



Unlocking profitability in Borsa Istanbul: The impact of noncash credit and maturity breakdown of cash credit on corporate performance

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ABSTRACT

Companies use either internal or external sources of financing to fund their operating or capital expenditure. When internal resources prove inadequate, businesses may turn to external financing options, such as issuing debt or equity in the capital market. In bank-dominated financial markets, cash credit is the primary funding source for most companies. In addition to cash credit, banks provide noncash credit instruments, such as letters of credit and letters of guarantee for international trading activities, obtaining working capital, or supporting participation in public and private tenders, for a fee. Surprisingly, prior research has not thoroughly explored the impact of noncash credit and the maturity breakdown of cash credit on corporate financial performance. Our study fills this gap by analyzing the effects of these factors on profitability of firms traded in Borsa Istanbul. The findings reveal a significant positive impact on firms' profitability of both noncash credit and long-term cash credit, but cash credit with shorter maturity does not significantly contribute to profitability. Moreover, financial risk, cash ratio, firm size, and inflation are identified as strong drivers of firms' financial performance. These findings have important implications for firms, banks, and regulators.

1. Introduction

Creating the right financing mix for a company is vital for maximizing its value. Firms can secure funds through cash or noncash credit or raise external capital by issuing stock. In markets where banks play a pivotal role, cash credit at different maturities, such as short, medium, and long term, are the primary choice for many firms. Capital structure theories suggest that firms become riskier with higher debt financing, and the effect becomes stronger when debt maturity is longer. Nevertheless, firms opt for bank credit as an alternative to equity funding because of the tax-shield effect of interest expense and the lower cost. The maturity of cash credit also affects corporate performance via its impact on a company's riskiness (Nakatani, 2023). Previous literature on the relationship between bank credit and firm performance reveals the impact of borrowing on firm performance in bank-based economies (Margaritis & Psillaki, 2007; Mishra & Dasgupta, 2019; Ramli et al., 2019; Sener et al., 2021). These studies mainly employ balance sheet-based debt ratios to measure firms' indebtedness and document conflicting findings, with positive, negative, or no effect. The role of the structure of debt maturity in this relationship has also been researched

(Leon, 2020; Nakatani, 2023; Nguyen & Nguyen, 2015; Nguyen et al., 2023; Salim & Yadav, 2012; Vijayakumaran & Vijayakumaran, 2019). Positive and negative effects of debt maturity on firm performance are reported in the literature, and some researchers find no significant impact. These inconclusive findings necessitate additional research on the impact on firm performance of cash credit with varying maturities.

A critical analysis of the impacts of noncash credit on profitability is also needed. In addition to cash credit, banks offer noncash credit instruments such as letters of credit (LC) and letters of guarantee (LG) for international trade, working capital, and participation in public and private tenders, albeit for a fee. Using LCs can boost a firm's financial performance by providing financial security in international transactions, thereby increasing the likelihood of successful deal completion. Under bank credit policy, firms can choose between cash and noncash credit within their designated credit limit. Research on the capital structure predominantly overlooks noncash credit as a contributing factor, as they are mainly off-balance-sheet items. Conversely, LGs can affect a firm's financial performance because substantial fees are incurred in their acquisition, which can also reduce the availability of credit lines. Although numerous empirical studies have explored the

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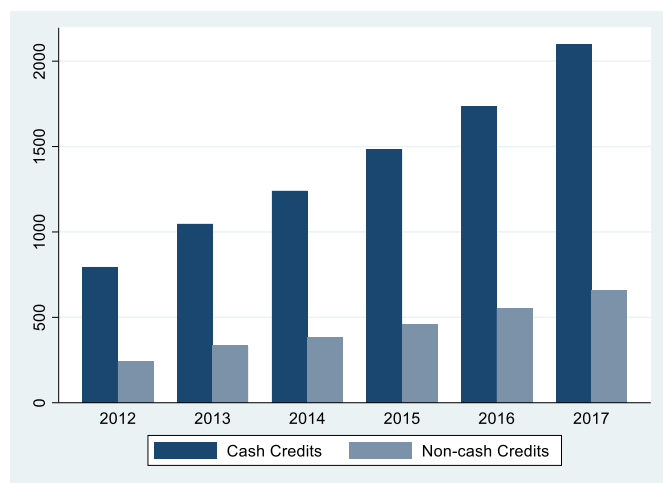


Fig. 1. Cash and noncash credit (billion TRY)

Source: BRSA (n.d.).

impact of noncash credit on bank performance (e.g., Asif & Akhter, 2019; Chu et al., 2020; Mishra et al., 2017; Shah et al., 2018), firm perspectives have not been examined to date.

This study reveals the connections between the use of cash and noncash credit and corporate performance employing dynamic panel methods to investigate 174 companies listed on the Borsa Istanbul stock exchange from 2012 to 2017. Türkiye has a resilient banking system and high reliance on debt financing by the private sector. During the sample period, the country experienced relative economic stability, providing a suitable environment for investigating the effects of cash and noncash credit on firm performance. According to the Banking Regulation and Supervision Agency (BRSA) of Türkiye, the amount of cash and noncash credit used by Turkish companies has consistently increased (see Fig. 1). During the sample period, the median growth rate is 24 percent for cash credit and 19 percent for noncash credit. Notably, the volume of noncash credit is nearly one-third that of cash credit. Even though banks' total fee and commission income accounted for less than 1 percent of overall noncash credit, it contributed significantly to banks' earnings (BRSA, n.d.). The existing literature offers valuable insights into some aspects of cash and noncash credit, but lacks a comprehensive exploration of the nuanced implications of cash and noncash credit instruments for the financial performance of Turkish firms.

The findings are expected to offer valuable guidance to businesses in optimizing their financial strategies, inform regulatory considerations, and contribute to the broader discourse on financial stability within the Turkish business ecosystem. The remainder of the paper is organized as follows: Section 2 discusses theoretical and empirical literature on the topic of the study; Section 3 explains the data and methodology employed; Section 4 discusses the findings; and Section 5 concludes the study with a summary of results and policy implications.

2. Literature review

The trade-off theory of capital structure posits that, under specific circumstances, a positive correlation exists between a firm's performance and the use of debt financing, due to the tax benefits from incurring debt. However, given the potential for insolvency because of an excessive debt load, firms with robust performance metrics are more inclined to opt for debt financing, as they have a lower likelihood of bankruptcy.

