REGULAR ARTICLE

Trade credit, labor employment, and demand for skills: An empirical investigation of Vietnamese small and medium enterprises

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Abstract

This paper examines the effect of firms' trade credit use on their labor demand and the composition of this labor demand in terms of skilled and unskilled workers. Our analysis is conducted on a rich data set of private manufacturing small and medium enterprises in Vietnam over the period of 2009–2013. We find strong and robust evidence that these firms recruit more workers when they receive trade credit offered from their suppliers. In addition, larger trade credit is associated with firms' higher propensity to hire skilled labor. We also find that the effect of trade credit on firms' labor market decision works through the investment channels, especially through those investment projects leading to the enhancement of firms' innovative capability. These findings highlight the role of trade credit regulations for job creation and economic development.

KEYWORDS
credit constraints, labor market decisions, skilled labor demand, SMEs, trade credit

JEL CLASSIFICATION
G21, J21, J23, J24, M51

1 | INTRODUCTION

Small and medium enterprises (SMEs), especially those in developing countries, are heavily financially constrained (Beck & Demirguc-Kunt, 2006). SMEs in developing countries have been reported to have a low level of access to formal credit due to obstacles such as strict collateral requirements and complicated loan application procedures (Bach, Le, & Bui, 2021; Casey & O'Toole, 2014; McGuinness et al., 2018). There has been a growing literature suggesting that credit constraints can have a harmful impact on labor employment and human capital development as they affect firms' decisions in the labor market, ranging from searching to screening, training, and firing workers. While the effect is mostly evident in studies on developed countries (e.g., Berton et al., 2018; Caggese et al., 2019; Caggese & Cuñat, 2008; Chodorow-Reich, 2013), evidence is also found within the context of a few developing or transitional countries (e.g., Bach, Harvie, & Le, 2021; Beck et al., 2019; Gine & Townsend, 2004; Popov, 2014). The effect of financing constraints on labor market outcomes of firms runs through different channels including the capital-skill complementarity in production (Krusell et al., 2000), the lack of working capital (Benmelech et al., 2011), the cost of hiring and maintaining workers (Oi, 1962) or output contraction (Buera et al., 2015).

While facing mounting difficulty in obtaining bank loans, a large number of SMEs have decided to turn to other alternative financial sources. Trade credit, a deferred payment for transacted goods, is one of the most important sources among these alternatives. For example, trade credit finances as much as two thirds of world trade (Bank for International Settlements, 2014) and 31.3% of total debt financing, as compared to 37.2% for bank loans in the US (Demirguc-Kunt & Maksimovic, 2001). Given that buyers can delay payments to their suppliers for a negotiable period of time, trade credit becomes an efficient financing arrangement between the firms. This source of funding provides a safety net for firms facing idiosyncratic liquidity shocks (e.g., Cunat, 2007).

Given that trade credit helps ease financial constraints for firms having limited bank loans to a certain extent, there are several ways it can help firms improve their labor market decisions. *First*, by relaxing the financing constraints of firms, trade credit may also relax firms' constraints on recruiting skilled workers. *Second*, as buyers do not need to make immediate payment to suppliers, the deferred money can be used to supplement working capital, thereby enlarging total employment. *Third*, the secured fund that works under a trade credit arrangement can be used to cover labor hiring costs, thus allowing firms to hire more workers. *Fourth*, if the secured fund is used for the purpose of expanding output, there will be a higher demand for labor following each wave of production expansion.

The aim of this paper is to empirically test the effect of firms' trade credit use on their labor-related decisions. Specifically, we seek answers to the following questions: (i) *How does trade credit affect firms' total demand for labor and the relative demand for skilled workers*? And (ii) *Are investments effective channels through which trade credit alters labor market outcomes*? In answering these questions, we make use of a rich data set on Vietnamese private manufacturing SMEs over the period of 2009–2013. This data set provides us with a unique opportunity to thoroughly investigate how trade credit influences employment outcomes within the sectors containing private SMEs with limited access to formal credit. As an additional source of finance, trade credit is, therefore, expected to affect not only firms' total employment but also the skill composition of this employment (i.e., skilled vs. unskilled labor). The rich data set also allows us to delve more deeply into the mechanism through which trade credit influences firms' strategic behavior in the labor market.

There are several reasons that make Vietnam an ideal context for this study. Specifically, Vietnam has been one of the fastest growing economies in the world over the last few decades with a highly dynamic role of private SMEs. These firms account for 97.5% of all firms, contribute around 40% of GDP and provide as many as 60% of jobs in the country (Vietnam Association of Small and Medium Enterprises, 2018), although the majority of them are financially constrained with limited access to bank loans (Ministry of Planning and Investment, 2012). The labor market is rather under-developed with weak protection for workers posing a challenge for job security. Meanwhile, the banking system has been underperforming with high levels of non-performing loans and disproportionate allocation of bank credit to state-owned enterprises (Ferrari & Tran, 2021). While financial distress might induce SMEs to make harmful decisions to workers (i.e., laying off workers more often or restraining from recruiting skilled workers), trade credit might be an important buffer for them to change these decisions in workers' favor.

Our identification strategy controls for endogeneity of trade credit by using the province-industry averaged geographical distance to firms' most important suppliers as an instrumental variable (IV). This IV is deemed relevant since it is correlated with trade credit provision from suppliers to firms; specifically, suppliers from farther distance are more likely to provide trade credit to SMEs in order to be more competitive. It is also likely to satisfy the exclusion restrictions as the IV captures the location-industry-specific conditions that affect SMEs' trade credit accessibility, rather than their employment demand. In addition, we run regressions for a balanced subsample that includes firms appearing in all survey years. Panel regression results indicate that trade credit helps boost up firms' demand for labor and encourages firms to recruit more workers. However, not all workers will benefit in the same way as an increase in trade credit use is associated with a rise in the relative demand for skilled workers. The reason is that firms with a higher share of skilled workers often find it difficult to adjust their labor demand in response to cash flow shocks, resulting in their more precautionary motives for holding cash (Ghaly et al., 2017). As such, greater access to trade credit contributes to firms' better cash or working capital management, enabling them to maintain a higher share of skilled workers. These results are robust to different estimation methods such as ordinary least squares (OLS), firm-specific fixed effects (FEs), and two-stage least squares (2SLS) as well as to the inclusion of control variables capturing firm basic characteristics and production technology conditions. They are also robust to different sample sizes (i.e., unbalanced sample vs. balanced subsample of firms) and alternative definitions of trade credit variable (i.e., using continuous values vs. dummy).

We also find that investment is a potential channel through which trade credit use affects firms' labor-related decisions. To be more precise, by generating extra liquidity for firms, trade credit allows them to use this fund to finance investment projects. These investment projects require firms to hire more labor, especially skilled labor. Among these investment projects, those that enhance firms' investment in general and innovative capacity investment in particular drive the relative demand for skilled labor the most. The intuition for this investment channel is as follows. Since trade credit defers SMEs' cash payment to suppliers to a later date, it allows financially constrained SMEs to take advantage of this concession by reallocating any available cash to productive activities including capital investment. Moving together with this further investment is the increase in demand for workers, especially those high-skilled ones due to the capital-skill complementary (Chen, 2020; Krusell et al., 2000). These findings are robust to panel probit and IV estimators as well as the inclusion of different control variables.

