

# Interaction Between Trade Credit And Debt: Evidence From The Italian Market

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## ABSTRACT

*Trade credit and trade debt choices are strictly interconnected, and some drivers of one of these features are common. The literature looks prevalently at the main reason behind each choice while considering the credit and debt features separately. Only a few articles consider the two features jointly to focus on the correlation between the two types of decisions. Using an approach adopted in the literature to study other topics, we analyze the interaction between trade credit and debt to identify the primary driver of trade policy decision. This study considers the amount of credit and debt and the duration of credit and debt delays while looking at contemporaneous and one-year-lagged relationships. Looking at a worldwide leading market for trade credit (Italy), the paper points out that the relationship could not be clearly identified for the duration terms and that it lags by one year when the amount of credit is taken into account.*

**Keywords:** Trade credit; trade debt; Granger Causality Test

## 1. INTRODUCTION

According to traditional theories (Omiccioli, 2005), the supply of and demand for trade credit are determined by the features of the economic sector and the characteristics of the firm (Giannetti et al., forthcoming), but market power, on both the demand and supply sides, could influence a firm's decisions regarding trade credit or debt (Mian and Smith, 1992; Wilson and Summers, 2002). In light of the multiple motivations for the use of trade credit, firms tend to supply and receive trade credit simultaneously, so the choices to offer or accept trade credit are influenced by each other (Kiyotaki and Moore, 1997). The relationship between the demand for and the offering of trade credit influences the payment behaviour of the firm; firms with a larger proportion of invoices paid by customers after delivery tend also to pay their suppliers late (McMillan and Woodruff, 2002), showing a theme of higher default risk (Boissay and Gropp, 2007). Consequently, predictive models of the net exposure on trade credit are characterised by a higher level of accuracy than predictive models of the gross exposure (Gibilaro and Mattarocci, forthcoming).

Notwithstanding the theoretical motivations and empirical evidence on the simultaneous supply of and demand for trade credit by firms, little attention is paid by the literature to the causal relationship between the offering of trade credit and the accepting of trade debt. This paper studies one of the main international markets for trade credit (the Italian market) to determine the type of relationship between the debt and credit policy of each firm. The causal relationship identified is changing over time and supports the thesis of a trial and error approach adopted by each firm to achieve the optimal trade policy.

The results obtained contribute to the literature on the relationship between trade credit and bank credit supporting the decline in trade credit provision when bank credit falls (Love et al., 2007). Empirical evidence is also relevant in light of the past economic downturn, characterised by the requesting of longer delays by powerful buyers and the need for cash by the suppliers up front (Atradius, 2010)

The article presents a literature review about the use of trade credit and trade debt, focussing on the main thesis proposed in the literature to identify the main driver of the trade policy (Section 2). The empirical analysis discusses the characteristics of the sample (Section 3.1), presents the main assumption behind the methodology

adopted (Section 3.2) and discusses the results obtained (Section 3.3). The last section summarises the main results and discusses implications and further developments of the work.

## **2. LITERATURE REVIEW**

According to traditional theories (Omiccioli, 2005), the supply of and demand for trade credit are determined by the features of the economic sector and the characteristics of the firm (Giannetti et al., forthcoming), but market power, on both the demand and supply sides, could influence a firm's decisions regarding trade credit/debt (Mian and Smith, 1992; Wilson and Summers, 2002). The economic sector determines the inspection requirement of the supply of and demand for delayed payment by the buyer (Long et al., 1993). According to the characteristics of the firm, suppliers extend trade credit to support sales (Nadiri, 1969), whereas financial motivations result in a focus on the position of trade debt in the firm's financial structure (Lewellen et al., 1980). As trade credit is used in the distribution channel, its dynamics can be affected by the bargaining power of the counterparties involved in the inter-firm transaction (Van Horen, 2005).

