73]	[1.48]
SPN_OWN	0	0	0	-0.005**
	[1.42]	[0.95]	[1.12]	[-2.15]
GOV_OWN	0.168***	0.277***	0.213***	2.291***
	[4.88]	[4.36]	[4.66]	[5.31]
FIN_DISTRESS	0	0.001	-0.001	-0.299***
	[-0.05]	[0.08]	[-0.12]	[-4.53]
SIZE_BOD	-0.001	-0.002	-0.001	-0.026**
	[-0.89]	[-0.57]	[-0.68]	[-2.07]
SIZE_AC	-0.006	-0.005	-0.005	0.042
	[-1.55]	[-0.77]	[-1.12]	[1.50]
BIND	0.021	0.028	0.017	0.974*
	[0.64]	[0.47]	[0.40]	[1.92]
DUALITY	-0.036*	-0.060**	-0.045**	0.066
	[-1.96]	[-2.15]	[-2.03]	[0.67]
ROA	0.612***	1.078***	0.803***	-1.07
	[6.05]	[5.67]	[5.94]	[-1.27]
RND	1.856	-0.057	1.191	13.968
	[1.04]	[-0.02]	[0.53]	[1.27]
GROWTH	-0.012	-0.019	-0.012	0.193*
	[-1.23]	[-1.21]	[-1.03]	[1.72]
FAGE	0.004	0.007	0.005	0.107***
	[0.84]	[0.84]	[0.79]	[2.90]
Year effects	Controlled	Controlled	Controlled	Controlled
Industry effects	Controlled	Controlled	Controlled	Controlled
CONSTANT	0.112***	0.155**	0.127**	-2.310***
	[2.68]	[2.12]	[2.36]	[-5.61]
Observations	1002	1002	1,002	1,002
R-squared	0.35	0.34	0.35	0.68
Adj. R-squared	0.33	0.31	0.33	0.67

A.4 Table 8: Two-step system GMM [Trade credit, group membership and corporate cash holding]

VARIABLES	(1) CASHTA	(2) CASHTA	(3) CASHNA	(4) CASHNA	(5) LNCASHNA	(6) LNCASHNA
CASHTA_LAG	0.644***	0.598***				
	[22.71]	[34.15]				
CASHNA_LAG			0.586***	0.581***		
			[28.64]	[25.54]		
LNCASHNA_LAG					0.581***	0.571***
					[25.18]	[21.80]
TCREC	**0.219*** **	**0.120*** **	**0.219*** **	**0.347*** **	**0.153*** **	**0.246*** **
	[5.38]	**[3.76]**	**[5.38]**	**[5.17]**	**[5.06]**	**[5.61]**
BGRP		0.042***		0.096***		0.066***
		[3.89]		[3.92]		[3.68]
*BGRP*TCREC*		**-0.093****		**-0.428*** **		**-0.291*** **
		[-2.11]		**[-3.40]**		**[-3.40]**
SIZE	0.015***	0.010***	0.040***	0.036***	0.027***	0.024***
	[5.28]	[4.30]	[6.76]	[5.77]	[6.45]	[5.39]
LEV	0.031*	-0.003	0.128***	0.088**	0.098***	0.073***
	[1.86]	[-0.26]	[3.61]	[2.48]	[3.59]	[2.90]
NWC	-0.057***	-0.078***	-0.118***	-0.174***	-0.052**	-0.075***
	[-4.22]	[-5.80]	[-3.60]	[-5.32]	[-2.12]	[-3.24]
MBRATIO	-0.000	0.001**	0.000	-0.000	0.000	-0.000
	[-0.17]	[2.40]	[0.57]	[-0.29]	[0.62]	[-0.19]
CAPEX	-0.177***	-0.176***	-0.304***	-0.142	-0.207***	-0.068
	[-4.56]	[-4.25]	[-4.02]	[-1.44]	[-3.80]	[-0.98]
OCF	0.335***	0.326***	0.627***	0.654***	0.408***	0.415***
	[11.66]	[12.42]	[13.15]	[12.03]	[11.26]	[11.77]
DIVIDEND	0.011*	0.017***	0.007	0.001	0.003	-0.001
	[1.71]	[2.68]	[0.65]	[0.06]	[0.42]	[-0.16]
SPN_OWN	-0.000	-0.000	-0.001***	-0.001***	-0.001**	-0.000
	[-0.90]	[-1.05]	[-4.04]	[-2.65]	[-2.43]	[-1.32]
GOV_OWN	-0.052*	-0.036	-0.168***	-0.128*	-0.063	-0.050
	[-1.80]	[-0.88]	[-3.08]	[-1.91]	[-1.57]	[-1.15]
FIN_DISTRESS	0.009***	0.017***	-0.007	0.001	-0.003	0.004
	[2.71]	[4.62]	[-1.11]	[0.21]	[-0.72]	[0.82]
SIZE_BOD	-0.007***	-0.006***	-0.014***	-0.014***	-0.010***	-0.010***
	[-4.70]	[-3.16]	[-4.28]	[-4.16]	[-3.94]	[-4.48]
SIZE_AC	0.001	0.003	0.005	0.005	0.004	0.004
	[0.25]	[1.26]	[1.36]	[1.34]	[1.16]	[1.49]
BIND	-0.081**	0.001	-0.173***	-0.119*	-0.133***	-0.113**
	[-2.08]	[0.03]	[-2.95]	[-1.89]	[-2.80]	[-2.37]
DUALITY	-0.088*	-0.166***	0.012	-0.061	-0.014	-0.046
	[-1.69]	[-3.47]	[0.19]	[-0.85]	[-0.29]	[-0.87]
ROA	0.056	0.203***	0.225**	0.335**	0.158*	0.279**
	[0.73]	[2.65]	[2.09]	[2.33]	[1.84]	[2.43]
RND	5.864***	2.028	5.616*	8.945***	6.466***	10.575***
	[2.96]	[0.88]	[1.80]	[3.03]	[2.83]	[4.75]
GROWTH	-0.014**	-0.011**	-0.050***	-0.037***	-0.026***	-0.020**
	[-2.02]	[-2.34]	[-5.25]	[-3.34]	[-3.20]	[-2.20]
FAGE	0.010**	0.016***	0.034***	0.049***	0.027***	0.041***
	[1.98]	[2.80]	[3.03]	[3.67]	[3.27]	[3.74]
Year effects	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
Industry effects	Controlled	Controlled	Controlled	Controlled	Controlled	Controlled
CONSTANT	-0.046	-0.006	-0.284	-0.314***	-0.211***	-0.220***
	[-1.16]	[-0.14]	[-3.15]	[-3.34]	[-3.34]	[-3.14]
Observations	888	888	888	888	888	888
AR1	-4.81***	-4.78***	-2.28**	-2.23**	-2.44***	-2.39**
	0.000	0.000	0.023	0.026	0.015	0.017
AR2	-0.33	-0.32	0.75	0.87	0.84	0.94
	0.742	0.746	0.450	0.385	0.398	0.346
Hansen J-Statistics	78.14	73.35	75.07	79.21	74.32	75.22