Myers and Majluf (1984) propose that firms adhere to a financing hierarchy where external financing is sought after when internal resources prove insufficient to meet capital needs. Because of its comparatively low cost, bank debt is preferred by unleveraged firms to

issuing equity. However, increased indebtedness raises the cost of debt, and firms have to make rational decisions about bank loans and equity issuance. Debt is expected to have a positive impact on a firm's profitability due to its lower cost, as per the debt hypothesis. Additionally, the free cash flow hypothesis suggests that debt can have a positive effect on profitability by disciplining management (Jensen, 1986). Nonetheless, high indebtedness can lead to agency costs, which can put pressure on profitability.

Numerous empirical studies have examined the impact of external financing on firm performance. Although some studies focus on the performance effect of aggregate cash credit, without considering its components (e.g., Margaritis & Psillaki, 2007; Musah & Kong, 2019; Ramli et al., 2019; Sener et al., 2021), few have investigated the effects of cash credit by disaggregating it into short- and long-term maturities (e.g., Forte & Tavares, 2019; Hasan et al., 2014; Hossain, 2016; Leon, 2020; Nakatani, 2023; Nguyen et al., 2023; Nguyen & Nguyen, 2015; Salim & Yadav, 2012; Vijayakumaran & Vijayakumaran, 2019; Vuong et al., 2017; Yazdanfar & Öhman, 2015). But the findings have been contradictory, with some indicating positive, negative, or no effect.

Musah and Kong (2019) investigate the association between debt and financial performance using a sample of 15 nonfinancial publicly listed firms in Ghana from 2008 to 2017. They observe a negative relationship between indebtedness and firm profitability. However, Margaritis and Psillaki (2007) examine the relationship between efficiency and indebtedness among 12,240 firms in New Zealand and report a positive association between indebtedness and firm performance. Additionally, their study reveals that the impact of efficiency on the debt ratio is positive at moderate levels of indebtedness but negative at higher levels. Ramli et al. (2019) focus on a sample of Malaysian and Indonesian firms in the period 1990-2010 to examine the effect of capital structure on firm performance, along with the mediating effect of firm leverage. They find evidence of a bidirectional link between the determinants of capital structure and firm performance, in which some variables for the capital structure directly increase firm performance, while others (e.g., asset structure, interest rate, liquidity, nondebt tax shield, and growth opportunities) are indirectly affected by the impact of firm leverage on performance. Sener et al. (2021) conduct a cross-country analysis of 9820 emerging market firms from 2010 to 2018, investigating the relationship between indebtedness and firm performance. Their fixed-effect regressions reveal a negative impact of debt financing on performance, except in countries with well-regulated credit markets and legal protection of creditors, in which the relationship becomes positive.

Salim and Yadav (2012) analyze the impact of debt on the profitability of 237 Malaysian publicly listed companies between 1995 and 2011 using a pooled ordinary least squares (OLS) estimator. They find that short-term, long-term, and total debt have a detrimental effect on corporate performance. Meanwhile, Hasan et al. (2014) evaluate the effect of indebtedness on the performance of listed firms in Bangladesh. Their study highlights the significance of disaggregating the debt maturity, as short-term debt had a positive effect on performance, while long-term debt has a negative impact. Nguyen and Nguyen (2015) examine the influence of credit on the profitability of Vietnamese listed companies, revealing a negative link between debt and corporate performance, with no significant differences observed across maturity terms. Yazdanfar and Öhman (2015) analyze the performance of a large sample of small and medium-size enterprises (SMEs) in Sweden and find that short- and long-term debt both negatively affect their financial performance.

Vijayakumaran and Vijayakumaran (2019) analyze the effect of leverage on Chinese listed companies from 2005 to 2010 by focusing on the short- and long-term debt maturity structures. The results reveal a positive association between long-term credit and firm performance, but they do not discuss the impact of short-term credit. Meanwhile, Forte and Tavares (2019) focus on a large sample of manufacturing firms in nine European countries and demonstrate that short-term debt

Table 1
Variable descriptions, data sources, and expected signs.

Type	Variable	Description	Source	Sign
Dependent variable	Profitability	EBIT/total assets	CGC-IQ	
Independent variables	Total credit	Natural logarithm of total cash and noncash credit	PDP & CBRT	+
	Noncash credit	Natural logarithm of noncash credit		+
	Cash credit	Natural logarithm of cash credit		+
	Short-term cash credit	Natural logarithm of cash credit with 0-12 month maturity		-
	Medium-term cash credit	Natural logarithm of cash credit with 12-24 month maturity		+
	Long-term cash credit	Natural logarithm of cash credit with 24+ month maturity		+
	Medium- and long-term cash credit	Natural logarithm of cash credit with 12+ month maturity		+
Control variables	Financial risk	(Long-term debt + short-term debt)/(long-term debt + short-term debt + market value of equity)	CGC-IQ	+/-
	Cash ratio	Cash and marketable securities/current liabilities		-
	Firm size	Natural logarithm of total assets		+
	Age	Natural logarithm of years since the firm went public		-
	Inflation rate	Inflation rate	WB	+

Notes: CGC-IQ is the Compustat Global Capital IQ database; PDP is the Public Disclosure Platform (KAP) of Türkiye and Central Bank of Republic of Türkiye (CBRT) Database; WB is the World Bank database.

positively impacts firm performance, while long-term debt has a negative association. Similarly, [Leon \(2020\)](#) examines the growth of SMEs in 62 countries in 2006-2016, finding that short-term credit is associated with growth by small and young companies, but long-term credit does not stimulate their development. [Vuong et al. \(2017\)](#) analyze the effect of capital structure on profitability at 739 UK listed companies in 2006-2015 using static panel regression models and find that long-term liabilities are negatively correlated with the return on assets (ROA), return on equity (ROE), and Tobin's Q, but short-term debt has no such relationship. [Hossain \(2016\)](#) assesses the impact of the capital structure on the financial performance of 81 listed manufacturing companies in Bangladesh in 2002-2014 using a panel corrected standard error regression model. They find that debt ratios are negatively associated with ROA but positively related to ROE, and short-term liabilities have a larger impact on profitability than long-term debt. [Nakatani \(2023\)](#)

Table 2
Descriptive statistics.

