



ELIT

Economic Laboratory Transition
Research Podgorica

Montenegrin Journal of Economics

For citation:

Zou, Y., Tong, Y., Serrasqueiro, Z. (2026), "Bank Credit and Trade Credit during Crisis", *Montenegrin Journal of Economics*, Vol. 22, No. 2, pp. 91-100.

Bank Credit and Trade Credit during Crisis

YIJUN ZOU¹, YEHUI TONG² (Corresponding author) and ZELIA SERRASQUEIRO³

¹Lecturer, School of Foreign Languages, Nanjing University of Finance and Economics, Nanjing, China

²Lecturer, Nanjing University of Finance and Economics, Nanjing, China, email: tongyyhh@163.com, ORCID: 0000-0002-7805-9470

³Professor, University of Beira Interior, Covilhã, Portugal, ORCID: 0000-0003-1761-5426

ARTICLE INFO

Received October 01, 2024
Revised from November 01, 2024
Accepted 20, December 01, 2024
Available online April 15, 2026

JEL classification: G21, G30, M13, M41

DOI: 10.14254/1800-5845/2026.22-2.8

Keywords:

Bank loans,
trade credit,
Covid crisis,
global financial crisis,
start-up firms.

ABSTRACT

Using the logit model, this paper investigates the relationship between bank credit and trade credit. In particular the impacts of trade credit factors on obtaining bank loans are studied in depth with comparing the global financial crisis and the Covid crisis (as the two most serious crises since the 21st century). Considering the importance of bank credit and trade credit for start-up firms, this paper uses the financial data of Portuguese manufacturing firms in their founding year during the crisis and pre-crisis periods. The findings generally support a substitute relationship between bank credit and trade credit for start-up firms. A special finding is that during the Covid crisis period trade credit factors cannot influence access to bank loans for start-up firms compared to during the global financial crisis period, while a positive effect of profitability on obtaining bank loans is highlighted during the Covid crisis period. One reason may be the effect of the European sovereign debt crisis making banks tighten granting loans in hard economic situations since then, which increases the importance of profitability. Another reason may be that the Covid pandemic broke out and diffused worldwide in a quite short time, which swiftly caused lock-down policy and then dramatic economic downturn in 2020 with the feature of being unable to be forecasted previously. The global financial crisis started in September 2008, which immediately triggered a pessimistic opinion about economic expectation in the following year; this means that banks had time to adjust their policy in granting loans to suit the upcoming market situation during this traditional crisis. Therefore, the findings confirm a failure of trade credit factors to influence obtaining bank credit for start-up firms during the Covid crisis that is unpredictable and untraditional.

INTRODUCTION

Trade credit is an important short-run financial resource (Del Gaudio et al., 2018). It is of importance to help financially constrained firms especially during economic downturn periods, which is because more information can be assessed by suppliers than by financial institutions and banks (Love, 2011). As pointed out by Milosevic et al. (2020), based on the data from Eurostat, trade credit as a crucial financing source for small and medium-sized enterprises had increased steadily from 2016 to 2018 in the European Union. In fact, from the perspective of financing, the importance of trade credit is similar to bank credit but is much higher than venture capital or other financing sources (Rodríguez-Rodríguez, 2008).

Bank credit is usually studied hand in hand with trade credit, particularly with regard to revealing the relationship between trade credit and bank credit. The relationship between trade credit and bank credit can be substitutive or complementary (Rahman et al., 2018). According to Andrieu et al. (2018), a complementary relationship between trade credit and bank credit is based on the assumption that receiving trade credit can pass a positive signal to banks as potential lenders to borrowers. On the other hand, some scholars point out that trade credit shows a substitute relationship with bank credit (Canto-Cuevas et al., 2019), mainly due to higher financial pressure for the firms with more trade credit.

The relationship between trade credit and bank credit could be impacted much by crisis, as during crisis bank credit tends to be constrained (Carbó-Valverde et al., 2016). According to Agostino and Trivieri (2014), because new firms usually lack of reputation on the credit market, they need to use trade credit as a signal of good quality in order to mitigate information asymmetries and then to obtain bank credit. Hence, trade credit is especially suitable for younger firms without sufficient reputation, credit worthiness, and then with low debt capacity and a lack of financial resources (Canto-Cuevas et al., 2019). In fact, start-up firms tend to invest more in trade credit in order to attract new customers and drive sales for counteracting the negative impact of crisis (Baños-Caballero and García-Teruel, 2023).