In light of the multiple motivations for the use of trade credit, firms tend to supply and receive trade credit at the same time, so the choices to offer/accept trade credit are influenced by each other (Kiyotaki and Moore, 1997). Firms might use accounts payable received from suppliers to finance accounts receivable; empirical evidence shows the intense use of trade credit by small firms (Berger and Udell, 1998) but also reveals the fact that large firms receive trade credit and small firms extend it (Rajan and Zingales, 1995; Nielsen, 2002). The relationship between the demand for and supply of trade credit influences the payment behaviour of the firm; firms with a larger proportion of invoices paid by customers after delivery tend also to pay their suppliers late (McMillan and Woodruff, 2002), thus showing a higher default risk on them (Boissay and Gropp, 2007). In fact, payables are likely to depend on the bargaining power of the firm over its supplier (Van Horen 2005), so firms are more likely to finance receivables with payables and to match the maturity when they simultaneously enjoy stronger market power in the *input* market and face stronger competition in the *output* market (Fabbri and Klapper, 2008)

As a consequence of the tendency of firms to extend and accept delayed payments, predictive models of the net exposure on trade credit feature a higher level of accuracy than predictive models of the gross exposure, whereas the relevance of firm-specific variables is affected by the choice to consider the net exposure instead of the gross exposure (Gibilaro and Mattarocci, forthcoming). As the trade credit position is affected by the life cycle of the firm, the analysis of the net exposure enables the consideration of the changing use of trade credit by firms over time (Huyghebaert, 2006).

## **3. EMPIRICAL ANALYSIS**

### **3.1 Sample**

The sample consists of all accounting information available for Italian firms in the AIDA-Bureau Van Dijk database for the time period of 1999-2008. The choice of accounting data for the Italian market constrains the choice of frequency because half-year reports are unavailable for most of the firms (Table 1).

The database encompasses 11,824 firms and, based on the standard Italian ATECO 2007<sup>1</sup> classification, is well diversified in terms of geographical area. Firms in northern Italy and firms in the manufacturing and mining sectors predominate in the sample. The sample is coherent with the Italian market, where more firms are located in the north because of the high efficiency of service and infrastructure available there, and it is predominantly specialised in the manufacturing or transport sectors.

Some firms do not have data for all the years considered, so the sample size varies over time on the basis of data availability, but for each year, there are no fewer than 7,600 firms (in the year 1999), and the number of firms considered is growing over time. More than 63.30% of the firms included in the sample remain in the sample for the

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<sup>1</sup> For further details on the ATECO 2007 classification, see the site of the Italian Institute of Statistics (ISTAT) at the following address: [www.istat.it](http://www.istat.it).

entire time period considered, and none of them has data available for only one year. The core sample is thus not variable over time, and the results are not significantly affected by the survivorship bias.

**Table 1 – Sample characteristics**

<b>Geographical area</b>	<b>N° firms</b>	<b>Year</b>	<b>Firms</b>
North	8878	1999	7695
Center	1853	2000	8136
South and Islands	857	2001	8594
Not Classified	264	2002	9068
Overall	11561	2003	9448
		2004	10198
		2005	10617
		2006	11115
		2007	11716
		2008	11731
<b>Sector</b>	<b>N° firms</b>	<b>N° years available</b>	<b>Firms</b>
Agriculture	1995	Only 1 year	0
Construction	238	2 years	658
Consultant	1703	3 years	495
Energy	199	4 years	452
Entertainment	203	5 years	739
Finance and Insurance	377	6 years	433
Media	577	7 years	495
Instruction	59	8 years	502
Manufacturing	2446	9 years	565
Mining	0	10 years	7485
Tourism	103		
Transportation	2935		
Utilities	241		
Wholesale	512		
Not Classified	237		

Source: AIDA-Bureau Van Dijk data, processed by the authors

Summary statistics of data available for the overall time period (1999-2008) are summarised in the following table.