A.5 Table 9: Endogeneity test: Heckman two stage regression approach

	1st Stage	Second Stage Regression			
	(1)	(2)	(3)	(4)	(5)
VARIABLES	Trade credit	CASHTA	CASHTA	CASHTA	CASHTA
TCREC		**0.126*** [3.85]**			
TCRERC			**0.183*** [3.97]**		
TC_CHANNEL				**0.011*** [6.76]**	
TCP					**0.062*** [6.73]**
SIZE	0	-0.003	-0.002	-0.005**	-0.005**
	[-0.12]	[-1.25]	[-1.06]	[-1.98]	[-2.16]
LEV	0.027	-0.014	-0.025	-0.015	-0.001
	[0.68]	[-0.70]	[-1.25]	[-0.76]	[-0.05]
NWC	-0.240***	-0.256***	-0.258***	-0.344***	-0.402***
	[-6.19]	[-6.93]	[-6.97]	[-8.53]	[-8.81]
MBRATIO	-0.001	0	0	-0.001	-0.001
	[-1.10]	[-0.10]	[0.02]	[-1.15]	[-1.65]
CAPEX	-0.139**	-0.250***	-0.251***	-0.282***	-0.310***
	[-2.13]	[-4.16]	[-4.19]	[-4.69]	[-5.07]
OCF	0.107**	0.150***	0.146***	0.180***	0.215***
	[2.49]	[3.13]	[3.07]	[3.83]	[4.60]
DIVIDEND	0.015*	0.032***	0.031***	0.039***	0.045***
	[1.75]	[3.79]	[3.71]	[4.77]	[5.30]
SPN_OWN	0	0	0	0.001**	0.001**
	[0.32]	[1.22]	[1.21]	[2.09]	[2.47]
GOV_OWN	0.198***	0.264***	0.255***	0.312***	0.359***
	[5.65]	[6.17]	[5.99]	[7.37]	[8.22]
FIN_DISTRESS	-0.005	-0.008	-0.005	-0.006	-0.009*
	[-0.87]	[-1.51]	[-0.94]	[-1.21]	[-1.78]
SIZE_BOD	-0.002	-0.002	-0.003	-0.002	-0.002
	[-1.13]	[-1.42]	[-1.52]	[-1.19]	[-1.46]
SIZE_AC	-0.006	-0.009**	-0.008**	-0.012***	-0.013***
	[-1.60]	[-2.28]	[-2.23]	[-3.09]	[-3.50]
BIND		0.001	0.004	0.015	0.001
		[0.03]	[0.13]	[0.46]	[0.04]
DUALITY		-0.027	-0.025	-0.030*	-0.029
		[-1.52]	[-1.39]	[-1.66]	[-1.59]
ROA		0.540***	0.580***	0.586***	0.578***
		[5.41]	[5.94]	[5.87]	[5.85]
RND		1.929	1.812	1.307	1.513
		[1.06]	[0.99]	[0.73]	[0.86]
GROWTH		-0.008	-0.01	-0.009	-0.006
		[-0.86]	[-1.00]	[-0.89]	[-0.58]
FAGE		0.002	0.001	0.002	0.003
		[0.33]	[0.18]	[0.35]	[0.70]
REC	0.152***				
	[3.51]				
INV	-0.017				
	[-0.39]				
OPINION	-0.013				
	[-1.09]				
TOBINQ	-0.003				
	[-0.92]				
FEM_BOD	0.010**				
	[2.54]				
AC_FEM	-0.038**				
	[-1.98]				
IMR		**0.929*** [3.75]**	**0.884*** [3.60]**	**1.385*** [5.11]**	**1.770*** [5.77]**
CONSTANT	0.149***	-0.577***	-0.532***	-0.861***	-1.151***
	[3.56]	[-3.18]	[-2.97]	[-4.46]	[-5.25]
Observations		1,002	1,002	1,002	1,002
R-squared	1,002	0.36	0.36	0.37	0.37
Adj. R-squared	0.29	0.34	0.34	0.35	0.35

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