Variables	Mean	Median	St.Dev.	Min.	Max.	Skew.	Kurt.	Obs.
Profitability	0.07	0.06	0.08	-0.24	0.53	0.66	6.69	814
Total credit	18.36	18.35	2.14	9.17	23.39	-0.47	3.87	814
Noncash credit	16.52	16.91	3.11	0.00	23.36	-1.74	10.15	814
Cash credit	15.82	17.47	5.72	0.00	22.89	-1.87	5.59	814
Short-term cash credit	14.31	16.17	5.70	0.00	22.29	-1.54	4.41	814
Medium-term cash credit	9.21	13.53	8.40	0.00	21.36	-0.11	1.15	814
Long-term cash credit	10.96	15.72	8.47	0.00	22.70	-0.44	1.35	814
Medium- and long-term cash credit	12.63	16.52	8.07	0.00	22.71	-0.82	1.89	814
Financial risk	0.51	0.54	0.22	0.01	0.98	-0.22	2.23	814
Cash ratio	0.72	0.17	4.07	0.00	89.73	17.39	344.59	806
Firm size	17.27	17.26	2.13	7.05	22.27	-0.65	4.87	814
Age	16.20	18.00	9.97	-4.00	36.00	-0.20	1.67	814
Inflation rate	8.72	7.78	1.36	7.49	11.14	0.96	2.36	814

investigates the relationship between debt maturity and firm profitability for Italian firms in the period 1997-2015 and documents that short-term debt increases firm profitability while long-term debt decreases it. The short debt maturity prevents moral hazard by increasing liquidity risks and forces managers to raise productivity. In contrast, long debt maturity lacks this stimulation, resulting in lower productivity. [Nguyen et al. \(2023\)](#) used an OLS estimator to analyze the effect of debt maturity on the performance of 300 Vietnamese firms from 2012 to 2018. Similarly, they document that long-term debt negatively affects profitability whereas short-term debt positively impacts it.

The different results in the extant literature could be attributed to the heterogeneity of the countries under study and the use of methodological approaches that suffer from weaknesses, such as the inclusion of a fixed-effects estimator with micro panel-data sets. Additionally, attention needs to be paid to the persistent nature of profitability and the potential endogeneity issue due to reverse causality, such as the leverage-profitability linkage. Moreover, the absence of a wider disaggregation of maturities for cash credit may have contributed to the contradictory results. Overall, the literature demonstrates the complex role of external cash injection, whereas the influence of noncash credit on firm performance has received relatively little academic attention.

The prior literature shows that additional research is required to comprehensively investigate the impact of cash credit with varying maturities (short, medium, and long term) on firm performance. The nature and magnitude of the relationship between cash credit and performance could hinge on the proportion of cash credit with different maturities relative to the total volume of cash credit. It is plausible that if short-term (long-term) cash credit constitutes a substantial proportion of the total, a detrimental (beneficial) effect on firm performance might result.

Additionally, the literature lacks critical analysis of the impacts of noncash credit. Prior studies on the effects of debt on firm performance have predominantly overlooked noncash credit as a contributing factor. Noncash credit, however, plays a crucial role in generating profits for firms by facilitating domestic and foreign business transactions, supporting participation in public and private tenders, and securing working capital. Under bank credit policies, firms can choose between cash and noncash credit within their designated credit limit. As such, we anticipate a significant association between noncash credit and firm performance. To the best of our knowledge, our study is the first to explore this relationship. Our research hypotheses are as follows:

Hypothesis 1. The sum of cash and noncash credit positively impacts firm profitability.

Hypothesis 2. Noncash credit positively impacts firm profitability.

Hypothesis 3. Aggregate cash credit positively impacts firm profitability.

Hypothesis 3a. Short-term credit negatively impacts firm profitability.

Table 3
Correlation matrix.

	Profitability	Total credit	Noncash credit	Cash credit	Short-term cash credit	Medium-term cash credit	Long-term cash credit	Medium- and long-term cash credit	Financial risk	Cash ratio	Firm size	Age	Inflation rate
Profitability	1												
Total credit	0.08*	1											
Noncash credit	0.18*	0.87*	1										
Cash credit	0.10*	0.80*	0.56*	1									
Short-term cash credit	0.06	0.56*	0.50*	0.89*	1								
Medium-term cash credit	-0.06	0.42*	0.31*	0.54*	0.46*	1							
Long-term cash credit	0.03	0.48*	0.35*	0.62*	0.46*	0.52*	1						
Medium- and long-term cash credit	0.03	0.54*	0.41*	0.72*	0.54*	0.73*	0.86*	1					
Financial risk	-0.19*	0.45*	0.36*	0.49*	0.44*	0.44*	0.44*	0.45*	1				
Cash ratio	-0.02	-0.13*	-0.22*	-0.23*	-0.22*	-0.13*	-0.12*	-0.14*	-0.25*	1			
Firm size	0.27*	0.68*	0.59*	0.41*	0.37*	0.17*	0.24*	0.23*	0.33*	-0.08*	1		
Age	0.039	0.318*	0.21*	0.06	0.02	-0.02	0.02	0.04	-0.04	0.10*	0.26*	1	
Inflation rate	0.051	0.070	0.04	0.03	0.03	0.04	0.02	0.01	0.03	0.02	0.02	0.07	1

Hypothesis 3b. The sum of medium- and long-term cash credit positively impacts firm profitability.

Hypothesis 3c. Medium-term cash credit positively impacts firm profitability.

Hypothesis 3d. Long-term cash credit positively impacts firm profitability.

Hypothesis 4. Noncash credit decreases the impact of cash credit on firm profitability.

Hypothesis 4a. Noncash credit decreases the impact of short-term cash credit on firm profitability.

Hypothesis 4b. Noncash credit decreases the impact of the sum of medium- and long-term cash credit on firm profitability.

Hypothesis 4c. Noncash credit decreases the impact of medium-term cash credit on firm profitability.

Hypothesis 4d. Noncash credit decreases the impact of long-term cash credit on firm profitability.

3. Research methodology

3.1. Sample data

The sample consists of firm-level annual data on 174 firms over the period 2012–2017. During the sample period, Türkiye had relative economic stability, providing a conducive environment for studying the impact of noncash credit on firm profitability without the confounding effects of major economic disruptions over the industry-level turmoil. This enables a more discerning analysis of the relationship under conditions of relative stability. The sample period ends in 2017, as the Turkish economy suffered from a large current account deficit and foreign currency debt afterward (Arbaa & Varon, 2019). Also, focusing on the period before 2017 enhances the practical relevance of the study. The outcomes are more likely to provide insights that apply to a business environment before this economic instability, offering valuable guidance for strategic decision-making under relatively stable economic conditions.

The sample firms are nonfinancial firms listed on the Borsa Istanbul collected based on data availability. Data on the firms' cash and noncash credit are extracted from auditing reports published by the Public Disclosure Platform (KAP) of Türkiye and the Central Bank of the

Republic of Türkiye (CBRT). Other firm-specific data are obtained from the Compustat Global Capital IQ (CGC-IQ) database, whereas macroeconomic variables come from the World Bank database (WB).