**Table 2 – Summary statistics of variables**

<b>Name of the variable</b>	<b>N° observations</b>	<b>Mean</b>	<b>Dev.st</b>	<b>Max</b>	<b>Min</b>
Trade debt amount	80,863.00	17,397,022.53	29,441,267.17	1,000,352,833.00	0.00
Trade credit amount	80,467.00	21,292,260.31	31,994,500.49	978,061,049.00	0.00
Trade debt duration	86,732.00	103.56	87.79	1,997.99	0.01
Trade credit duration	73,079.00	147.63	96.52	554.52	0.02

Source: AIDA-Bureau Van Dijk data, processed by the authors

The entire sample is used to construct some benchmark variables (such as sector trade credit/debt amount/duration and sales/sector) used in the analysis, although because of the lack of some firm-specific data, more than 60% of the firms previously identified could not be considered for the analysis of firms’ choices regarding trade credit/debt.

### **3.2 Methodology**

The analysis of the relationship between trade credit and debt considers the causal relationship of trade credit with respect to trade debt on the basis of a Granger causality test (Granger, 1969). We follow the specification proposed by Holtz-Eakin et al. (1988), and the Granger causality test is tested on the basis of the following formulae:

$$TradeCredit\ Amount_{it} = \alpha_{it} + \psi_i Trade\ Debt\ Amount_{it} + \sum_{l=1}^n \beta_l^l X_{it}^l + \sum_{l=1}^n \gamma_l^l Y_{it}^l + \sum_{l=1}^n \delta_l^l Z_{it}^l + \varepsilon_{it}, \tag{1a}$$

$$Trade\ Debt\ Amount_{it} = \alpha_{it} + \psi_i Trade\ Credit\ Amount_{it} + \sum_{l=1}^n \beta_l^l X_{it}^l + \sum_{l=1}^n \gamma_l^l Y_{it}^l + \sum_{l=1}^n \delta_l^l Z_{it}^l + \varepsilon_{it}, \tag{1b}$$

$$Trade\ Credit\ Duration_{it} = \alpha_{it} + \psi_i Trade\ Debt\ Duration_{it} + \sum_{l=1}^n \beta_l^l X_{it}^l + \sum_{l=1}^n \gamma_l^l Y_{it}^l + \sum_{l=1}^n \delta_l^l Z_{it}^l + \varepsilon_{it}, \tag{2a}$$

$$Trade\ Debt\ Duration_{it} = \alpha_{it} + \psi_i Trade\ Credit\ Duration_{it} + \sum_{l=1}^n \beta_l^l X_{it}^l + \sum_{l=1}^n \gamma_l^l Y_{it}^l + \sum_{l=1}^n \delta_l^l Z_{it}^l + \varepsilon_{it}, \tag{2b}$$

where the variable representing the time/amount of trade credit/debt is regressed with respect to the opposite choices in the trade credit policy and to some controlling variables related to features of the firm ( $X_{it}$ ), the sector ( $Y_{it}$ ) and the market ( $Z_{it}$ ) that have been identified in the literature as possible explanatory variables or indices.

Because of the short-term horizon of the policy decisions regarding trade credit (Peterson and Rajan, 1997), we do not make a panel regression analysis, instead preferring to study each year separately and to perform a multiple-cross-section analysis.

Following the approach proposed by an article that studies the same economy in the same time horizon (Gibilaro and Mattarocci, forthcoming), we consider the following set of explanatory variables:

**Table 3 – Trade credit / debt policy determinants**

Name	Description	Type of variable	Name	Description	Type of variable
Firm age	N° years from the firm’s year of birth and the evaluation date	Firm	Output inventory	Output inventory <sub>t</sub> / Inventory <sub>t</sub>	Firm
Geographical Area	Dummy variable for North, Center and South and Islands	Firm	Cash Flow / Sales	Cash flow <sub>t-1</sub> / Sales <sub>t</sub>	Firm
Listed	Dummy variable with value 1 for listed companies	Firm	Cash sales	(Sales <sub>t</sub> - Trade credit <sub>t</sub> )/Total Assets <sub>t</sub>	Firm
Total Assets	Total assets at time t	Firm	Current asset ratio	Current Assets <sub>t</sub> / Total Assets <sub>t</sub>	Firm
Employees	No. of Employees	Firm	Solvency	Rating <sub>t</sub>	Firm
BT debt	Short term debt <sub>t</sub>	Firm	Sector trade credit amount	Mean amount of sector trade credits	Sector
MLT debt	Bank debt <sub>t</sub> / Total Asset <sub>t</sub>	Firm	Sector trade debt amount	Mean amount of sector trade debts	Sector
Fixed assets	Fixed Assets/Assets	Firm	Sector trade credit amount	Mean duration of sector trade credits	Sector
Revenues growth	Mean revenue growth rate <sub>t,t-1</sub>	Firm	Sector trade debt amount	Mean duration of sector trade debts	Sector
Trade credit growth	Yearly growth rate of trade credit <sub>t</sub>	Firm	Inventory turnover	N° day for inventory turnover <sub>t</sub>	Sector
Inventory coverage	N° days for which inventory available at time t ensure production cycle	Firm	Brand equity	Fixed assets at time t / Sales <sub>t</sub>	Market
Debt interest rate	Mean interest rate for bank lending <sub>t</sub>	Firm	Brand equity net	(Fixed assets at time t - Goodwill) / Sales <sub>t</sub>	Market
Profit margin	Operating margin <sub>t</sub> / Sales <sub>t</sub>	Firm	Ratio sales/sector	Revenues <sub>t</sub> / Sector Total Revenue <sub>t</sub>	Market

Source: Gibilaro and Mattarocci (forthcoming)

To select the best model for each year using a reasonable number of controlling variables, a standard procedure is adopted to reduce the number of estimators. The approach selected is the stepwise forward approach, with the cut-off for including a variable fixed at 0.01%. In the analysis, no assumption is made on the order of the variables to be included, and all possible model combinations are tested to define the model with the best fit.

To test the Granger causality relationship, a standard F test is used to evaluate the impact of the addition of the trade credit debt/credit policy as an explanatory variable in the formula. The trade debt (credit) Granger causes the trade credit (debt) if the F-test for formula (a) is (not) significant and that for formula (b) is (not) insignificant whereas if the F-test is satisfied in both formulae, it means that there some external factors that jointly influence trade credit and debt policy (Carbo Valverde, Rodriguez Fernandez and Udell, 2008).

In the models previously proposed, the contemporaneous impact of credit (debt) choices on trade debt (credit) policy is assumed on the basis of the results of previous studies that point out a lagged relationship between the two choices. The new model proposed is based on the following formulae:

$$Trade\ Credit\ Amount_t = \alpha_{it} + \lambda_t Trade\ Credit\ Amount_{t-1} + \psi_t Trade\ Debt\ Amount_{t-1} + \sum_{l=1}^n \beta_l^l X_{it}^l + \sum_{l=1}^n \gamma_l^l Y_{it}^l + \sum_{l=1}^n \delta_l^l Z_{it}^l + \varepsilon_{it} \tag{3a}$$

$$Trade\ Debt\ Amount_t = \alpha_{it} + \lambda_t Trade\ Debt\ Amount_{t-1} + \psi_t Trade\ Credit\ Amount_{t-1} + \sum_{l=1}^n \beta_l^l X_{it}^l + \sum_{l=1}^n \gamma_l^l Y_{it}^l + \sum_{l=1}^n \delta_l^l Z_{it}^l + \varepsilon_{it} \tag{3b}$$

$$Trade\ Credit\ Duration_{it} = \alpha_{it} + \lambda_t Trade\ Credit\ Duration_{it-1} + \psi_t Trade\ Debt\ Duration_{it-1} + \sum_{l=1}^n \beta_l^l X_{it}^l + \sum_{l=1}^n \gamma_l^l Y_{it}^l + \sum_{l=1}^n \delta_l^l Z_{it}^l + \varepsilon_{it} \tag{4a}$$

$$Trade\ Debt\ Duration_{it} = \alpha_{it} + \lambda_t Trade\ Debt\ Duration_{it-1} + \psi_t Trade\ Credit\ Duration_{it-1} + \sum_{l=1}^n \beta_l^l X_{it}^l + \sum_{l=1}^n \gamma_l^l Y_{it}^l + \sum_{l=1}^n \delta_l^l Z_{it}^l + \varepsilon_{it} \tag{4b}$$