With a special focus on Vietnam, this paper contributes directly to the literature examining how different levels of financial resources can lead to different labor market outcomes in a

developing country. While there are a large number of studies focusing on developed countries, only a few papers have attempted to investigate this issue within a developing country's context, for example, Gine and Townsend (2004) on financial liberalization and occupation choice in Thailand or Beck et al. (2019) on financing constraints and hiring of experienced and trained workers in Uganda. Studies linking credit with labor market decisions in the context of Vietnam are limited in number and scope. While Bach, Harvie, and Le (2021) consider Vietnamese SMEs, their focus is on how different financially constrained types of firms affect firms' behavior in the labor market. More importantly, they do not study trade credit. Being the pioneering research to test the link between trade credit and firms' strategic behavior in the labor market for Vietnam, this paper broadens our understanding of another transitional country with different institutional relationships and philosophical cultures.[1] This paper is also related to the literature considering trade credit as a source of external finance for firms' survival and development.[2] Trade credit increases liquidity to firms in less advanced markets (Burkart & Ellingsen, 2004; Demirguc-Kunt & Maksimovic, 2001) and even functions as a substitute for bank loans in European countries (McGuinness & Hogan, 2016). By easing the liquidity shock of the global financial crisis (GFC), trade credit has a positive effect on SMEs' survival during the GFC. In fact, during the GFC, SMEs mostly rely on trade credit, not bank loans, to finance their capital expenditure (Carbo-Valverde et al., 2016). Within that context, we evaluate the role of trade credit on investment, an issue that has not been thoroughly explored in the literature. This evaluation leads to a brand-new result that investment, along with a few specific types focusing on enhancing innovative capability, is a potential channel through which trade credit influences labor-related decisions of firms. This insight is an additional important contribution of our research.

The paper proceeds as follows. Section 2 describes data sources as well as definitions of variables and their summary statistics. Section 3 discusses empirical strategies for exploring the effect of trade credit use on firms' labor market decisions and if investment, along with some investment types, is an effective channel of the impact. It also discusses alternative ways to deal with the potential endogeneity problem of trade credit. Sections 4 and 5 present the empirical results and discussion. Finally, Section 6 concludes.

2 | DATA DESCRIPTION

2.1 | Data sources

Data used for empirical investigation in this paper are drawn from the Vietnamese SMEs survey conducted biannually over the three survey years of 2009, 2011, and 2013. The survey was a product of the collaboration among several organizations such as the Central Institute for Economic Management, the Institute of Labor Science and Social Affairs, the University of Copenhagen, and the United Nations University. In each round of the survey, there were from 2500 to almost 2700 privately owned firms taking part, with more than 60% of them being repeated from the previous round. These firms operate in manufacturing sector and locate in 10 different provinces across different regions of the country, including Hanoi, Phu Tho, Ha Tay,[3] Hai Phong (the North); Nghe An, Quang Nam, Lam Dong, Khanh Hoa (the Central); and Ho Chi Minh City and Long An (the South). To guarantee sufficient representation of firms and data validity, the survey used stratified sampling in which firms' owners or managers were invited to

participate in questionnaire-based interviews. For the purpose of this study, we use data primarily from the major questionnaire module that contains information on firms' age, total assets, legal status, total full-time employment, skills composition of total full-time employment, firms' access to external finance such as trade credit and bank loans, production technology, investment, labor market conditions, and supplier contacts.

2.2 | Variable definitions and summary statistics

Table 1 gives out definitions for variables used in this study. Among the key variables, firms' total full-time employment is defined as total number of regular employees working on a full-time basis. The data for the measurement of this variable are derived from the question "What was the total work force number at the previous year's end?" in the employment section of the major questionnaire in each survey year. Skilled employment ratio is calculated by the proportion of full-time employees having a university or college degree. The information on skilled employment is derived from the question "Of the total regular workforce in the previous year, how many are in each of the following categories?" in the employment section. We focus on answers about number of employees with a university and college degree. Trade credit is measured by total accounts payable or total outstanding balance owed to all suppliers. Data for constructing this variable are drawn from the question "Current outstanding balance owed to all suppliers?" under the section of investments, assets, liabilities, and credit in the major questionnaire. Under this commercial financing, a firm can purchase goods and services and pay the supplier at a later date agreeable by both sides. Besides these key variables, Table 1 also contains those related to firms' credit position and other important characteristics.

Table 2 provides summary statistics for all variables defined above. Upon excluding those having non-positive or peculiar values of labor employment or total assets, our sample ends up with 2470 firms in 2009; 2423 firms in 2011; and 2428 firms in 2013; making a total of 7311 firm-year observations over the 3 years of analysis. Among them, 1518 firms appear in all three survey years, constituting a balanced subsample of 4554 firm-year observations. A typical firm employs around 13–14 full-time employees in each of the three survey years. Skilled labor ratio is at 3.0%–3.3% of the total full-time employment. Trade credit is averaged at 208.4 million Vietnamese dong in 2009 (around US\$9200 in 2009 price) before increasing to 246.4 million and 352.5 million dong respectively in the two survey years after, 2011 and 2013. Despite having a smaller value than formal credit, trade credit appears in the balance sheet of around 54%–60% of firms, which is a much higher fraction than that of firms having reported using formal (bank) credit (around 15%–21%). More than 64% of the firms are household businesses, with the rest being in one of the following forms: limited-liability company, sole proprietorship, joint-stock company, or cooperative. Regarding firms' production technology and innovation, an average firm uses 1.3–1.5 personal computers and has a likelihood of 6%–14% to introduce a new technology or new production process in the 3 years of analysis. Roughly 9%–17% of firms found it difficult to recruit workers possessing some required/appropriate skill level.

Table 3 reports mean differences across different groups of firms over the employment outcome variables, trade credit and main firm characteristics. There are marked differences between SMEs that use trade credit and those that do not use it across the variables, except for firm age. For example, compared to those without trade credit, firms using trade credit

TABLE 1   Variable definitions.

Variable	Definition
Labor demand	
Full-time employment	Total number of regular full-time employees
Log(Full-time employment)	Natural logarithm of one plus full-time employment
Skilled employment	Number of full-time employees with a university or college degree
Skilled employment ratio	Ratio of skilled employment over full-time employment
Skilled employment dummy	Dummy variable, equal to 1 if skilled employment and 0 otherwise
Trade credit and firm characteristics	
Trade credit	Total accounts payable or total outstanding balance owed to all suppliers, in million Vietnamese dong
Log(Trade credit)[a]	Natural logarithm of one plus trade credit
Trade credit dummy	Dummy variable, equal to 1 for having positive accounts payable and 0 otherwise
Firm age	Number of firms' years of operation
Total assets	Total assets of a firm at end of the year in million Vietnamese dong
Log(Total assets)[a]	Natural logarithm of one plus firm's total assets
Formal credit	Formal short-term (up to 1 year) debt of a firm in million Vietnamese dong, which is mostly accumulated from bank credit
Log(Formal credit)[a]	Natural logarithm of one plus formal credit
Formal credit dummy	Dummy variable, equal to 1 for having formal credit and 0 otherwise
Legal status	Categorical variable for firms' legal status, equal to 1 for household business, 2 for sole proprietorship, 3 for cooperative, 4 for limited liability company, and 5 for joint-stock company
Technology, investment, recruitment, and distance to supplier	
Personal computers	Number of operating personal computers
Log(Personal computers)[a]	Natural logarithm of one plus the number of operating personal computers
Technological innovation dummy	Dummy variable, equal to 1 for introducing a new production process or new technology, and 0 otherwise
Investment dummy	Dummy variable, equal to 1 for undertaking an investment project, and 0 otherwise
Productivity investment dummy	Dummy variable, equal to 1 for making a specific type of investment aimed at improving the firm's productivity, and 0 otherwise
R&D investment dummy	Dummy variable, equal to 1 for making a specific type of R&D investment, and 0 otherwise
Recruitment difficulty dummy	Dummy variable capturing a firm's perceived labor market condition, equal to 1 for experiencing difficulty in recruiting workers with required/appropriate skill level, and 0 otherwise