Profitability is the dependent variable, measured as the ratio of earnings before interest and taxes over total assets for a given year. Six firm-specific variables are employed to investigate the effect of cash and noncash credit on firm profitability. The first is *Total Credit*, the natural logarithm of the sum of noncash and cash credit of all maturities. Consequently, *Total Credit* consists of both *Noncash credit* and *Cash credit*. *Noncash credit* is the natural logarithm of noncash credit, the sum of LCs and LGs. *Cash credit* is the natural logarithm of aggregate cash credit. Further, we divide aggregate cash credit into three maturities: short, medium, and long term. *Short-Term Cash Credit* is the natural logarithm of cash credit with maturity of 0 to 12 months, *Medium-Term Cash Credit* is the natural logarithm of cash credit with maturity of 12 to 24 months, and *Long-Term Cash Credit* is the natural logarithm of cash credit with maturity of more than 24 months. For robustness, we also consider the combination of medium- and long-term cash credit.

Several firm-specific and macroeconomic factors are included in the analysis as control variables. The firm-specific control variables are *Financial Risk*, *Cash Ratio*, *Firm Size*, and *Age*. *Financial Risk* is the ratio of financial debt to total invested capital and is a proxy for insolvency risk. Financial debt comprises both short- and long-term debt: the sum of finance lease obligations, bonds, mortgages, and similar debt, indebtedness to affiliates, and all obligations that require interest payment, including bank credit (i.e., cash credit). Total invested capital is the sum of financial debt and the market value of equity. The market value of equity is estimated by multiplying the year-end closing share price by the total number of shares outstanding.

Cash Ratio is the ratio of cash and marketable securities to short-term liabilities. *Firm Size* is another plausible predictor of profitability. Larger firms are assumed to be more profitable, mainly due to their reputation and credibility in the market. Additionally, big firms typically have supply chain advantages, such as economies of scale. *Firm Size* is measured as the natural logarithm of total assets. *Firm Age* is measured as the time between when the firm went public and the present (in years). Aging firms have more assets than growth opportunities, easing their debt financing. Finally, *Inflation* is a country-level control variable. Inflation is expected to positively impact profitability because an increase in prices raises the nominal value of a firm's inventory, thus contributing to higher revenue. However, inflation may harm businesses if they depend heavily on costly short-term borrowing. Detailed variable

Table 4
Two-step system-GMM estimation results.

Variable	Phase 1		Phase 2		Phase 3		Phase 4	
	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7	Model 8
L. Profitability	0.5766** (0.0965)	0.5873** (0.1094)	0.5589** (0.0995)	0.5364** (0.1006)	0.5781** (0.0958)	0.5138** (0.1095)	0.5873** (0.1016)	0.4897** (0.1148)
Current ratio	-0.0015** (0.0005)	-0.0182** (0.0072)	-0.0011** (0.0005)	-0.0010** (0.0005)	-0.0012** (0.0005)	-0.0014** (0.0005)	-0.0014** (0.0005)	-0.0016** (0.0006)
Financial risk	-0.2259** (0.0615)	-0.2709** (0.0734)	-0.2220** (0.0600)	-0.2491** (0.0667)	-0.2385** (0.0639)	-0.2819** (0.0738)	-0.2413** (0.0613)	-0.2873** (0.0769)
Firm size	0.0112** (0.0028)	0.0045 (0.0026)	0.0087** (0.0026)	0.0085** (0.0024)	0.0093** (0.0024)	0.0124** (0.0031)	0.0112** (0.0027)	0.0132** (0.0034)
Age	-0.0006 (0.0004)	-0.0007 (0.0004)	-0.0006 (0.0004)	-0.0005 (0.0004)	-0.0005 (0.0004)	-0.0007 (0.0004)	-0.0005 (0.0004)	-0.0007 (0.0005)
Inflation	0.0048** (0.0012)	0.0044** (0.0013)	0.0047** (0.0013)	0.0050** (0.0013)	0.0048** (0.0013)	0.0050** (0.0013)	0.0045** (0.0013)	0.0049** (0.0013)
Constant	-0.0764** (0.0292)	-0.1046** (0.0374)	-0.0895** (0.0301)	-0.0807** (0.0271)	-0.0745** (0.0282)	-0.0976** (0.0309)	-0.0808** (0.0285)	-0.0968** (0.0324)
		Total credits	Noncash credit	Cash credit	Short-term cash credit	Mid- and long-term cash credit	Mid-term cash credit	Long-term cash credit
		0.0101** (0.0039)	0.0034* (0.0020)	0.0040** (0.0017)	0.0026** (0.0011)	0.0026** (0.0009)	0.0016** (0.0006)	0.0021** (0.0008)
Obs.	604	554	604	604	604	604	604	604
Groups	174	174	174	174	174	174	174	174
Instruments	27	28	28	28	28	28	28	28
AR1 (p)	0.000	0.003	0.000	0.000	0.000	0.001	0.000	0.002
AR2 (p)	0.184	0.222	0.153	0.110	0.155	0.126	0.145	0.185
Hansen (p)	0.245	0.230	0.224	0.229	0.195	0.485	0.338	0.408

Notes: *p < 0.1, **p < 0.05. Standard errors are in parentheses.

definitions and data sources are given in Table 1.

3.2. Method

This study employs a dynamic modeling approach with the first lag of the dependent variable among the right-hand-side variables to investigate the determinants of firm profitability, consistent with previous research. The model used in this study tests the association between the different categories of bank credit and firm profitability:

$$Y_{it} = \beta_0 + \sum_{k=1}^K \beta_k X_{k,it} + \sum_{j=1}^J \delta_j Z_{j,it} + u_{it} \quad (1)$$

where Y_{it} is firm profitability, $X_{k,it}$ is the k th variable, and $Z_{j,it}$ is the j th control variable of firm i at time t . The empirical analysis yields models with varying numbers of variables (see Tables 4 and 5). The control variables—*Financial Risk*, *Cash Ratio*, *Firm Size*, *Age*, and *Inflation*—are also incorporated into all the models.

The presence of endogeneity issues in dynamic panel analysis is denoted by the interdependence of the lagged dependent variable with the individual effects and the error term, thereby leading to biased estimates in datasets with large N and small T (micro panel) (Baltagi, 2013). To obtain reliable estimates for dynamic micro panels, Arellano and Bond (1991) proposed the use of the difference generalized method of moments (diff-GMM) estimation approach, which eliminates individual effects via differencing and employs instruments for the lagged dependent variable (Baltagi, 2013).