This paper investigates the relationship between trade credit and bank credit, and especially focuses on the impacts of trade credit factors on obtaining short-term bank loans for start-up firms during crisis periods in order to find the differences between the global financial crisis in 2009 and the 2020 Covid crisis. We explore the financing behavior of the start-up firms founded in manufacturing sectors in Portugal that was negatively impacted by a series of crises in the past two decades. Thus, the most important contribution of this paper is to recognize the relationship between trade credit and bank credit during the most important two crises since the 21st century.

1. RESEARCH METHODS

Our sample includes the firms that incorporated in 2008, 2009, 2019 and 2020 in Portugal from Iberian Balance sheet Analysis System (SABI) database which is developed by Bureau Van Dijk. We focus on their founding year data, and the firms with missing data and outliers are excluded from the sample. Finally, the sample consists of 1274 firms incorporated in 2008, 868 firms incorporated in 2009, 871 firms incorporated in 2019, and 626 firms incorporated in 2020 in manufacturing sectors in Portugal.

Following the studies of Deloof and La Rocca (2015) and Baños-Caballero and García-Teruel (2023), we use receivables (accounts receivable to total assets), payables (accounts payable to total assets), and net trade credit (the difference between accounts receivable and accounts payable to total assets) as independent variables for testing their impacts on access to bank loans respectively. Bank credit as the dependent variable, we refer to the research method of Adilkhanova et al. (2022) to use a dummy variable to identify whether obtaining short-term bank loans, which takes the value of 1 for the firm with access to short-term bank loans and 0 otherwise.

In addition to the above mentioned variables, there are also several control variables that are defined as follows. Firm size is measured as the natural logarithm of total assets. Profitability captures self-financing, which is calculated as the ratio between earnings before interests and tax (EBIT) and sales. Leverage is calculated as the ratio of total liabilities to total assets. Tangibility is defined as the ratio between tangible fixed assets and total assets. Stock is used to measure the ratio of stocks to total assets. Group is a dummy variable that takes the value of 1 for the firm with a parent company and 0 otherwise.

Here logistic model is employed to explore the targeted relationships. According to Horváthová and Mokrisová (2020), Kitowski et al. (2022), and Brygała (2022), the logistic model is a binary model with the dependent variable taking only two values and the logistic regression equation (that is estimated by maximum-likelihood) can be written as follows:

$$\pi = \exp(\alpha + \beta_1 X_1 + \dots + \beta_n X_n) / (1 + \exp(\alpha + \beta_1 X_1 + \dots + \beta_n X_n))$$

and $\text{logit} = \ln(\pi / (1 - \pi)) = \alpha + \beta_1 X_1 + \dots + \beta_n X_n$

where π represents the probability, α is the intercept, β represents the estimated parameters, and X represents the selected predictors. Logistic regression aims to calculate the odds ratio $\pi / (1 - \pi)$.

2. RESULTS

Table 1 and 2 show the results of logistic regression for the start-up firms founded respectively in 2008, 2009, 2019, and 2020. Receivables, payables, and net trade credit are statistically significant in the 2008, 2009 and 2019 regressions, whereas all of these are non-significant in the 2020 regressions. In the 2008 and 2009 regressions, the coefficients of receivables and net trade credit are positive at the 1 percent level while the coefficient of payables is negative at the 1 percent level. In the 2019 regressions, the coefficients of receivables and payables are negative at the 1 percent level, whereas the coefficient of net trade credit is positive at the 5 percent level. Therefore, similar to the research results of Santos and Silva (2014) for Portuguese industrial companies, our findings generally endorse the existence of a negative relationship between bank credit and trade credit, indicating a substitute relationship between bank credit and trade credit; in 2008 and 2009, investments in trade credit and shrinkage in trade credit finance can help start-up firms gain bank loans.

Profitability is statistically significant at the 5 percent level and positively associated with obtaining bank loans in the 2008 and 2020 regressions. According to Niskanen and Niskanen (2006), profit-related variables can be used to measure a firm's ability to generate internal cash flows. Therefore, the positive effect of profitability on access to bank loans goes against the pecking order theory where internally accumulated profits as a financing source is prior to external bank loans.