TABLE 1 (Continued)

Variable	Definition
Distance to supplier	Province-industry average distance (in kilometers) of a firm to the most important supplier
Log(Distance to supplier)[a]	Natural logarithm of one plus distance to supplier

[a]To avoid taking natural logarithm of zero, we add one into the original value before taking the natural logarithm.

relatively employ a larger number of full-time workers, recruit more skilled labor, have more total assets, formal credit, and personal computers. They are also more likely to invest, especially in those productivity-enhancing and innovative capability investment projects, but tend to face with more recruitment difficulty. A similar picture is found for the differences between firms with and without formal (bank) credit. In general, SMEs having trade credit and formal credit are relatively younger. The mean difference test statistics for log(Formal credit) and log(Trade credit) signal the potential complementary relationship between these two sources of external financing.[4]

3 | EMPIRICAL STRATEGIES

3.1 | Effect of trade credit on firms' labor demand

3.1.1 | The baseline models

To evaluate the effect of trade credit on firms' labor employment and their relative demand for skills, we put forward the following empirical model:

$$\text{Labor demand}_{it} = \alpha * \log(\text{Trade credit}_{it}) + \beta * \text{Investment dummy}_{it} + \gamma \qquad (1)$$
$$* \log(\text{Total assets}_{it}) + \mu * \log(\text{Formal credit}_{it}) + \boldsymbol{X}'_{it}\Delta + \boldsymbol{\theta_i} + \omega_{it}.$$

In this equation, the dependent variable Labor demand$_{it}$ is the demand for labor of firm i in year t, measured either by $\log(\text{Full} - \text{time employment}_{it})$ or Skilled employment ratio$_{it}$. While the former accounts for the firm's total demand for labor, the latter characterizes the firm's relative demand for skilled labor (vs. unskilled labor) in total full-time employment. Our main variable of interest is $\log(\text{Trade credit}_{it})$ that measures the scale of trade credit used by the firm for its operation. We also include in this regression equation a variable named Investment dummy$_{it}$ to examine the effect of the firm's investment activity on its labor demand. As explained later, this variable will help reveal a potential channel through which trade credit affects labor market outcome. To control the impact of the firm's financial health on its labor demand, we use $\log(\text{Total assets}_{it})$ and $\log(\text{Formal credit}_{it})$ that capture the firm size and the size of formal (bank) loans, respectively. We also control for a wide range of variables that potentially affect the behavior of the firm in the labor market. To that aim, $\boldsymbol{X}_{it}$ is a vector of control covariates covering firm characteristics such as firm age, legal status, number of personal computers used, and application of new technology to firm perceived labor market

TABLE 2 Summary statistics.

Variable name	2009 Mean	2009 Std. Dev.	2011 Mean	2011 Std. Dev.	2013 Mean	2013 Std. Dev.
Labor demand						
Full-time employment	14.41	27.27	13.84	27.86	12.91	25.83
Log(Full-time employment)	2.09	0.99	2.03	1.00	1.97	0.99
Skilled employment	0.87	2.42	0.94	2.76	0.88	2.54
Skilled employment ratio (%)	3.02	5.75	3.27	6.13	3.32	6.26
Skilled employment dummy	0.29	0.45	0.29	0.45	0.28	0.45
Trade credit and firm characteristics						
Trade credit	208.4	1530.2	246.4	1669.7	352.5	3356.7
Log(Trade credit)	2.14	2.33	2.21	2.40	2.11	2.44
Trade credit dummy	0.60	0.49	0.59	0.49	0.54	0.50
Firm age	15.61	11.35	14.50	9.44	16.54	9.95
Total assets	4024.8	10,212.6	5746.2	18,769.8	5148.7	12,925.5
Log(Total assets)	6.84	1.81	7.28	1.73	7.20	1.72
Formal credit	256.0	1842.1	265.3	1968.9	522.0	7751.0
Log(Formal credit)	1.13	2.39	0.95	2.26	0.92	2.30
Formal credit dummy	0.21	0.41	0.17	0.37	0.15	0.36
Legal status						
Household business	67%		66%		64%	
Sole proprietorship	8%		8%		8%	
Cooperative	3%		3%		2%	
Limited liability	19%		20%		21%	
Joint stock	3%		4%		5%	
Technology, investment, recruitment, and distance to supplier						
Personal computers	1.30	4.13	1.35	4.53	1.47	3.52
Log(Personal computers)	0.47	0.69	0.47	0.70	0.51	0.75
Technological innovation dummy	0.14	0.34	0.13	0.34	0.06	0.25
Recruitment difficulty dummy	0.17	0.37	0.17	0.38	0.09	0.29
Investment dummy	0.61	0.49	0.56	0.50	0.47	0.50
Productivity investment dummy	0.04	0.21	0.05	0.21	0.04	0.18
R&D investment dummy	0.01	0.11	0.01	0.09	0.01	0.08
Distance to supplier	52.15	54.92	52.97	55.60	53.40	59.51
Log(Distance to supplier)	3.60	0.82	3.60	0.83	3.60	0.84
No. of observations	2470		2423		2418	
3-year firms	1518		1518		1518	

TABLE 3 Nonparametric mean differences across firm groups.

Variable name	Trade credit			Formal (bank) credit		
	No	Yes	Test statistic	No	Yes	Test statistic
Full-time employment	1.79	2.21	−18.15***	1.90	2.64	−25.05***
Skilled employment ratio (%)	2.14	3.98	−13.05***	2.77	5.23	−13.38***
Skilled employment dummy	0.19	0.36	−16.23***	0.24	0.49	−18.81***
Investment decision dummy	0.43	0.63	−17.91***	0.46	0.93	−32.55***
Log(Total assets)	6.83	7.31	−11.80***	6.93	7.96	−19.59***
Log(Formal credit)	0.62	1.29	−12.34***			
Log(Trade credit)				1.86	3.52	−23.44***
Firm age	18.06	15.79	8.38***	17.18	14.73	6.98***
Log(Personal computers)	0.33	0.59	−15.50***	0.41	0.83	−19.44***
Technological innovation dummy	0.08	0.13	−7.25***	0.10	0.19	−9.37***
Recruitment difficulty dummy	0.11	0.17	−7.44***	0.13	0.20	−6.72***
Productivity investment dummy	0.02	0.06	−6.59***	0.04	0.07	−5.36***
R&D investment dummy	0.004	0.01	−3.67***	0.01	0.02	−5.44***
Log(Distance to supplier)	3.58	3.61	−1.89**	3.59	3.66	−2.84***