Arellano and Bover (1995) suggested the use of orthogonal transformations, instead of differencing, to prevent the loss of observations, because the instruments in the diff-GMM estimator may be biased when the right-hand-side variables of the model are persistent over time, and T is small (Kripfganz, 2019). To address the drawbacks of diff-GMM, Arellano and Bover (1995) and Blundell and Bond (1998) developed the system-GMM estimator, which simultaneously estimates both difference and level equations and increases the number of instruments by using lagged first differences as instruments for levels and lagged levels as instruments for first differences. The system-GMM estimator requires the additional and restrictive assumption that the lagged first differences used as instruments are uncorrelated with the error term (Kripfganz, 2019). In this study, we adopt the two-step system-GMM (2S-sys-GMM) estimator because the additional instruments are valid based on the difference in Hansen tests.

4. Empirical findings

4.1. Preliminary analysis

Table 2 lists the descriptive statistics of the variables under investigation, in which average profitability of the sample firms is 7 percent. On average, *Long-term Cash Credit* comprises the largest share of *Cash credit*. Furthermore, the sample firms' average *Noncash Credit* is higher than their average *Cash Credit*.

Table 3 reveals that *Noncash credit* and *Cash credit* are positively and significantly correlated with corporate profitability, in addition to having a high degree of correlation. These preliminary findings suggest a potential association between the type of credit and performance. Further insights into the correlation matrix results are obtained through empirical analysis.

4.2. Empirical analysis

Our estimation strategy involves a two-step process. Initially, we assess the impact of total credit on firm profitability. Then, we substitute total credit with noncash credit and aggregate cash credit. Subsequently, we divide cash credit into various maturities. In the second step, we confirm the robustness of the results by modeling the interactions of noncash and cash credit as well as financial risk and firm size.

Table 5
Two-step system-GMM estimation results for noncash credit and the components of cash credit.

Variable	Model 9	Model 10	Model 11	Model 12	Model 13
L.Profitability	0.5364** (0.1001)	0.5704** (0.094)	0.5724** (0.100)	0.5139** (0.109)	0.5258** (0.106)
Cash ratio	-0.0007 (0.0005)	-0.0006 (0.000)	-0.0009* (0.000)	-0.0008 (0.001)	-0.0009 (0.001)
Firm size	0.0091** (0.0025)	0.0094** (0.002)	0.0105** (0.003)	0.0125** (0.003)	0.0124** (0.003)
Age	-0.0005 (0.0004)	-0.0004 (0.000)	-0.0004 (0.000)	-0.0004 (0.000)	-0.0005 (0.000)
Inflation	0.0050** (0.0013)	0.0048** (0.001)	0.0047** (0.001)	0.0051** (0.001)	0.0052** (0.001)
Firm size	-0.2436** (0.0649)	-0.2373** (0.063)	-0.2405** (0.059)	-0.2695** (0.068)	-0.2718** (0.067)
Noncash credit	0.0035 (0.0026)	0.0056** (0.003)	0.0043** (0.002)	0.0068** (0.003)	0.0053** (0.002)
Cash credit	0.0071** (0.0029)				
Short-term cash credit		0.0079** (0.003)			
Medium-term cash credit			0.0072** (0.003)		
Long-term cash credit				0.0124** (0.003)	
Medium- and long-term cash credit					0.0097** (0.003)
	Noncash credit × Cash credit	Noncash credit × Short-term cash credit	Noncash credit × Medium-term cash credit	Noncash credit × Long-term cash credit	Noncash credit × Medium- and Long-term cash credit
Interactions	-0.0002 (0.0002)	-0.0004** (0.000)	-0.0003** (0.000)	-0.0006** (0.000)	-0.0004** (0.000)
Constant	-0.1394** (0.0520)	-0.1610** (0.051)	-0.1436** (0.037)	-0.2115** (0.043)	-0.1894** (0.043)
Observations	604	604	604	604	604
Groups	174	174	174	174	174
Instruments	30	30	30	30	30
AR1 (p)	0.001	0.000	0.000	0.000	0.000
AR2 (p)	0.119	0.130	0.100	0.150	0.090
Hansen (p)	0.204	0.180	0.350	0.460	0.420

Notes: * $p < 0.1$, ** $p < 0.05$. Standard errors are in parentheses. The lags are limited to the range from 1 to 3 in all models.

Table 4 presents the empirical findings obtained through 2S-system-GMM, in which eight versions of Equation (1) are estimated. To investigate further, Table 5 presents the models with interaction terms between noncash and cash credit and disaggregation of cash credit. The estimated model coefficients and robust standard errors are presented along with the p -values for the Arellano-Bond first- and second-order tests and the Hansen test of overidentification. The results of the Hansen test indicate that the instrumental variables (IVs) used in all models are valid. As anticipated, first-order autocorrelations are present in all the models, whereas the null hypothesis of second-order autocorrelation is rejected in all cases. Furthermore, the number of IVs used is within an acceptable range considering the number of groups. Thus the coefficient estimates and standard errors presented in Tables 4 and 5 are reliable and can be further interpreted.

Model 1 presents the base model estimates that only include control variables. The outcomes concerning these control variables align with our expectations (see expected signs in Table 1). For example, higher financial risk negatively affects firm profitability, likely due to the increased cost of capital associated with higher risk. Also, riskier firms are less likely to engage in new lucrative projects and participate in tenders. Meanwhile, profitability may drive financial risk, as the pecking order theory implies. More profitable firms tend to require less external funding, and this reverse causality may cause methodological issues of endogeneity if static modeling techniques are used. To tackle this issue, we employ the GMM approach.

Furthermore, a company's lower profitability can be attributed to its higher cash ratio, which implies the unproductive use of resources. The

greater profitability of larger companies can be explained by the economies of scale that they enjoy. Additionally, inflation favors profitability because price increases elevate the nominal value of a firm's inventory, resulting in "better" performance. Although older companies are typically expected to be more experienced, have a more extensive customer base, and thus be more profitable, our findings indicate an insignificant or negative correlation between firm age and profitability. It is also possible that the implementation of new technologies can enable even younger companies to operate more efficiently.