Firm size and leverage are statistically significant and positively related to obtaining bank loans in the 2008, 2009, 2019 and 2020 regressions. The positive relationship between firm size and access to bank loans is in line with Andrieu et al. (2018), Agostino and Trivieri (2014), and Arslan and Umutlu (2009). Psillaki and Eleftheriou (2015) also find that larger firms, *ceteris paribus*, tend to receive more bank credit than smaller firms during the credit crunch period (2007 to 2009). As explained by Masiak et al. (2019), compared to large firms, from the supply side banks would bear higher monitoring and risk management costs when providing loans to small firms; and from the demand side small firms would bear high financing costs when obtaining bank loans, thus tending to rely less on bank loans.

For the effect of leverage, according to Drakos (2013) and Hernández-Cánovas and Martínez-Solano (2010), leverage usually represents the borrower's credit risk in that more levered firms usually are more likely to be of insolvency. Therefore, we have an untraditional result about a positive impact of leverage on obtaining bank loans. A possible explanation may be that, for start-up firms, high leverage means more financial intermediaries offering funds and then signals positive information to banks.

The relationship between tangibles and gaining bank loans is positive and its statistical significance is mainly shown in the 2008 and 2009 regressions at the 1 percent level. The association between stocks and access to bank loans is also significantly positive in the 2008 and 2009 regressions at the 1 percent level. The positive effects of tangibles and stocks on access to bank loans are coherent with the most frequent results in the literature, that is, pledgeable assets are positively related to short-term bank debt (Agostino and Trivieri, 2014). As noted by Peón and Guntín (2021), because fixed tangible assets can work as collateral and then reduce the problems of asymmetric information and agency costs as well as the costs for external financing, asset tangibility can help to obtain external finance. Therefore, the firms having more collaterals (tangible assets and stocks) are estimated to be more likely to have access to bank loans.

Group background only shows statistical significance in the 2019 regression with a negative impact on obtaining bank loans. The group dummy generally fails to significantly explain access to bank loans, which consists to the finding of Agostino and Trivieri (2014) that whether belonging to a group or a consortium is not significantly linked to short-term bank debt.

Table 1. The results of year-by-year regressions with receivables and payables as independent variables

2008 year (1274 samples)				2009 year (868 samples)			
Classification accuracy: 66.9%				Classification accuracy: 66.2%			
	Beta Coefficient	Wald	Significance		Beta Coefficient	Wald	Significance
Receivables	1.601***	26.526	0.000	Receivables	1.869***	27.747	0.000

Payables	-1.319***	50.284	0.000	Payables	-1.080***	24.165	0.000
Profitability	0.111**	5.633	0.018	Profitability	0.044	0.104	0.747
Size	0.442***	99.230	0.000	Size	0.387***	50.698	0.000
Leverage	1.461***	61.411	0.000	Leverage	1.205***	25.357	0.000
Tangibles	1.979***	36.526	0.000	Tangibles	2.533***	43.886	0.000
Stocks	1.988***	27.029	0.000	Stocks	2.272***	29.061	0.000
Group	0.065	0.408	0.523	Group	-0.130	1.209	0.271
Constant	-4.197***	165.414	0.000	Constant	-3.942***	106.902	0.000
<i>2019 year (871 samples)</i>				<i>2020 year (626 samples)</i>			
<i>Classification accuracy: 60.7%</i>				<i>Classification accuracy: 62.3%</i>			
	<i>Beta Coef- ficient</i>	<i>Wald</i>	<i>Signifi- cance</i>		<i>Beta Coef- ficient</i>	<i>Wald</i>	<i>Signifi- cance</i>
Receiva- bles	-0.743***	6.596	0.010	Receiva- bles	-0.186	0.331	0.565
Payables	-1.040***	21.913	0.000	Payables	-0.348	1.771	0.183
Profitability	0.011	0.017	0.897	Profitability	0.313**	6.220	0.013
Size	0.497***	99.718	0.000	Size	0.427***	68.248	0.000
Leverage	0.950***	45.115	0.000	Leverage	0.551***	6.730	0.009
Tangibles	-0.212	0.525	0.469	Tangibles	0.479	1.968	0.161
Stocks	-0.345	0.740	0.390	Stocks	-0.288	0.431	0.511
Group	-0.216*	3.337	0.068	Group	-0.042	0.089	0.765
Constant	-2.068***	52.819	0.000	Constant	-2.097***	38.545	0.000

Note: dependent variable is the bank loan dummy variable.

Source: authors' own calculation.