Note: Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level of significance, respectively.

condition (i.e., *Recruitment difficulty$_{it}$*). It also includes a number of specific fixed factors characterized at province or industry level or over the years. While the year-specific FE controls for common macroeconomic shocks such as changes in aggregate demand and inflation, the province-specific FE picks up distinctive socio-economic conditions that vary across provinces and potentially affect the firm's labor demand. Similarly, the industry-specific FE is used to control for market demand and technology that are different across industries but common within each industry. As an example, various degrees of market structure or economies of scale are likely to condition firms' demand for total employment and skills. θ_i is a firm-specific fixed factor that is unique, unobservable, and time-invariant for each firm. ω_{it} is a usual random error that is independently and identically distributed (i.i.d.). α, β, γ, μ, and Δ are coefficients to be estimated, where α is the main parameter of interest, accounting for the effect of trade credit on the firm's labor demand.

Baseline results of Equation (1) will first be obtained through the OLS estimator in which the year-, province-, and industry-FEs are gradually controlled for. Equation (1) will then be estimated with the firm-specific FE estimator, which is applicable to both the whole unbalanced sample and the balanced subsample. In this estimation, we will only control for the firm-specific and year-specific FEs, but not the province- or industry-specific FEs. Since firms hardly change industry or location within a short period of time, these FEs will largely be summoned by the firm FEs. The FE estimator is advantageous over the conventional OLS since it allows us to control for unobserved heterogeneity at firm level, such as owners' ability and management practice and firm culture, which might have considerable effects on the firm's labor demand. To account for zero-inflated data with the dependent variable of skilled employment ratio, we also employ the Tobit model as an additional robustness check.

3.1.2 | Addressing the endogeneity problem

When estimating Equation (1), endogeneity could be a serious issue that biases the relationship between trade credit and the firm's labor market decisions. Although the use of control covariates considerably helps alleviate the unobserved heterogeneity at firm level, there might be other confounding factors that drive both a firm's labor demand and its trade credit use. These include the firm's growth potential or owner's/manager's management capability. Also, reverse causality from labor demand to trade credit could be present as a greater demand for skilled labor may result in the production of more sophisticated products for the firm, which in turn strengthens its credit standing in suppliers' eyes and, hence, heightens its trade credit access.

In this paper, we will address this endogeneity problem in two different ways. *First*, we run FE regressions to control for unobservable heterogeneity at firm level such as owner's/manager's management capability. *Second*, we use an IV method in which we employ geographical distance (in km) to firms' main (most important) supplier as a potential IV for trade credit variable. Instead of measuring the variable at firm level, we take the provincial-industry average. This IV is considered relevant since it is correlated with trade credit provision from suppliers to firms; specifically, suppliers from a farther distance are more likely to provide trade credit to SMEs than nearby suppliers to gain more competitiveness. It also has high potential to satisfy the exclusion restrictions as the IV represents the location-industry-specific conditions that are more likely to affect SMEs' trade credit accessibility than their employment demand. Furthermore, since employment demand is firm-specific, it hardly affects the IV measured at the province-industry level.

3.2 | The role of investment channels

While Equation (1) above helps reveal how trade credit can directly affect firms' labor demand, including total full-time employment and the relative demand for skilled labor, there may be other ways through which trade credit influences firms' behavior in the labor market (i.e., an indirect effect of trade credit). These include investment channels through the so-called capital-skill complementarity, as per Krusell et al. (2000) and Chen (2020). In this section, we attempt to explore the role of some investment types, especially those that are aimed at improving productivity and R&D investment, in affecting the trade credit–labor demand nexus. To this end, we consider the following regression model:

$$\text{Investment dummy}_{it} = \alpha * \log(\text{Trade credit}_{it}) + \beta * \log(\text{Total assets}_{it}) + \gamma \qquad (2)$$
$$* \log(\text{Formal credit}_{it}) + \mathbf{X}'_{it}\Delta + \boldsymbol{\theta_i} + \omega_{it}.$$

In this equation, Investment dummy$_{it}$ is the dependent variable capturing an investment decision, either in terms of making investment as a whole or investing in a specific type aimed at improving the firm's productivity and innovative capability (e.g., R&D activities). These types of investments are expected to strengthen the demand for skilled labor as they stimulate the application of advanced technology in the workplace. Other variables are as previously defined. Given that our investment variables are dummies by construction, panel probit estimator will be used for our regressions. For robustness checks, regressions will be conducted both with and

without controlling for year-, province-, and industry-specific FEs. To deal with the potential endogeneity of trade credit variable, we will also use an IV method with the province-industry averaged geographical distance to firms' most important suppliers serving as an IV for trade credit (as discussed above). In that regard, the 2SLS estimation procedure will also be used, similar to the one described in Section 3.1.2.

4 | RESULTS AND DISCUSSION

4.1 | The labor demand equations

Table 4 presents baseline results for the direct effect of trade credit on firms' total labor demand. The dependent variable is the firm's full-time employment that comprises all regular employees working on a full-time basis. There are three pairs of specifications in this table, corresponding to OLS estimation, FE estimation on the whole sample, and FE estimation on the balanced subsample, respectively. The estimated results show that trade credit stimulates the firm to expand its full-time labor force. This is evidenced by a positive and statistically significant estimated coefficient for log(Trade credit) in all the specifications from (4.1) to (4.6). Quantitatively, for example, in specification (4.6) with FE estimator, a 1% increase in the volume of trade credit

TABLE 4 Trade credit and full-time employment demand.

Dependent variable: Log(full-time employment)	(4.1) OLS	(4.2) OLS	(4.3) FE	(4.4) FE	(4.5) FE	(4.6) FE
	Whole sample		Whole sample		Balanced subsample	
Log(Trade credit)	0.040***	0.042***	0.015***	0.016***	0.017***	0.017***
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Investment dummy	0.115***	0.098***	0.039***	0.039***	0.038***	0.039***
	(0.014)	(0.014)	(0.013)	(0.013)	(0.014)	(0.014)
Log(Total assets)	0.180***	0.184***	0.069***	0.073***	0.070***	0.075***
	(0.005)	(0.006)	(0.008)	(0.008)	(0.009)	(0.009)
Log(Formal credit)	0.025***	0.024***	0.006	0.005	0.007*	0.007
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Additional controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year-specific effects	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*
Province-specific effects	*No*	*Yes*	*No*	*No*	*No*	*No*
Industry-specific effects	*No*	*Yes*	*No*	*No*	*No*	*No*
No. of observations	7311	7311	7311	7311	4554	4554
R^2	0.703	0.725	0.268	0.271	0.257	0.261
R^2 (within)			0.096	0.098	0.099	0.101

Note: Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level of significance, respectively. Additional controls consist of firm age, legal status, log(Personal computers), technological innovation dummy, and recruitment difficulty dummy. All variables are as defined in Table 1.