The subsequent models are built upon Model 1 by gradually including particular variables. The models are grouped into four phases. Model 2 demonstrates a significantly positive association between total credit and profitability and supports H1. As the trade-off theory suggests, debt financing increases performance by the sample firms as debt financing decreases financing costs and provides a tax shield. The free cash flow hypothesis also predicts a positive impact due to the disciplinary role of debt on top management. Our findings on cash credit and financial risk should be interpreted together, as the latter comprises cash credit. The detected negative impact of financial risk on firm performance aligns with the previous literature (e.g., Musah & Kong, 2019; Sener et al., 2021). After we control for this effect, more bank credit leads to higher profitability. Some researchers document a positive connection between indebtedness and profitability (Margaritis & Psillaki, 2007; Ramli et al., 2019). Likewise, H2 is supported by noncash credit in Model 3, which shows a positive link with profitability. Noncash credit, as an off-balance-sheet item, does not raise the perceived risk level of a company; instead, it is an indicator of

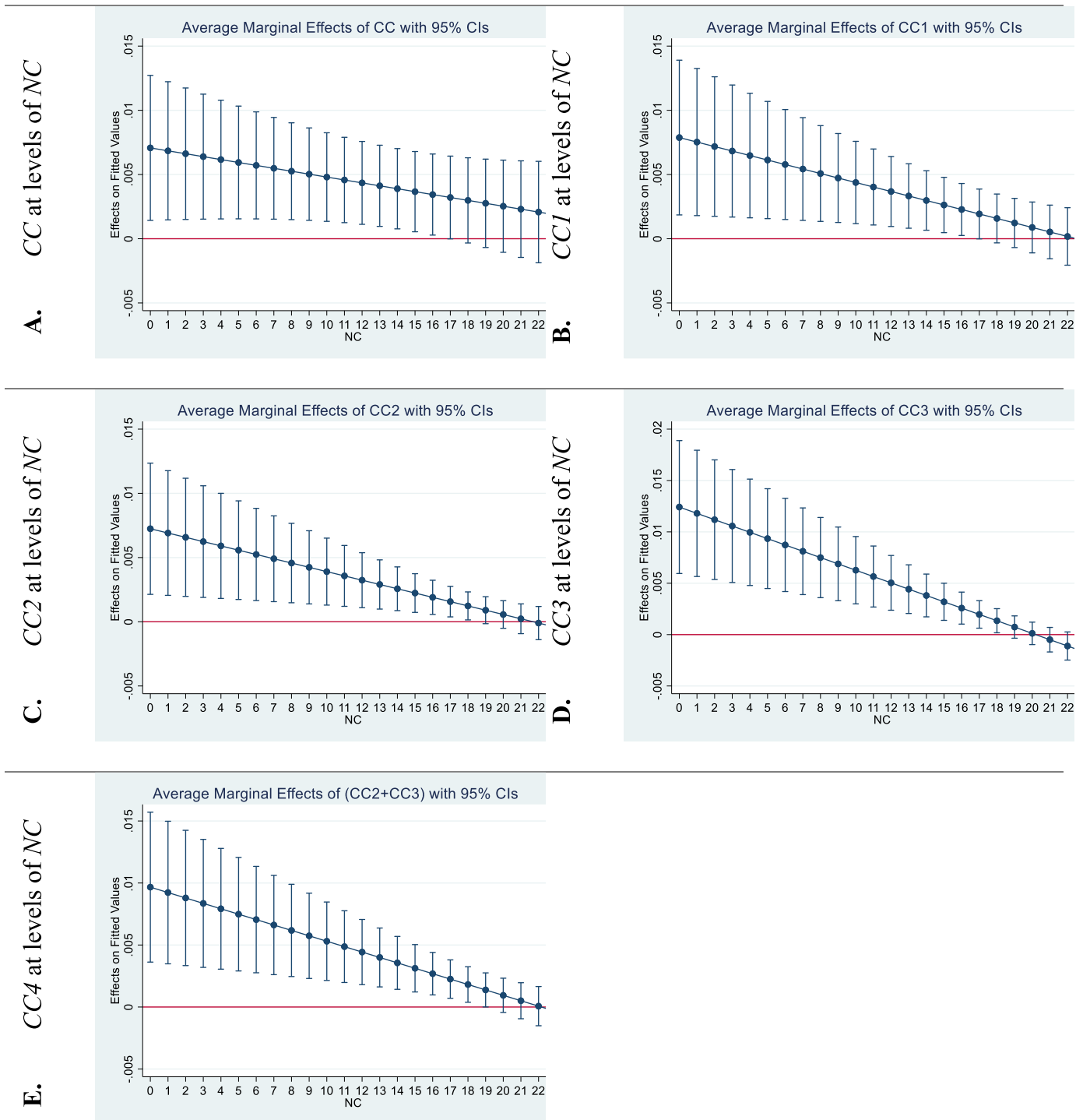


Fig. 2. Effect of cash credit at levels of noncash credit. *Notes:* The graphs show coefficients (with standard errors) of cash credit at different maturities of noncash credit. CC is aggregate cash credit; CC1 is short-term cash credit; CC2 is medium-term cash credit; CC3 is long-term cash credit; CC4=CC2 + CC3; NC is noncash credit.

creditworthiness to the firm’s stakeholders, thereby enhancing business opportunities.

Similarly, Model 4 establishes a positive relationship between cash credit and earnings. Furthermore, departing from the common approach taken in the literature, we split cash credit into the following maturities: short term is 0 to 12 months (*Short-Term Cash Credit* in Model 5), medium term is 12 to 24 months (*Medium-Term Cash Credit* in Model 7), and long term is longer than 24 months (*Long-Term Cash Credit* in Model 8).

For robustness, we also consider *Medium- and Long-Term Cash Credit* (see Model 6). The coefficients of cash credit, along with all its components, are significantly positive. Thus, we find evidence that supports H3, H3b, H3c, and H3d. There is no consensus in the literature on the effect of debt maturity on profitability, as both positive and negative connections are documented (e.g., Vijayakumaran & Vijayakumaran, 2019; Vuong et al., 2017). Thus, we find evidence for our hypotheses. However, contrary to our expectations, short-term cash credit also decreases firm