Table 2. The results of year-by-year regressions with net trade credit as independent variable

<i>2008 year (1274 samples)</i>				<i>2009 year (868 samples)</i>			
<i>Classification accuracy: 66.7%</i>				<i>Classification accuracy: 65.4%</i>			
	<i>Beta Coef- ficient</i>	<i>Wald</i>	<i>Signifi- cance</i>		<i>Beta Coef- ficient</i>	<i>Wald</i>	<i>Signifi- cance</i>
Net trade credit	1.384***	66.866	0.000	Net trade credit	1.286***	43.543	0.000
Profitability	0.115**	5.989	0.014	Profitability	0.066	0.235	0.628
Size	0.448***	104.678	0.000	Size	0.405***	57.102	0.000
Leverage	1.498***	68.052	0.000	Leverage	1.341***	33.926	0.000
Tangibles	1.795***	55.399	0.000	Tangibles	2.065***	48.530	0.000
Stocks	1.851***	28.835	0.000	Stocks	1.909***	25.646	0.000
Group	0.070	0.472	0.492	Group	-0.117	0.978	0.323
Constant	-4.075***	197.772	0.000	Constant	-3.641***	112.156	0.000
<i>2019 year (871 samples)</i>				<i>2020 year (626 samples)</i>			
<i>Classification accuracy: 61.1%</i>				<i>Classification accuracy: 62.3%</i>			
	<i>Beta Coef- ficient</i>	<i>Wald</i>	<i>Signifi- cance</i>		<i>Beta Coef- ficient</i>	<i>Wald</i>	<i>Signifi- cance</i>

Net trade credit	0.421**	5.267	0.022	Net trade credit	0.150	0.461	0.497
Profitability	-0.066	0.686	0.407	Profitability	0.282**	5.394	0.020
Size	0.479***	96.226	0.000	Size	0.419***	67.181	0.000
Leverage	0.771***	31.983	0.000	Leverage	0.447**	5.067	0.024
Tangibles	0.397	2.250	0.134	Tangibles	0.685**	4.917	0.027
Stocks	-0.011	0.001	0.978	Stocks	-0.223	0.260	0.610
Group	-0.277**	5.669	0.017	Group	-0.052	0.137	0.711
Constant	-2.536***	88.050	0.000	Constant	-2.183***	43.342	0.000

Note: dependent variable is the bank loan dummy variable.

Source: authors' own calculation.

3. ROBUSTNESS CHECKS

For checking the robustness of the previous regression results, the start-up firms founded in 2008 and 2009 and in 2019 and 2020 are respectively combined to regress with year dummy created here. The purpose of this design is to find the differences of the financing behavior of start-up firms when coming into the crisis periods separately from 2008 to 2009 and from 2019 to 2020. According to our estimates (shown in Table 3), all the interaction variables are not statistically significant in the regressions describing the interaction effects between 2008 and 2009. The results here to a large extent are in line with the comparison of the regression results separately in 2008 and 2009, since the statistically significant levels of all the variables are kept unchanged from the 2008 to the 2009 regressions except for profitability.

In the regressions describing the interaction effects between 2019 and 2020 (shown in Table 3), the interaction variables of payables and leverage are statistically significant and their signs are different to their original variables. Therefore, the negative effect of payables and the positive effect of leverage are reduced from 2019 to 2020. In addition, we also find the effect of profitability tends to become positive from 2019 to 2020. However, the changes of the significant level of receivables, net trade credit, group and tangibles are not presented here in the cross-effect regressions. Therefore, the robustness checks partially support the previous findings between 2019 and 2020.

Table 3. Regression results with year dummy variable as interaction variable to identify crisis

2008 and 2009 years together (2142 samples)				2019 and 2020 years together (1497 samples)			
Classification accuracy: 66.7%				Classification accuracy: 61.5%			
	Beta Coefficient	Wald	Significance		Beta Coefficient	Wald	Significance
Receivables	1.588***	32.116	0.000	Receivables	-0.744***	7.068	0.008
Receivables × Year dummy 08-09	0.299	0.570	0.450	Receivables × Year dummy 19-20	0.557	1.836	0.175
Payables	-1.327***	54.014	0.000	Payables	-1.039***	21.822	0.000
Payables × Year dummy 08-09	0.282	0.958	0.328	Payables × Year dummy 19-20	0.691**	4.098	0.043
Profitability	0.112**	6.046	0.014	Profitability	0.010	0.015	0.902
Profitability × Year dummy 08-09	-0.066	0.201	0.654	Profitability × Year dummy 19-20	0.304**	4.332	0.037
Size	0.442***	115.402	0.000	Size	0.497***	125.590	0.000