Abbreviations: FE, fixed effect; OLS, ordinary least squares.

used by the firm is associated with a 0.017% rise in its total full-time employment. While this estimate is relatively smaller than that with OLS estimator, it is quite persistent across all FE specifications, applying to either the whole sample or the balanced subsample.[5] The positive effect of trade credit on firms' employment is largely similar to what is reported by Barrot and Nanda ([2020]) in the context of federal *Quickpay* reform of 2011 in the United States. Specifically, the *Quickpay* reform indefinitely accelerated payments to a subset of small business contractors of the US government, cutting the time between invoice approval and payment by half, from 30 to 15 days, thus reducing the working capital needed for sustaining sales with the government. The authors find that trade credit alleviates financial constraints in small firms, thereby contributing to employment growth at firm level. By looking at trade credit from the aspect of a firm's relationship with its suppliers within the context of a developing country, our paper therefore complements Barrot and Nanda's ([2020]) study.

The main control covariates produce meaningful estimates. Specifically, each time the firm embarks on a new investment project, it tends to expand its full-time employment. This is evidenced by a positive and significant coefficient of Investment dummy across the regressions. Firm size, measured by the firm's total assets, positively and significantly increases the firm's total employment. Similarly, higher credit from banks and other formal institutions significantly boosts up the firm's labor demand. It is interesting to see that the effect of formal credit on total employment is largely insignificant and much smaller than that of trade credit. For example, in specifications (4.5) and (4.6), the elasticity of total full-time employment with respect to formal credit is 0.007, which is less than half of that with respect to trade credit, at 0.017. This gap is persistent across all the specifications from (4.1) to (4.6). This result can be explained on the ground that the use of trade credit among Vietnamese SMEs is much more prevalent than that of formal credit. In the study period, 54%–60% of the firms used trade credit, compared to 15%–21% of them using formal credit. In many developing countries, it is not easy for SMEs to access formal bank loans due to strict collateral and book-keeping requirements (Casey & O'Toole, [2014]; McGuinness et al., [2018]). Hence, they have to rely more on informal financial sources including trade credit for their employment expansion.

Table [5] reports the results on the effect of trade credit use on the firm's relative demand for skilled employment. Specifically, Skilled employment ratio is now used as the dependent variable instead. The estimated results show that the use of trade credit entails the firm's stronger demand for skilled labor relatively to that for unskilled labor. In the first two specifications (using OLS estimator), the estimated coefficient for log(Trade credit) is highly significant and a 1% increase in the volume of trade credit used by the firm is associated with a rise of 0.128–0.130 percentage point in the skilled employment ratio. This result is qualitatively the same across all other specifications despite using a different estimation method (i.e., FE and Tobit estimator).[6] It is interesting that formal credit has a negligible impact on the relative demand for skilled employment. The estimated coefficient for log(*Formal credit*) is smaller in terms of magnitude and statistically insignificant in all specifications with FE estimator from (5.3) to (5.6).

There are several reasons why trade credit stimulates relative demand for skilled employment. *First*, hiring skilled workers often incurs fixed costs associated with recruiting, firing, and training, thus additional funding will be required (Oi, [1962]). Given that SMEs in developing countries are heavily credit-constrained in the formal credit market (Casey & O'Toole, [2014]; McGuinness et al., [2018]), trade credit helps relax their credit constraint. Although trade credit does not involve any cash receipts, it allows firms to use any available cash for other operational purposes such as recruiting more skilled workers. This result is consistent with what is found in

TABLE 5 Trade credit and relative skilled employment demand.

	(5.1)	(5.2)	(5.3)	(5.4)	(5.5)	(5.6)	(5.7)	(5.8)
	OLS	OLS	FE	FE	FE	FE	Tobit	Tobit
Dependent variable: Skilled employment ratio	Whole sample				Balanced subsample		Whole sample	
Log(Trade credit)	0.130***	0.128***	0.130***	0.130***	0.165***	0.165***	0.259***	0.253***
	(0.035)	(0.035)	(0.046)	(0.046)	(0.051)	(0.051)	(0.075)	(0.075)
Investment dummy	0.376***	0.427***	0.431***	0.430***	0.337*	0.337*	1.262***	1.725***
	(0.116)	(0.118)	(0.166)	(0.166)	(0.180)	(0.180)	(0.404)	(0.420)
Log(Total assets)	0.160***	0.185***	0.177**	0.169**	0.192**	0.193**	1.569***	1.535***
	(0.037)	(0.047)	(0.074)	(0.078)	(0.081)	(0.087)	(0.156)	(0.161)
Log(Formal credit)	−0.070**	−0.063*	−0.040	−0.039	−0.065	−0.065	−0.204***	−0.150**
	(0.033)	(0.033)	(0.046)	(0.046)	(0.052)	(0.052)	(0.062)	(0.063)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-specific effects	No	Yes	No	Yes	No	Yes	No	Yes
Province-specific effects	No	Yes	No	No	No	No	No	Yes
Industry-specific effects	No	Yes	No	No	No	No	No	Yes
No. of observations	7311	7311	7311	7311	4554	4554	7311	7311
R^2	0.436	0.447	0.374	0.373	0.390	0.390	0.216	0.221
R^2 (within)			0.030	0.030	0.031	0.031		
Log pseudolikelihood							−8839.4	−8785.3

Note: Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level of significance, respectively. Additional controls consist of firm age, legal status, log(Personal computers), technological innovation dummy, and recruitment difficulty dummy. All variables are as defined in Table 1.

Abbreviations: FE, fixed effect; OLS, ordinary least squares.

Beck et al. (2019) in the context of small businesses in Uganda, where skilled labor employment depends crucially on firms' access to external financing, whilst the hiring of casual and family workers does not. *Second*, firms with a higher share of skilled workers often find it difficult to adjust their labor demand in response to cash flow shocks, resulting in more precautionary motives for holding cash (Ghaly et al., 2017). As such, a greater access to trade credit contributes to firms' better cash or working capital management, enabling them to maintain a higher share of skilled workers. *Third*, there may exist some channels through which trade credit exerts its effect on firms' demand for skilled labor such as investment channels. In Section 5, we will explore this possible indirect effect with investments being considered as potential channels of impact using formal regression analysis.

With respect to the control covariates of interest, undertaking investment stimulates firms to move towards recruiting relatively more skilled workers in total full-time employment composition. This may be because of the capital-skill complementarity in production as explained by Krusell et al. (2000) and Chen (2020) in their theoretical models. Firm size (measured in total assets) is positively and significantly associated with the relative demand for skilled labor. This indicates that larger firms tend to focus more on recruiting skilled labor in their total employment structure.

4.2 | Addressing the endogeneity problem

In this section, we deal with the endogeneity problem. Specifically, we use the IV approach with a 2SLS procedure. We report obtained results in Table 6 in which the second stage results are presented in the first four columns and the first stage results are in the last column. The results from the first stage regressions indicate that log(Distance to supplier) is a highly relevant IV for log(Trade credit). This is because the estimated coefficient for log(Distance to supplier) is positive and statistically significant at 5% level in specification (6.5). This indicates that there is a positive relationship between firms' distance to the most important supplier and their trade credit access. This is because to increase the market share, a supplier of longer distance needs to attract their customers by providing them with more favorable trading conditions such as more trade credit. In addition, the obtained F-statistics is well above 10 meaning that the IV is valid for the endogenous variable (Staiger & Stock, 1997). Given a relevant and valid IV, the second stage reconfirms the baseline results on the positive effect of trade credit on both full-time employment and skilled employment ratio. This is evidenced by the positive and significant estimated coefficient for log(Trade credit) in the specifications from (5.1) to (5.4). There is thus a potential causal effect of trade credit on SMEs' demand for full-time employment and their relative demand for skilled employment.