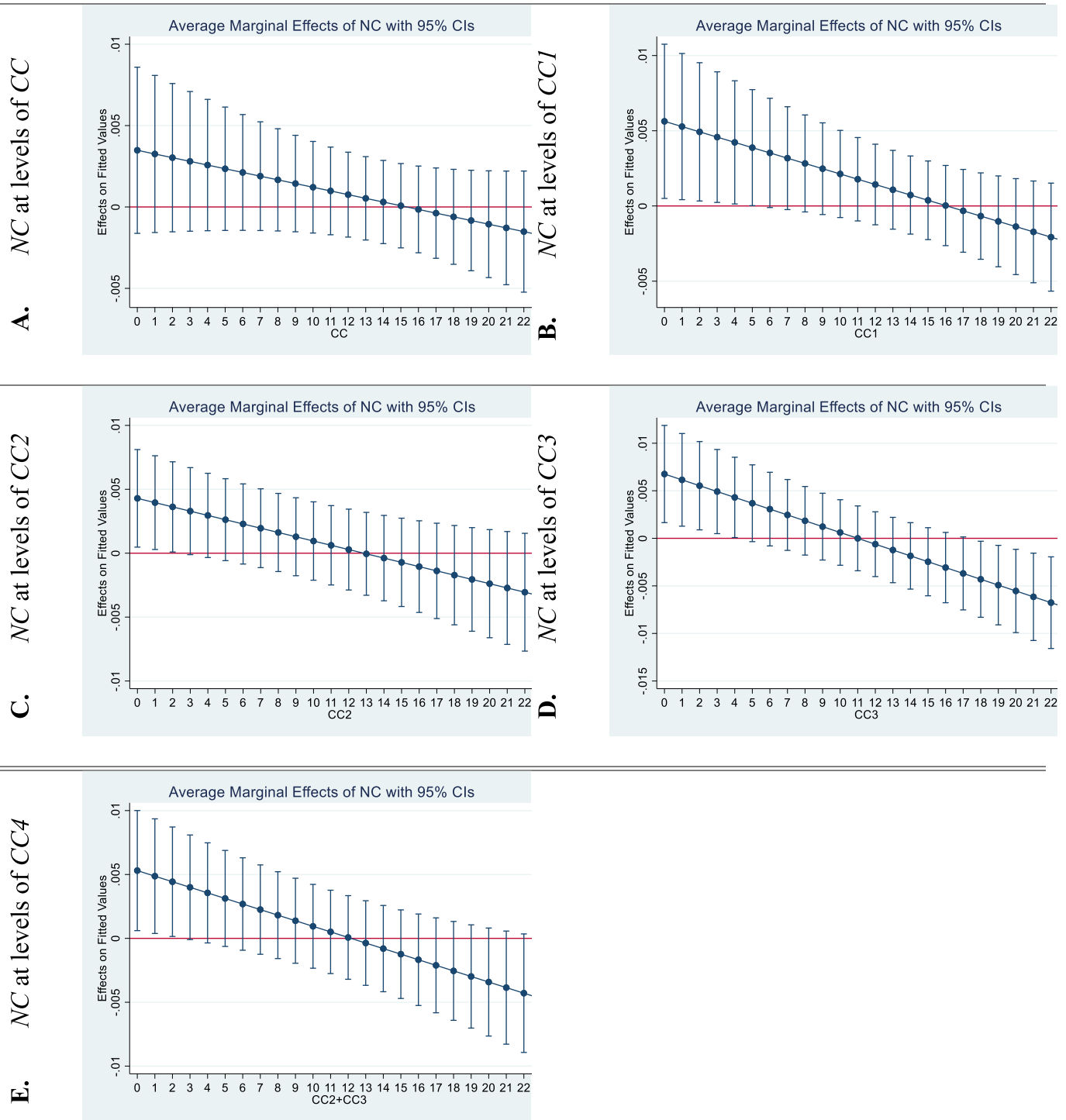


Fig. 3. Effect of cash credit at levels of noncash credit. *Notes:* The graphs show coefficients (with standard errors) of noncash credit at different levels of cash credit. CC = Aggregate cash credit; CCI = Short-term cash credit; CC2 = Medium-term cash credit; CC3 = Long-term cash credit; CC4=CC2 + CC3; NC = Noncash credit.

performance. This finding aligns with Nakatani (2023) and Nguyen et al. (2023) and shows that short-term cash credit exposes the firm to bankruptcy due to the liquidity risk. This connection puts upward pressure on managers to be more profitable.

Because banks allow firms to consider their designated credit limits in terms of either cash or noncash credit, we also investigated their interaction effects. Table 5 presents the results from incorporating interaction terms between noncash and cash credit as well as the

disaggregation of cash credit. The findings on the control variables are generally consistent with the underlying assumptions. Specifically, firm size tends to have a significantly positive association with profitability in most models, implying that larger firms are more profitable. Conversely, firm age appears to have little impact on profitability. In contrast, inflation, which reflects the macroeconomic environment, has a consistent and significant effect across all model specifications, indicating its importance in explaining profitability. When both cash and

Table 6
Robustness checks.

Variable	Model 1	Model 2	Model 3	Model 4	Model 5	Model 6	Model 7
L.Profitability	0.5573** (0.1037)	0.5423** (0.1011)	0.7050** (0.1102)	0.7506** (0.1098)	0.7272** (0.1053)	0.6013** (0.1023)	0.5903** (0.1155)
Cash ratio	-0.0009** (0.0004)	-0.0009** (0.0004)	-0.0039* (0.0021)	-0.0031** (0.0013)	-0.0031** (0.0014)	-0.0023** (0.0009)	-0.0018** (0.0006)
Financial risk	-0.2176** (0.0594)	-0.2445** (0.0673)	-1.4773** (0.6012)	-0.9474** (0.3498)	-0.7642** (0.2940)	-0.4169** (0.1286)	-0.3849** (0.1273)
Firm size	0.0163 (0.0110)	0.0136** (0.0059)	0 (0.0056)	0.0064** (0.0031)	0.0092** (0.0030)	0.0130** (0.0033)	0.0128** (0.0033)
Age	-0.0006 (0.0004)	-0.0005 (0.0004)	-0.001 (0.0007)	-0.0013** (0.0006)	-0.0013** (0.0006)	-0.0010* (0.0005)	-0.0010* (0.0006)
Inflation	0.0048** (0.0013)	0.0050** (0.0013)	0.0035** (0.0016)	0.0065** (0.0014)	0.0061** (0.0014)	0.0049** (0.0014)	0.0045** (0.0014)
Noncash credit	0.0121 (0.0111)		-0.0311 (0.0195)				
Cash credit		0.0093** (0.0046)		-0.0139** (0.0057)			
Short-term cash credit					-0.0157** (0.0069)		
Medium-term cash credit						-0.0085** (0.0031)	
Long-term cash credit							-0.0068** (0.0029)
	Noncash credit × Firm Size	Cash credit × Firm Size	Noncash credit × Financial Risk	Cash credit × Financial Risk	Short-term Cash credit × Financial Risk	Medium-term Cash credit × Financial Risk	Long-term Cash credit × Financial Risk
Interactions	-0.0005 (0.0006)	-0.0003 (0.0003)	0.0838** (0.0356)	0.0478** (0.0188)	0.0419** (0.0173)	0.0193** (0.0068)	0.0166** (0.0068)
Constant	-0.2242 (0.1831)	-0.1657** (0.0785)	0.5501* (0.3038)	0.1629 (0.1200)	0.1200 (0.1046)	-0.0328 (0.0455)	-0.0463 (0.0412)
Observations	604	604	604	604	604	604	604
Groups	174	174	174	174	174	174	174
Instruments	29	29	29	29	29	29	29
AR1 (p)	0.001	0.001	0.006	0.008	0.004	0	0.001
AR2 (p)	0.151	0.119	0.114	0.038	0.153	0.086	0.116
Hansen (p)	0.158	0.196	0.64	0.206	0.558	0.43	0.273