Size × Year dummy 08-09	-0.059	0.939	0.332	Size × Year dummy 19-20	-0.070	1.846	0.174
Leverage	1.474***	70.790	0.000	Leverage	0.948***	46.548	0.000
Leverage × Year dummy 08-09	-0.306	1.262	0.261	Leverage × Year dummy 19-20	-0.397*	3.483	0.062
Tangibles	1.965***	42.838	0.000	Tangibles	-0.214	0.543	0.461
Tangibles × Year dummy 08-09	0.565	1.656	0.198	Tangibles × Year dummy 19-20	0.694	2.498	0.114
Stocks	1.975***	30.677	0.000	Stocks	-0.347	0.749	0.387
Stocks × Year dummy 08-09	0.304	0.337	0.561	Stocks × Year dummy 19-20	0.055	0.009	0.926
Group	0.065	0.426	0.514	Group	-0.216*	3.381	0.066
Group × Year dummy 08-09	-0.195	1.550	0.213	Group × Year dummy 19-20	0.174	0.989	0.320
Constant	-4.087***	271.305	0.000	Constant	-2.080***	91.340	0.000
Classification accuracy: 66.9%				Classification accuracy: 61.6%			
	Beta Coefficient	Wald	Significance		Beta Coefficient	Wald	Significance
Net trade credit	1.368***	74.201	0.000	Net trade credit	0.388**	4.656	0.031
Net trade credit × Year dummy 08-09	-0.079	0.110	0.740	Net trade credit × Year dummy 19-20	-0.209	0.564	0.453
Profitability	0.114**	6.302	0.012	Profitability	-0.073	0.860	0.354
Profitability × Year dummy 08-09	-0.038	0.066	0.797	Profitability × Year dummy 19-20	0.386***	7.328	0.007
Size	0.440***	127.612	0.000	Size	0.458***	115.900	0.000
Size × Year dummy 08-09	-0.023	0.196	0.658	Size × Year dummy 19-20	-0.013	0.074	0.785
Leverage	1.475***	83.106	0.000	Leverage	0.724***	33.368	0.000
Leverage × Year dummy 08-09	-0.108	0.234	0.629	Leverage × Year dummy 19-20	-0.176	0.998	0.318
Tangibles	1.773***	59.574	0.000	Tangibles	0.376	2.034	0.154
Tangibles × Year dummy 08-09	0.289	0.624	0.430	Tangibles × Year dummy 19-20	0.342	0.721	0.396
Stocks	1.820***	30.731	0.000	Stocks	-0.037	0.009	0.925
Stocks × Year	0.099	0.039	0.843	Stocks × Year	-0.187	0.102	0.749

dummy 08-09				dummy 19-20			
Group	0.064	0.419	0.518	Group	-0.294**	6.519	0.011
Group × Year dummy 08-09	-0.171	1.214	0.271	Group × Year dummy 19-20	0.277	2.568	0.109
Constant	-3.891***	309.238	0.000	Constant	-2.397***	130.719	0.000

Note: dependent variable is the bank loan dummy variable.

Source: authors' own calculation.

4. DISCUSSION

From 2008 to 2009, the statistically significant levels of the variables do not change much except for profitability. In 2008 the statistical significance of profitability is at 0.05 level, whereas it is statistically insignificant in 2009. The statistically significant levels of receivables, payables, net trade credit, size, leverage, tangibles, and stocks are kept at 0.01 from 2008 to 2009. Group is statistically insignificant in both 2008 and 2009. From 2019 to 2020 the statistical significance of size and leverage is kept, while stocks keep being statistically insignificant. Receivables, payables, net trade credit, and group are statistically significant in 2019 but are not statistically significant in 2020. Profitability and tangibles are statistically insignificant in 2019 but are statistically significant in 2020.

The significance of receivables and payables generally remains stable from 2008 to 2009, while the significance becomes less from 2019 to 2020. The significance of profitability becomes less from 2008 to 2009 but is more stressed from 2019 to 2020. Therefore, in 2020 banks give more weight to the ability to generate internal cash flow than external trade credit in gaining bank loans. Signals regarding future business prospects are especially important for banks to evaluate whether granting loans (Blumberg and Letterie, 2008), and profitability can be seen as a crucial indicator that signals a firm's future. This is because more profitable firms should have better ability to generate internal funds and then could accumulate more resources. Regarding start-up firms, they are especially difficult to receive loans from banks, as banks have difficulties in judging the risk of a start-up project and then tend to be risk-averse (Blumberg and Letterie, 2008). According to Drakos (2013), more profitable firms tend not to face with tightening conditions for bank loans. Therefore, the signaling role of profitability is of particular importance for start-up firms to apply for bank credit.