5 | THE ROLE OF INVESTMENT CHANNELS

It has been shown that trade credit potentially has a direct and causal effect on SMEs' demand for total full-time employment and their relative demand for skilled employment. Since the literature on the trade credit-labor demand nexus is in a nascent stage, we further explore a number of potential channels through which trade credit helps enhance firms' labor demand, particularly their relative demand for skilled labor. In Table 7, we report results obtained from regressing trade credit on the firm's decision regarding making an investment in general, and

TABLE 6 Trade credit and employment demand (addressing endogeneity).

Dependent variable:	(6.1)	(6.2)	(6.3)	(6.4)	(6.5)
	2nd stage				**1st stage**
	Log(full-time employment)		**Skilled employment ratio**		**Log(trade credit)**
Log(Trade credit)	0.397***	0.387***	2.974**	2.984**	
	(0.150)	(0.149)	(1.376)	(1.376)	
Log(Distance to supplier)					0.055**
					(0.028)
Investment dummy	0.138***	0.125***	0.440***	0.445***	
	(0.014)	(0.014)	(0.114)	(0.115)	
Log(Total assets)	0.050	0.061	−0.868*	−0.877*	0.355***
	(0.054)	(0.054)	(0.494)	(0.494)	(0.016)
Log(Formal credit)	−0.037	−0.0368	−0.555**	−0.556**	0.169***
	(0.026)	(0.025)	(0.235)	(0.235)	(0.011)
Additional controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year-specific effects	*No*	*Yes*	*No*	*Yes*	*No*
Province-specific effects	*No*	*No*	*No*	*No*	*No*
Industry-specific effects	*No*	*No*	*No*	*No*	*No*
No. of observations	7303	7303	7303	7303	7303
F-statistic	1215.9	1078.0	326.1	279.7	432.5
R^2	0.697	0.703	0.435	0.435	0.322

Note: Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level of significance, respectively. In the second-stage regressions, additional controls consist of firm age, legal status, log(Personal computers), technological innovation dummy, and recruitment difficulty dummy. In the first-stage regression, additional controls include firm age and legal status. All variables are as defined in Table 1.

making a specific investment for productivity improvements and R&D in particular. It can be seen that the estimated coefficient for log(Trade credit) is positive and highly significant in specifications (7.1) and (7.2), indicating a positive association between trade credit and SMEs′ investment. In addition, trade credit is found to encourage greater investment made into the areas that yield productivity enhancement and innovative capability. This is evidenced by a positive and significant coefficient for log(Trade credit) in specifications (7.3) and (7.4) for the case of productivity improvement and (7.5) and (7.6) for the case of R&D, respectively.

The above results together with the result that Investment dummy stimulates greater full-time employment and higher relative demand for skilled employment indicate that investment, particularly those purposefully on enhancing productivity and innovation, is a possible channel through which trade credit affects SMEs′ recruiting behavior. The intuition for this impact channel is as follows. Since trade credit defers SMEs′ cash payment to suppliers to a later date, it allows financially constrained SMEs to take advantage of this concession by reallocating any available cash to productive activities including capital investment. Together with this further investment is the increase in demand for workers, especially for those high-skilled ones. This capital-skill complementarity has been documented in several previous studies such as Krusell

TABLE 7 Investment channels for the trade credit-employment demand nexus.

Dependent variable:	(7.1)	(7.2)	(7.3)	(7.4)	(7.5)	(7.6)
	Investment dummy		Productivity investment dummy		R&D investment dummy	
Log(Trade credit)	0.113***	0.100***	0.091***	0.090***	0.070**	0.093***
	(0.010)	(0.010)	(0.015)	(0.015)	(0.027)	(0.028)
Log(Total assets)	−0.027*	0.073***	0.026	0.026	0.026	−0.035
	(0.014)	(0.016)	(0.023)	(0.026)	(0.052)	(0.054)
Log(Formal credit)	0.266***	0.232***	0.020*	0.013	0.036*	0.037*
	(0.013)	(0.013)	(0.012)	(0.012)	(0.020)	(0.020)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Year-specific effects	No	Yes	No	Yes	No	Yes
Province-specific effects	No	Yes	No	Yes	No	Yes
Industry-specific effects	No	Yes	No	Yes	No	Yes
No. of observations	7311	7308	7311	7296	7311	6966
Log pseudolikelihood	−4216.6	−3916.4	−1227.9	−1202.1	−314.6	−280.0

Note: ***, **, and * indicate significance at the 1%, 5%, and 10% level of significance, respectively. Additional controls consist of firm age, legal status, log(Personal computers), technological innovation dummy, and recruitment difficulty dummy. All variables are as defined in Table 1.

et al. (2000) and Chen (2020). In particular, Chen (2020) builds a theoretical model in which capital substitutes low-skilled labor but complements high-skilled labor. He finds that two thirds of labor productivity growth in the goods sector can be explained by capital accumulation and its interaction with capital-skill complementary. As such, investment will serve as a potential channel through which trade credit, as part of firms' external financing, affects their demand for full-time labor in general and for skilled labor in particular.

In Table 8, we report the second-stage results obtained from conducting the 2SLS regressions for the trade credit-investment nexus. Note that we do not report the first-stage results here because they have already been included in Table 6 above. There are three pairs of regression in Table 8, corresponding to the firm's decision on whether to make any investment or not, and to invest purposefully for productivity improvements and R&D. The second stage results in Table 8 reconfirm the positive and causal effect of trade credit on firm's general investment decision and, more specifically, on firm's R&D investment decision. This is evidenced by the positive and significant estimated coefficient for log(Trade credit) in specifications (8.1), (8.2), and (8.5) and (8.6). However, there is insufficient statistical evidence for the causal effect of trade credit on firm's decision on undertaking investment for productivity improvement as the estimated coefficient for log(Trade credit) is insignificant, although positive, in specifications (8.3) and (8.4).

6 | CONCLUSIONS

In this paper, we have examined the importance of trade credit as an alternative source of external finance to firms' strategic labor market decisions. Results from empirical analysis conducted

TABLE 8 Investment channels for the trade credit-employment demand nexus (addressing endogeneity, second-stage results).