To study the causal relationship between trade credit and trade debt, the Granger approach previously identified is applied.

**3.3 Results & discussion**

The analysis of the causal relationship between trade credit and debt policy considers the contemporaneous relationship between the variables for the time horizon 2000-2008 (Table 4).

In agreement with the literature, the relationship between the two variables is always positive and significant in terms of both the amount (Fabbri and Klapper, 2008) and duration (Kiyotaki and Moore, 1997) for all the years considered. Each yearly cross-section differs with respect to the amount and type of controlling variables included in the model by the stepwise procedure (from a minimum of 5 controlling variables to a maximum of 13) and presents a different degree of statistical fitness (normally lower for the models of the duration of credit or debt).

The F-test, used to establish the Granger causality relationship, does not allow the identification of the sign of the relationship because in almost all cases (excluding the trade debt in 2001), the test is significant; as a result, the choice to include the variable in the model increases the fit of the model. Evidence related to a contemporaneous trade policy does not enable the identification of the relationship; consequently, the analysis is repeated with consideration of a one-year lag between the trade credit and debt policies (Table 5).

Table 4 – OLS cross section regression of trade credit-debt policy of Italian on the time horizon 2000-2008

	2000	2001	2002	2003	2004	2005	2006	2007	2008	
<i>Dependent variable trade credit amount<sub>t</sub></i>										
Trade debt amount <sub>t</sub>	0.15**	0.44**	0.17**	0.31**	0.19**	0.32**	0.24**	0.11**	0.27**	
Trade credit amount <sub>t</sub>	-	-	-	-	-	-	-	-	-	
Significant controlling variables	11	5	9	9	9	9	10	9	11	
Number of observations	2103	2272	2457	2685	2770	3204	3318	3563	3514	
Adj R-squared	0.78	0.78	0.70	0.69	0.66	0.65	0.67	0.67	0.57	
Granger causality test	F value	0.15	2.32	15.53	7.99	6.23	4.98	1.11	15.70	79.60
	Prob	1	1	1	1	1	1	1	1	1
<i>Dependent variable trade debt amount<sub>t</sub></i>										
Trade debt amount <sub>t</sub>	-	-	-	-	-	-	-	-	-	
Trade credit amount <sub>t</sub>	0.15**	0.31**	0.18**	0.38**	0.20**	0.26**	0.24**	0.11**	0.23**	
Significant controlling variables	9	5	8	11	9	10	10	10	13	
Number of observations	2103	2272	2457	2685	2770	3204	3318	3563	3514	
Adj R-squared	0.70	0.79	0.71	0.76	0.66	0.66	0.67	0.66	0.60	
Granger causality test	F value	28.49	0.88	27.63	1.62	256.36	3.29	9.36	5.34	18.36
	Prob	1	0	1	1	1	1	1	1	1
<i>Dependent variable trade credit duration<sub>t</sub></i>										
Trade debt duration <sub>t</sub>	0.09**	0.16**	0.09**	0.09**	0.12**	0.10**	0.13**	0.21**	0.15**	
Trade credit duration <sub>t</sub>	-	-	-	-	-	-	-	-	-	
Significant controlling variables	11	6	7	7	10	8	7	10	6	
Number of observations	2042	2205	2377	2582	2674	3072	3216	3463	3413	
Adj R-squared	0.47	0.30	0.47	0.46	0.50	0.50	0.46	0.41	0.39	
Granger causality test	F value	384.64	550.60	249.08	511.30	690.85	345.51	355.99	413.55	509.60
	Prob	1	1	1	1	1	1	1	1	1
<i>Dependent variable trade debt duration<sub>t</sub></i>										
Trade debt duration <sub>t</sub>	-	-	-	-	-	-	-	-	-	
Trade credit duration <sub>t</sub>	0.09**	0.22**	0.17**	0.19**	0.18**	0.17**	0.26**	0.38**	0.28**	
Significant controlling variables	12	13	14	14	13	12	13	14	13	
Number of observations	2042	2205	2377	2582	2674	3072	3216	3463	3413	
Adj R-squared	0.54	0.50	0.49	0.51	0.53	0.51	0.51	0.50	0.49	
Granger causality test	F value	5.12	2.53	10.62	21.04	33.11	8.51	8.67	6.50	6.00
	Prob	1	1	1	1	1	1	1	1	1