The change of the significance of tangibles that becomes more important in 2020 than in 2019 also demonstrates the crucial role of start-up firms' capacity in collaterality in gaining bank loans. According to Bartoli et al. (2013), one main function of banks is to deal with the problems of information asymmetry between investors and borrowers, and the problems of information asymmetry can be lowered down through accumulating information from borrowers. For the firms applying for bank loans, collateral that plays a signaling role in presenting borrowers' credit quality can be used to reduce the problems of adverse selection and moral hazard, and can help firms gain better financing conditions in application for bank loans (Agostino and Trivieri, 2017). During crisis banks tend to cut down credit and take more cautious attitudes on granting loans, as the credit that can be supplied by commercial banks is usually limited by the central bank; thereby, providing sufficient collateral is a key factor that determines whether a firm can apply for bank loans successfully (Paulet et al., 2014).

Hence, we find that in the 2020 crisis banks tend to stress the internal capacity of start-up firms in generating profits and collaterality instead of external trade credit. One possible reason for the discreteness in the 2020 crisis compared to in the 2009 crisis may be the changes of the banks in Portugal after the European sovereign debt crisis. Because Portugal as a stressed country in the euro area was impacted in depth by the European sovereign debt crisis since 2010, there were more firms suffering credit constraints and being difficult to have access to bank finance in the period from 2010 to 2012 than in 2009 (Ferrando et al., 2017). Hence, profitability as the core ability of a business entity is especially highlighted by banks when assessing the application for bank loans.

CONCLUSION

This paper explores a traditional problem, that is, the relationship between trade credit and bank credit. In particular, the impacts of the use of trade credit on obtaining bank loans are investigated for Portuguese start-ups in manufacturing sectors. Specifically, the data during the global financial crisis and the Covid crisis as well as the data in the pre-crisis periods are compared for revealing the relationship between bank credit and trade credit. We find that, in 2008 and 2009, investments in trade credit (receivables) can benefit to access to bank loans and the use of trade credit as a financing source (payables) tends to extrude bank loans. Therefore, our findings here support a substitute relationship between trade credit and bank credit as well as a positive effect of exerting an aggressive strategy of trade credit (granting trade credit to customers) in helping to obtain bank credit.

From the perspective of receivables, we find that banks give weight to the sales of start-up firms when granting loans in that more receivables usually represent more sales. For start-up firms, generating sufficient sales and then occupying sufficient market share are the most important task, which are even more important than generating profits at the initial stage of firms. The positive effect of net trade credit as well as the negative effect of payables on access to bank loans in 2008, 2009 and 2019 endorse a pivotal role of sales and a substitute effect of trade credit finance on bank finance. By contrast, none of the trade credit variables shows statistical significance in the 2020 regressions, while profitability becomes a significant factor positively impacting on access to bank loans. Hence, our findings indicate a great change of the impacts of the trade credit factors on obtaining bank loans from 2019 to 2020 compared to from 2008 to 2009.

In addition to the influence of the European sovereign debt crisis that makes banks tighten granting loans during negative economic environment, another important reason for the difference between 2009 and 2020 may be the difference in economic situations and expectations. Although the economy of Portugal dropped much in both 2009 and 2020 compared to the previous years, the economic situation in 2020 was much worse than it was in 2009 and the predictions for future were different. The global financial crisis began in September 2008 after the Lehman Brothers Collapse in the United States, which resulted in a pessimistic prediction on the economy in 2009 before the start of economic downturn in European countries. Therefore, banks had time to adjust their policy to be mature enough to suit the upcoming market environment. By contrast, the Covid pandemic broke out suddenly and the lock-down policy started to exert swiftly after the diffusion of the pandemic, which cannot be predicted in 2019. Therefore, we argue that the relationship between trade credit and bank credit becomes weak and profitability becomes a crucial factor to identify the worthiness of bank credit when suffering unpredictable great economic downturn.