	(8.1)	(8.2)	(8.3)	(8.4)	(8.5)	(8.6)
Dependent variable:	Investment dummy		Productivity investment dummy		R&D investment dummy	
Log(Trade credit)	0.383***	0.379***	0.060	0.061	0.049**	0.049**
	(0.121)	(0.121)	(0.052)	(0.052)	(0.024)	(0.024)
Log(Total assets)	−0.137***	−0.132***	−0.017	−0.017	−0.017**	−0.017*
	(0.043)	(0.043)	(0.019)	(0.019)	(0.009)	(0.009)
Log(Formal credit)	−0.001	−0.001	−0.006	−0.006	−0.007*	−0.007*
	(0.021)	(0.020)	(0.009)	(0.009)	(0.004)	(0.004)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes
Year-specific effects	No	Yes	No	Yes	No	Yes
Province-specific effects	No	No	No	No	No	No
Industry-specific effects	No	No	No	No	No	No
No. of observations	7303	7303	7303	7303	7303	7303
F-statistic	195.0	167.9	5.6	4.9	4.4	3.7
R^2	0.152	0.159	0.013	0.013	0.021	0.022

Note: Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level of significance, respectively. Additional controls consist of firm age, legal status, log(Personal computers), technological innovation dummy, and recruitment difficulty dummy. All variables are as defined in Table 1.

on a rich firm-level data set reveal that a higher level of trade credit use is associated with a higher demand for labor. In comparison, skilled workers have a higher probability of being recruited than their unskilled counterparts whenever there is a more extensive use of trade credit by firms. An increase in trade credit use also predicts more investment to be conducted, especially R&D investment. Because investment often entails more labor employment, especially skilled labor, this implies that investment effectively translates trade credit use into strategic behavior of firms in the labor market. Our results are robust to different model specifications as well as to the inclusion of a wide range of control variables. They are also robust to different sample types, methods used for addressing endogeneity and zero-inflated dependent variable concerns, and alternative definitions of trade credit variables.

While our findings are based on firm-level data, they have broader implications for policy and practice. As firms' trade credit use and employment decisions are interrelated, the findings suggest that the availability of trade credit potentially allows firms to continue to employ workers in times of limited access to bank loans. On the policy front, they highlight the need to regulate and protect trade credit agreements so that SMEs can secure enough funds for their employment generation, human capital accumulation and making broader contributions to the society.

Our paper lays an important first step in examining the relationship between trade credit use and SMEs' labor market demand within a country that is heavily rooted in the culture of trust meanwhile the financial and labor markets are largely underdeveloped. What further

needs to be done would be the effect of trade credit on workers' on-the-job training and receipt of overtime payment. This will help enrich our future research agenda.

CONFLICT OF INTEREST STATEMENT

The authors declare no conflicts of interest.

DATA AVAILABILITY STATEMENT

Data used in this study will be made available upon request.

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ENDNOTES

[1] Microfinance and social networks have been important features of Vietnamese culture. Relational mechanisms are effective in case Vietnamese firms provide trade credit to each other (McMillan & Woodruff, 1999).

[2] There are broadly several main financing methods depending on sources: market finance, formal finance, and informal finance. Some studies include trade credit as a type of informal finance (Allen et al., 2019; Degryse et al., 2016), while others classify it under the formal finance framework (Ayyagari et al., 2010). As such, trade credit can be seen as having a "hybrid" form of financing as it has both formal finance and informal finance characteristics.

[3] Ha Tay used to be an independent province but has been merged into Hanoi since 2009. For the sake of consistent time analysis, data for Ha Tay is presented separately.

[4] This is also evident in a multivariate regression framework when trade credit is regressed on formal (bank) credit and other firm characteristics such as firm age, firm size, and legal status. In all specifications, the estimated coefficient for formal credit is positive and statistically significant at a high level of 1%. The relevant results are not reported here to save space but will be provided upon request.

[5] As a robustness test, Table A1 in Appendix A also shows the positive and statistically significant effect of trade credit dummy on firms' full-time labor force, across all specifications with the OLS and FE estimator. In the subsample analysis of Table A3, the statistically significant effect of trade credit on SMEs' full-time employment is applicable to firms operating in the Northern and Southern region, but not to those in the Central region. In Table A5, trade credit's effect is statistically significant in all subsamples established based on firm age.

[6] As a robustness test, Table A2 in Appendix A also indicates the positive and statistically significant effect of trade credit dummy on skilled employment ratio, in all specifications from (A2.1) to (A2.8). Tables A4 and A6 provide further evidence on the trade credit-skilled employment demand nexus in which a positive and statistically significant effect is realized only in the subsample of SMEs in the Northern region, but not in the Central or Southern region. Similarly, a positive and significant effect is identified in the subsample of SMEs having less than 10 years of operation, but not in older firms.

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APPENDIX A

TABLE A1 Trade credit and full-time employment demand (using trade credit dummy).

Dependent variable: Log(full-time employment)	(A1.1)	(A1.2)	(A1.3)	(A1.4)	(A1.5)	(A1.6)
	OLS	OLS	FE	FE	FE	FE
	Whole sample		Whole sample		Balanced subsample	
Trade credit dummy	0.069***	0.080***	0.042***	0.043***	0.044***	0.046***
	(0.014)	(0.013)	(0.013)	(0.013)	(0.014)	(0.014)
Log(Formal credit)	0.029***	0.028***	0.007*	0.006*	0.008*	0.007*
	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)
Investment dummy	0.128***	0.109***	0.041***	0.041***	0.040***	0.041***
	(0.014)	(0.014)	(0.013)	(0.013)	(0.014)	(0.014)
Log(Total assets)	0.192***	0.196***	0.072***	0.076***	0.073***	0.078***
	(0.005)	(0.006)	(0.008)	(0.008)	(0.009)	(0.009)
Additional controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year-specific effects	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*
Province-specific effects	*No*	*Yes*	*No*	*No*	*No*	*No*
Industry-specific effects	*No*	*Yes*	*No*	*No*	*No*	*No*
No. of observations	7311	7311	7311	7311	4554	4554
R^2	0.698	0.721	0.261	0.264	0.249	0.253
R^2 (within)			0.094	0.095	0.096	0.097

Note: Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level of significance, respectively. Additional controls consist of firm age, legal status, log(Personal computers), technological innovation dummy, and recruitment difficulty dummy. All variables are as defined in Table 1.

Abbreviations: FE, fixed effect; OLS, ordinary least squares.

TABLE A2 Trade credit and relative skilled employment demand (using trade credit dummy).

Dependent variable: Skilled employment ratio	(A2.1) OLS	(A2.2) OLS	(A2.3) FE	(A2.4) FE	(A2.5) FE	(A2.6) FE	(A2.7) Tobit	(A2.8) Tobit
	Whole sample		Whole sample		Balanced subsample		Whole sample	
Trade credit dummy	0.232**	0.234**	0.340**	0.339**	0.398***	0.398***	0.902**	0.930**
	(0.110)	(0.113)	(0.140)	(0.139)	(0.154)	(0.154)	(0.400)	(0.407)
Log(Formal credit)	−0.057*	−0.050	−0.032	−0.032	−0.056	−0.056	−0.183***	−0.128**
	(0.033)	(0.033)	(0.046)	(0.046)	(0.051)	(0.052)	(0.062)	(0.063)
Investment dummy	0.417***	0.463***	0.447***	0.446***	0.362**	0.363**	1.305***	1.768***
	(0.116)	(0.118)	(0.166)	(0.166)	(0.180)	(0.180)	(0.406)	(0.422)
Log(Total assets)	0.196***	0.220***	0.201***	0.193**	0.220***	0.221**	1.669***	1.631***
	(0.037)	(0.047)	(0.074)	(0.078)	(0.081)	(0.087)	(0.153)	(0.159)
Additional controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year-specific effects	No	Yes	No	Yes	No	Yes	No	Yes
Province-specific effects	No	Yes	No	No	No	No	No	Yes
Industry-specific effects	No	Yes	No	No	No	No	No	Yes
No. of observations	7311	7311	7311	7311	4554	4554	7311	7311
R^2	0.435	0.446	0.365	0.364	0.381	0.381	0.216	0.221
R^2 (within)			0.029	0.029	0.028	0.028		
Log likelihood							−8842.6	−8788.1

Note: Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level of significance, respectively. Additional controls consist of firm age, legal status, log(Personal computers), technological innovation dummy, and recruitment difficulty dummy. All variables are as defined in Table 1.