Source: AIDA-Bureau Van Dijk data, processed by the authors

The results obtained for the trade credit/debt duration are unaffected by the choice of considering a one-year lag in the regression analysis. This result could be justified on the basis of the structural resilience of some contract characteristics that could not be changed on the basis of temporary needs of trade debtors or creditors (Ng et al., 1999).

The analysis of the amount of credit is more interesting because the choice to consider a lag in the relationship leads to a significant change in the results. In some years, the Granger causality test fails for the trade credit and is satisfied for the opposite position, and in the following year, the scenario could be the opposite. This strange result could be justified on the basis of a trial-and-error strategy adopted by each firm; when the market condition changes, the firm modifies its credit policy, but in the following year it also has to adjust its debt policy to the market conditions after the new trade policy is adopted. This result is similar to the evidence obtained in the literature about the relationship between trade credit and bank lending that demonstrates a change in the causal relationship, which is interpreted as an adaptive process leading to the optimal equilibrium (Love et al., 2007).

**Table 5 – OLS cross section regression of trade credit-debt policy of Italian with one year lag on the time horizon 2000-2008**

		2000	2001	2002	2003	2004	2005	2006	2007	2008	
<i>Dependent variable trade credit amount<sub>t</sub></i>											
Trade debt amount <sub>t-1</sub>		-0.13**	-0.10**	-0.31**	-0.13**	-0.12**	-0.07**	-0.05**	-0.15**	-0.19**	
Trade credit amount <sub>t-1</sub>		0.51**	0.48**	0.67**	0.77**	0.55**	0.83**	0.83**	0.85**	0.82**	
Significant controlling variables		13	8	11	7	11	9	9	10	10	
Number of observations		2084	2257	2407	2622	2742	3166	3291	3526	3475	
Adj R-squared		0.85	0.85	0.83	0.85	0.81	0.89	0.93	0.90	0.83	
Granger causality test		F value	1.17	0.49	2.40	4.41	5.78	0.97	14.37	57.77	1.54
		Prob	1	0	1	1	1	0.2	1	1	1
<i>Dependent variable trade debt amount<sub>t</sub></i>											
Trade debt amount <sub>t-1</sub>		0.57**	0.35**	0.71**	0.31**	0.16**	0.66**	0.85**	0.80**	0.69**	
Trade credit amount <sub>t-1</sub>		-0.16**	0.00	-0.28**	-0.07**	-0.07**	-0.07**	-0.04**	-0.11**	-0.12**	
Significant controlling variables		6	7	9	10	8	7	10	10	6	
Number of observations		2085	2267	2407	2617	2735	3173	3300	3523	3476	
Adj R-squared		0.78	0.84	0.81	0.77	0.68	0.84	0.88	0.88	0.81	
Granger causality test		F value	0.40	9.02	3.58	0.51	2.98	17.18	12.96	4.16	17.68
		Prob	0	1	1	0	1	1	1	1	1
<i>Dependent variable trade credit duration<sub>t</sub></i>											
Trade debt duration <sub>t-1</sub>		-0.05**	-0.01	-0.01	-0.04**	-0.04**	-0.04**	-0.02**	-0.03**	0.00	
Trade credit duration <sub>t-1</sub>		0.67**	0.70**	0.65**	0.75**	0.90**	0.74**	0.74**	0.84**	0.65**	
Significant controlling variables		7	6	9	8	10	7	8	6	4	
Number of observations		2006	2171	2324	2519	2646	3023	3183	3446	3384	
Adj R-squared		0.66	0.76	0.73	0.82	0.80	0.80	0.82	0.75	0.73	
Granger causality test		F value	753.60	1122.6	421.21	576.61	846.76	399.29	418.91	946.04	478.60
		Prob	1	1	1	1	1	1	1	1	1
<i>Dependent variable trade debt duration<sub>t</sub></i>											
Trade debt duration <sub>t-1</sub>		0.71**	0.76**	0.74**	0.7**	0.71**	0.74**	0.77**	0.78**	0.76**	
Trade credit duration <sub>t-1</sub>		-0.10**	-0.07**	-0.07**	-0.07**	-0.08**	-0.07**	-0.06**	0.00	-0.08**	
Significant controlling variables		9	8	8	10	7	8	9	9	9	
Number of observations		1991	2162	2308	2495	2621	3008	3169	3423	3367	
Adj R-squared		0.79	0.80	0.79	0.80	0.78	0.80	0.81	0.80	0.80	
Granger causality test		F value	3.95	10.21	20.32	11.60	9.12	7.67	15.02	4.96	8.13
		Prob	1	1	1	1	1	1	1	1	1