In a nutshell, on the basis of the previous research of Huyghebaert et al. (2007) and Baños-Caballero and García-Teruel (2023) regarding the use of bank credit and trade credit for start-up firms, this paper contributes to the empirical studies on the relationship between trade credit and bank credit and especially enriches the literature regarding the use of trade credit for start-up firms during crisis. Here, a substitute relationship between trade credit and bank credit (revealing the effect of financial burden) is supported for Portuguese start-up firms in manufacturing sectors in both the pre-crisis and the crisis periods, but not in a dramatically changed economic environment such as the Covid crisis. The research here is limited by the availability of data, and future research should enlarge the sample especially in time-span for getting richer findings.

REFERENCES

- Adil Khanova, Z., Nurlankul, A., Token, A., Yavuzoglu, B. (2022), "Trade credit and financial crises in Kazakhstan", *Journal of Asian Economics*, Vol. 80, 101472, pp. 1-16. <https://doi.org/10.1016/j.asieco.2022.101472>
- Agostino, M., Trivieri, F. (2014), "Does trade credit play a signalling role? Some evidence from SMEs microdata", *Small Business Economics*, Vol. 42, pp. 131-151. <https://doi.org/10.1007/s11187-013-9478-8>

- Agostino, M., Trivieri, F. (2017), "Collateral in lending relationships. A study on European SMEs microdata", *International Review of Applied Economics*, Vol. 31, No. 3, pp. 339-356. <https://doi.org/10.1080/02692171.2016.1257580>
- Andrieu, G., Staglianò, R., van der Zwan, P. (2018), "Bank debt and trade credit for SMEs in Europe: firm-, industry-, and country-level determinants", *Small Business Economics*, Vol. 51, pp. 245-264. <https://doi.org/10.1007/s11187-017-9926-y>
- Arslan, Ö., Umutlu, G. (2009), "Trade credits and bank loans for SMEs in the textile sector", *Journal of Small Business & Entrepreneurship*, Vol. 22, No. 4, pp. 383-397. <https://doi.org/10.1080/08276331.2009.10593461>
- Baños-Caballero, S., García-Teruel, P.J. (2023), "Investment in trade credit in small business start-ups: Evidence from Spain during a financial crisis", *Applied Economics*, Vol. 55, No. 3, pp. 273-282. <https://doi.org/10.1080/00036846.2022.2086685>
- Bartoli, F., Ferri, G., Murro, P., Rotondi, Z. (2013), "Bank-firm relations and the role of Mutual Guarantee Institutions at the peak of the crisis." *Journal of Financial Stability*, Vol. 9, No. 1, pp. 90-104. <https://doi.org/10.1016/j.jfs.2012.03.003>
- Blumberg, B.F., Letterie, W.A. (2008), "Business starters and credit rationing", *Small Business Economics*, Vol. 30, pp. 187-200. <https://doi.org/10.1007/s11187-006-9030-1>
- Brygala, M. (2022), "Consumer bankruptcy prediction using balanced and imbalanced data", *Risks*, Vol. 10, No. 2, 24, pp. 1-13. <https://doi.org/10.3390/risks10020024>
- Canto-Cuevas, F.-J., Palacín-Sánchez, M.-J., Di Pietro, F. (2019), "Trade credit as a sustainable resource during an SME's life cycle", *Sustainability*, Vol. 11, No. 3, 670, pp. 1-16. <https://doi.org/10.3390/su11030670>
- Carbó-Valverde, S., Rodríguez-Fernández, F., Udell, G.F. (2016), "Trade credit, the financial crisis, and SME access to finance", *Journal of Money, Credit and Banking*, Vol. 48, No. 1, pp. 113-143. <https://doi.org/10.1111/jmcb.12292>
- Del Gaudio, B.L., Porzio, C., Verdoliva, V. (2018), "Trade credit, SMEs and short-run survivorship: What we know and what we would like to know", *Qualitative Research in Financial Markets*, Vol. 10, No. 4, pp. 346-362. <https://doi.org/10.1108/QRFM-02-2018-0014>
- Deloof, M., La Rocca, M. (2015), "Local financial development and the trade credit policy of Italian SMEs", *Small Business Economics*, Vol. 44, pp. 905-924. <https://doi.org/10.1007/s11187-014-9617-x>
- Drakos, K. (2013), "Bank loan terms and conditions for Eurozone SMEs", *Small Business Economics*, Vol. 41, pp. 717-732. <https://doi.org/10.1007/s11187-012-9454-8>
- Ferrando, A., Popov, A., Udell, G.F. (2017), "Sovereign stress and SMEs' access to finance: Evidence from the ECB's SAFE survey", *Journal of Banking & Finance*, Vol. 81, pp. 65-80. <https://doi.org/10.1016/j.jbankfin.2017.04.012>
- Hernández-Cánovas, G., Martínez-Solano, P. (2010), "Relationship lending and SME financing in the continental European bank-based system", *Small Business Economics*, Vol. 34, pp. 465-482. <https://doi.org/10.1007/s11187-008-9129-7>
- Horváthová, J., Mokrisová, M. (2020), "Comparison of the results of a data envelopment analysis model and logit model in assessing business financial health", *Information*, Vol. 11, No. 3, 160, pp. 1-20. <https://doi.org/10.3390/info11030160>
- Huyghebaert, N., Van de Gucht, L., Van Hulle, C. (2007), "The choice between bank debt and trade credit in business start-ups", *Small Business Economics*, Vol. 29, pp. 435-452. <https://doi.org/10.1007/s11187-006-9005-2>
- Kitowski, J., Kowal-Pawul, A., Lichota, W. (2022), "Identifying symptoms of bankruptcy risk based on bankruptcy prediction models—A case study of Poland", *Sustainability*, Vol. 14, No. 3, 1416, pp. 1-18. <https://doi.org/10.3390/su14031416>
- Love, I. (2011), "Trade credit versus bank credit during financial crises", in Chauffour, J.-P., Malouche, M. (ED.), *Trade Finance during the Great Trade Collapse*. The International Bank for Reconstruction and Development / The World Bank, pp. 27-41. <https://openknowledge.worldbank.org/server/api/core/bitstreams/47a0be98-5642-501e-a596-43ab27e8f136/content>
- Masiak, C., Block, J.H., Moritz, A., Lang, F., Kraemer-Eis, H. (2019), "How do micro firms differ in their financing patterns from larger SMEs?", *Venture Capital: An International Journal of Entrepreneurial Finance*, Vol. 21, No. 4, pp. 301-325. <https://doi.org/10.1080/13691066.2019.1569333>