Abbreviations: FE, fixed effect; OLS, ordinary least squares.

TABLE A3 Trade credit and full-time employment demand (regional subsamples).

Dependent variable: Log(full-time employment)	(A3.1)	(A3.2)	(A3.3)	(A3.4)	(A3.5)	(A3.6)
	Northern region		Central region		Southern region	
Log(Trade credit)	0.018***	0.018***	0.003	0.003	0.020***	0.019***
	(0.006)	(0.006)	(0.008)	(0.008)	(0.006)	(0.006)
Log(Formal credit)	0.012**	0.012**	0.001	−0.0003	−0.001	−0.002
	(0.006)	(0.006)	(0.008)	(0.008)	(0.007)	(0.007)
Investment dummy	0.024	0.024	0.076***	0.073***	0.021	0.023
	(0.022)	(0.022)	(0.021)	(0.021)	(0.025)	(0.025)
Log(Total assets)	0.080***	0.081***	0.055***	0.062***	0.050***	0.052***
	(0.011)	(0.012)	(0.014)	(0.014)	(0.018)	(0.018)
Additional controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year-specific effects	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*
Province-specific effects	*No*	*No*	*No*	*No*	*No*	*No*
Industry-specific effects	*No*	*No*	*No*	*No*	*No*	*No*
No. of observations	3180	3180	1995	1995	2136	2136
R^2	0.184	0.185	0.436	0.432	0.184	0.187
R^2 (within)	0.113	0.114	0.074	0.077	0.116	0.118

Note: Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level of significance, respectively. Additional controls consist of firm age, legal status, log(Personal computers), technological innovation dummy, and recruitment difficulty dummy. All variables are as defined in Table 1.

TABLE A4 Trade credit and relative skilled employment demand (regional subsamples).

Dependent variable: Skilled employment ratio	(A4.1)	(A4.2)	(A4.3)	(A4.4)	(A4.5)	(A4.6)
	Northern region		Central region		Southern region	
Log(Trade credit)	0.141**	0.139**	0.125	0.131	0.136	0.143*
	(0.065)	(0.065)	(0.091)	(0.092)	(0.086)	(0.087)
Log(Formal credit)	−0.034	−0.035	0.104	0.0883	−0.175*	−0.162*
	(0.062)	(0.062)	(0.090)	(0.090)	(0.094)	(0.095)
Investment dummy	0.395*	0.382*	0.141	0.109	0.739*	0.717
	(0.226)	(0.227)	(0.200)	(0.200)	(0.442)	(0.442)
Log(Total assets)	0.126	0.100	0.149	0.214**	0.274	0.248
	(0.093)	(0.100)	(0.091)	(0.098)	(0.209)	(0.212)
Additional controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year-specific effects	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*
Province-specific effects	*No*	*No*	*No*	*No*	*No*	*No*
Industry-specific effects	*No*	*No*	*No*	*No*	*No*	*No*
No. of observations	3180	3180	1995	1995	2136	2136
R^2	0.425	0.423	0.444	0.444	0.050	0.045
R^2 (within)	0.047	0.047	0.051	0.054	0.031	0.033

Note: Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level of significance, respectively. Additional controls consist of firm age, legal status, log(Personal computers), technological innovation dummy, and recruitment difficulty dummy. All variables are as defined in Table 1.

TABLE A5 Trade credit and full-time employment demand (firm age subsamples).

Dependent variable: Log(Total employment)	(A5.1)	(A5.2)	(A5.3)	(A5.4)	(A5.5)	(A5.6)
	Less than 10 years		10–20 years		More than 20 years	
Log(Trade credit)	0.024***	0.024***	0.012*	0.011*	0.016**	0.017**
	(0.008)	(0.008)	(0.006)	(0.006)	(0.008)	(0.008)
Log(Formal credit)	0.013*	0.013*	0.002	0.001	0.008	0.007
	(0.007)	(0.007)	(0.006)	(0.006)	(0.009)	(0.009)
Investment dummy	0.002	0.001	0.031	0.033	0.036	0.037
	(0.028)	(0.028)	(0.022)	(0.022)	(0.025)	(0.025)
Log(Total assets)	0.071***	0.069***	0.051***	0.059***	0.069***	0.074***
	(0.018)	(0.018)	(0.014)	(0.014)	(0.013)	(0.014)
Additional controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year-specific effects	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*
Province-specific effects	*No*	*No*	*No*	*No*	*No*	*No*
Industry-specific effects	*No*	*No*	*No*	*No*	*No*	*No*
No. of observations	2425	2425	3018	3018	1868	1868
R^2	0.577	0.573	0.506	0.510	0.010	0.011
R^2 (within)	0.102	0.102	0.070	0.076	0.124	0.127

Note: Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level of significance, respectively. Additional controls consist of firm age, legal status, log(Personal computers), technological innovation dummy, and recruitment difficulty dummy. All variables are as defined in Table 1.

TABLE A6 Trade credit and relative skilled employment demand (firm age subsamples).

Dependent variable: Skilled employment ratio	(A6.1)	(A6.2)	(A6.3)	(A6.4)	(A6.5)	(A6.6)
	Less than 10 years		10–20 years		More than 20 years	
Log(Trade credit)	0.298***	0.298***	0.006	0.008	0.105	0.106
	(0.102)	(0.102)	(0.082)	(0.082)	(0.082)	(0.083)
Log(Formal credit)	0.014	0.015	−0.024	−0.018	−0.097	−0.097
	(0.093)	(0.093)	(0.070)	(0.070)	(0.093)	(0.093)
Investment dummy	0.770	0.767	0.324	0.314	0.102	0.102
	(0.472)	(0.473)	(0.240)	(0.238)	(0.247)	(0.247)
Log(Total assets)	0.408**	0.402**	0.114	0.066	0.117	0.120
	(0.181)	(0.186)	(0.120)	(0.127)	(0.102)	(0.116)
Additional controls	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*	*Yes*
Year-specific effects	*No*	*Yes*	*No*	*Yes*	*No*	*Yes*
Province-specific effects	*No*	*No*	*No*	*No*	*No*	*No*
Industry-specific effects	*No*	*No*	*No*	*No*	*No*	*No*
No. of observations	2425	2425	3018	3018	1868	1868
R^2	0.299	0.299	0.379	0.376	0.207	0.208
R^2 (within)	0.048	0.048	0.027	0.029	0.049	0.049

Note: Robust standard errors are in parentheses. ***, **, and * indicate significance at the 1%, 5%, and 10% level of significance, respectively. Additional controls consist of firm age, legal status, log(Personal computers), technological innovation dummy, and recruitment difficulty dummy. All variables are as defined in Table 1.