Source: AIDA-Bureau Van Dijk data, processed by the authors

During the last three years, the causal relationship between trade credit and debt has not been clear, and the Granger test fails to identify the driver of the trade policy. This result could be justified on the basis of the financial crisis, which, as suggested in the literature, significantly changed the strategies adopted by trade creditors (who became more interested in cash payments) and trade debtors (who, because of the lack of standard credit solutions, tried to maximise the amount of credit requested) (Atradius, 2010).

#### 4. CONCLUSIONS

Policy decisions regarding trade credit/debt strictly affect each other and, as demonstrated in the literature, net models normally show a better statistical fit relative to gross models (see, for example, Gibilaro and Mattarocci, forthcoming).

Considering the contemporaneous interaction between the two decisions, the results obtained do not enable the identification of the main driver of trade policy decisions in terms of either the amount or the duration. Looking at a one-year-lagged relationship, the Granger test only allows the identification of the leader and the follower for the amount of trade credit/debt; normally, the policy regarding trade credit is the first strategy changed by a firm in

response to new market conditions, but after a change in the credit policy, it could be necessary to make an adjustment in the trade debt to overcome some errors in anticipating the new credit policy conditions.

This paper presents some preliminary evidence regarding the causal relationship between trade credit and debt policy using accounting data of a large sample of Italian firms and thus does not allow the study of the infra-annual relationship between the two decisions. An improvement of the database is necessary to ensure that the threshold of one year used to study the non-contemporaneous relationship is not arbitrary (see, among others, Paul and Wilson, 2006). Even if high-frequency data are not available for analysis, the same analysis could be repeated in future years to test whether the relationship identified is still present after the crisis or whether the crisis persistently changes the trade credit policy adopted by the firms (Atradius, 2010).

Financial intermediaries offer lending solutions based on trade credit agreements and the value of the service offered is strictly affected by the quality of credits discounted and the relationship between supplier and customer (Sopranzetti, 1998). A further development of the paper had to consider the impact of the casual relationship in trade credit and debt choices on the asset based lending looking at the different types of contracts available.

## ENDNOTES

The article is a joint effort by the two authors and the single sections could be ascribed as follows: introduction, literature review and conclusions by Lucia Gibilaro and empirical analysis by Gianluca Mattarocci.

## AUTHOR INFORMATION

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