- Milosevic, D., Popovic, J., Avakumovic, J., Kvirgic, G. (2020), "The impact of the equity capital and trade credit financial sources on the company's performances sustainability", *Economics of Agriculture*, Vol. 67, No. 3, pp. 735-746. <https://doi.org/10.5937/ekoPolj2003735M>
- Niskanen, J., Niskanen, M. (2006), "The determinants of corporate trade credit policies in a bank-dominated financial environment: The case of Finnish small firms", *European Financial Management*, Vol. 12, No. 1, pp. 81-102. <https://doi.org/10.1111/j.1354-7798.2006.00311.x>
- Paulet, E., Parnaudeau, M., Abdessemed, T. (2014), "The SME struggle for financing: A clampdown in European banks post-crisis", *Journal of Business Strategy*, Vol. 35, No. 2, pp. 36-45. <https://doi.org/10.1108/JBS-09-2013-0089>
- Peón, D., Guntín, X. (2021), "Bank credit and trade credit after the financial crisis: Evidence from rural Galicia", *Journal of Business Economics and Management*, Vol. 22, No. 3, pp. 616-635. <https://doi.org/10.3846/jbem.2021.14270>
- Psillaki, M., Eleftheriou, K. (2015), "Trade credit, bank credit, and flight to quality: Evidence from French SMEs", *Journal of Small Business Management*, Vol. 53, No. 4, pp. 1219-1240. <https://doi.org/10.1111/jsbm.12106>
- Rahman, A., Rozsa, Z., Cepel, M. (2018), "Trade credit and bank finance – Evidence from the Visegrad group", *Journal of Competitiveness*, Vol. 10, No. 3, pp. 132-148. <https://doi.org/10.7441/joc.2018.03.09>
- Rodríguez-Rodríguez, O.M. (2008), "Firms as credit suppliers: An empirical study of Spanish firms", *International Journal of Managerial Finance*, Vol. 4, No. 2, pp. 152-173. <https://doi.org/10.1108/17439130810864032>
- Santos, J., Silva, A. (2014), "The determinants of trade credit: A study of Portuguese industrial companies", *International Journal of Financial Research*, Vol. 5, No. 4, pp. 128-138. <http://dx.doi.org/10.5430/ijfr.v5n4p128>