Notes: * $p < 0.1$, ** $p < 0.05$. Standard errors are in parentheses. The lag limits specified within the range: one to three in all models.

noncash credit are included in *Model 9*, noncash credit loses its significance. However, cash credit retains explanatory power by increasing the magnitude of the coefficient in *Table 4*. Also, their interaction is insignificant. Thus, H4 is rejected.

When the cash credit is replaced by its components in *Models 10-13*, noncash credit maintains its positive effect. In contrast, all the components of cash credit have a positive effect on profitability. However, the coefficients of all the interactions of the components with noncash credit are negative and significant. These findings support H4a, H4b, H4c, and H4d.

The summary of marginal effects based on these estimations is illustrated graphically. *Fig. 2* shows the average marginal effect of cash credit on profitability at different maturities of noncash credit. The findings reveal that both aggregate *Cash Credit* and *Short-Term Cash Credit* have a positive impact on the profitability of firms, but this effect diminishes as *Noncash Credit* increases to 16 percent. No significant effect is observed after this threshold. This pattern remains consistent for medium- and long-term cash credit, while the effect diminishes after noncash credit rises to 18 percent. Interestingly, the coefficient of long-term cash credit turns negative as soon as noncash credit surpasses 23 percent. As for *Medium- and Long-Term Cash Credit*, the positive diminishing effect is observed as noncash credit increases to 19 percent. Note that all the inferences are based on a 5 percent significance level.

In contrast, *Fig. 3* presents the average marginal effect of noncash credit on profitability at different levels of cash credit. No significant correlations are detected in testing the impact of noncash credit on company earnings at any aggregate cash credit level. However, we observe a positive but diminishing impact of noncash credit on profitability when short-, medium- and long-term cash credit rise to 5 percent,

2 percent, and 4 percent, respectively. Moreover, the relationship between noncash credit and company earnings turns negative when long-term cash credit exceeds 17 percent. Notably, noncash credit contributes to a firm's earnings only when the sum of medium- and long-term cash credit (CC4) is below 2 percent.

4.3. Robustness

Table 6 displays more focused empirical results for the components of cash credit and for noncash credit with various specifications. Noncash credit boosts profitability, as shown in *Table 4* (Model 3). However, it loses significance after the interactions with firm size and financial risk are introduced in Models 1 and 3 of *Table 6*, respectively. The interaction variable between noncash and financial risk indicates that the positive effect of noncash credit is more profound for firms with higher leverage. This finding implies that firms with a more diversified structure of financing sources are better equipped to handle higher leverage ratios. Alternatively, this result can be interpreted as proof of the leverage effect of converting noncash credit into cash credit.

5. Conclusion

Cash credit is the primary source of funding for firms in bank-driven financial markets. Depending on their needs, riskiness, credibility, and market relationships, firms can borrow bank credit at different maturities. Like many other managerial decisions, the structure of a firm's debt maturity affects performance. Capital structure theories suggest that firms become riskier with increasing debt, and the effect becomes stronger with longer debt maturities. Nevertheless, firms opt for bank

credit as an alternative to equity funding because of the tax-shield effect of interest expenditure and lower cost. Although a significant body of literature reveals the impact of cash credit on corporate performance, the effect of debt maturity on this connection has not been investigated before.

However, noncash credit, such as LC for import-export operations and LG for investment, involve fees and commissions charged by banks that may affect firm performance. Research on the capital structure to date has paid little attention to noncash credit as it mainly comprises off-balance-sheet items that are not considered in leverage estimations. However, noncash credit for investment in working capital is related to the debt structure and affects firm performance.

This study demonstrates that cash and noncash credit significantly contribute to a firm's earnings, irrespective of the different maturity terms for cash credit. In line with some of the previous literature, our findings reveal a positive connection between the cash credit component of leverage and firm performance. This positive effect is documented for all cash credit maturities. Short- and medium-term cash credit are typically used to address working capital needs, whereas long-term cash credit and noncash credit are commonly preferred for funding investment that is expected to contribute to a company's growth performance. The purpose of credit utilization does not determine its impact on firm performance, as other factors previously discussed may have additional ramifications. Moreover, in an inflationary economy such as that of Türkiye, interest yields may soar over short periods, making long-term debt a more feasible option for firms. Applying fixed interest rates for bank credit may prevent having a differentiated result for cash credit based on the maturity term. Furthermore, firm profitability can be influenced by several key drivers, such as financial risk, cash ratio, firm size, and inflation.

Our results offer valuable insights into the impact of external financing options and their components on firm profitability, contributing to the body of knowledge on corporate finance. Further research on the various constituents of noncash credit instruments, such as LCs and LGs, could offer additional insights into corporate performance.

The firms in the country studied face restricted access to capital, unlike other production factors. As a result, cash credit, regardless of the maturity, has a positive influence on the firm's performance, in accordance with our assumptions based on the constructive impact of long-term investment. This phenomenon is corroborated by the negative consequences associated with a low cash ratio, which might refer to obsolete sources. Some portions of the short-to medium-term credit might represent early portions of long-term credit, thereby warranting further scrutiny.

We recommend that regulators, banks, and firms critically analyze the structure of their bank credit to improve their asset quality and performance. This suggestion aligns with the perspective of the Bank for International Settlements on risk weight, supporting deeper analysis of noncash conversions, a thorough examination of leverage components. Firms should carefully consider the type and maturity structure of their credit mix, recognizing their effect on performance.

A deeper focus on the mechanisms behind these connections and explanation of how noncash credit contributes to financial performance, as an indicator of creditworthiness, can be enlightening in studies on the capital structure. Understanding the optimal balance between noncash and cash credit with firm-specific factors can also be fruitful for refining existing theories.

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