Net Trade Credit and Firm Performance

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Abstract

This paper examines the impact of net trade credit on firm performance using a novel nonlinear threshold model and a large panel of European firms. We uncover a robust "U-shaped" nonmonotonic relationship between net trade credit and firm performance, when endogeneity is taken into account. Using the components of trade credit on their own cannot generate a consistent relationship with profitability, due to the loss of information. Assessing the recent financial crisis we find that the nonmonotonic outcome is driven from the pre-crisis period. Finally, older firms benefit more from the increase in net trade credit compared to younger firms.

Keywords: firm performance, net trade credit, threshold, nonmonotonic relationship, endogeneity

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1 Introduction

How does a firm's net position with respect to extended and received trade credit affects its profitability? Trade credit is used extensively by financially constrained firms and firms under tightened financing conditions and liquidity shortage (Casey and O'Toole, 2014). Therefore, it is crucial to assess the role of trade credit on firm profitability, especially for vulnerable firms such as the Small and Medium Enterprises (SMEs). For these firms, the trade credit channel forms a substantial part of the balance sheet and this is evident in our data where, on average, firms engage in providing and receiving trade credit at the levels of 33.4% and 21.4% respectively, as a share of their assets. Moreover, the recent global financial crisis created an excellent environment in assessing the importance of the trade credit channel because in that period the supply of bank loans was reduced and firms had to search for alternative sources of financing.

We investigate the above question using a large dataset of European firms, most of which are SMEs. In the Euro area, SMEs are the workhorse of the economy, being responsible for about 60% of production (Muller et al., 2016).[1] Given the large shares of extended and received trade credit in balance sheets, it is necessary to consider both of them simultaneously when assessing the total effect of the trade credit on firm profitability. We define extended trade credit to be the accounts receivable over total assets and received trade credit as the accounts payable over total assets. Figure 1 illustrates the unconditional relationship between net trade credit (NTC), defined as the difference of extended trade credit and received trade credit (horizontal axis), and firm performance defined as return on assets and taken in deviations of firm-specific means (WFD-ROA, vertical axis). For the first three deciles, as net trade credit increases, ROA decreases. Firm-year observations which are in the third decile are associated with the worse performance. From the fourth decile and onwards, higher net trade credit levels are associated with higher ROAs. This indicates that there is a nonmonotonic relationship between the two variables. In particular, this is "U-shaped", which means that when net trade credit is low (i.e. in the first and second decile), an increase in net trade credit is associated with a reduction in firm performance. However, once net trade credit exceeds a certain point (threshold) then there are positive effects on firm performance, i.e. after the third decile, an increase in NTC is associated with an increase in ROA. In other words, when a firm is relatively more exposed to its suppliers (high trade credit received) compared to its customers (trade credit extended) the extension of net trade credit is not profitable unless it exceeds a certain threshold.

Figure 2 provides an additional illustration of these arguments. Here we utilize the

[1] This is based on EU28 value added calculations in the non-financial business sector in 2015.

nonparametric Nadaraya-Watson estimator to trace out the relationship between the same two variables. The horizontal axis displays NTC, the right vertical axis has the values of the Nadaraya-Watson estimate and the left vertical axis has the values of the histogram. The estimated fitted line (along with the 95% confidence interval) exhibits a nonmonotonic relationship of a "U-shape" between the variables. The threshold point is estimated at -0.06, which belongs to the second decile of the net trade credit variable. This negative value of the threshold indicates that extended trade credit is less that received trade credit.

Figures 1-2 here

This descriptive analysis provides a strong indication for a nonmonotonic relationship between net trade credit and firm performance, albeit it is rather stylized and omits many significant determinants of firm performance and net trade credit. Nevertheless these figures are very helpful in providing a preliminary criticism on the related literature which only finds either a positive or a negative impact of trade credit on firm performance. Using formal statistical inference, we uncover and quantify this nonmonotonic relationship between net trade credit and firm performance. We further show that this relationship is robust to the use of various firm performance indicators. The results indicate that the strength of our analysis stems from the use of a novel nonlinear regression approach that controls for endogeneity. The use of alternative methodologies, similar to the ones that have been used in the related literature, fails to uncover a consistent and nonmonotonic relationship between the two variables.

Many theories have been developed in an effort to explain the existence of trade credit. These theories mainly describe the advantages that suppliers have over financial institutions in providing trade credit, via accounts receivables, from a commercial, operational and financial point of view. For example, financing advantage theories stipulate that, by extending trade credit, suppliers increase their investment in accounts receivables which may have a positive effect on firm profits and liquidity. However, the extension of trade credit is costly (Nadiri, 1969). Suppliers need to monitor their buyers, which involves both direct monetary and human resource costs, bear the risk of default and also bear the opportunity cost of not being able to invest in another venture (Sartoris and Hill, 1981; Biais and Gollier, 1997). Other such theories explain the existence of trade credit due to information asymmetry, (Biais and Gollier (1997)), price discrimination (Brennan et al. (1988), redeployment of goods after default (Frank and Maksimovic (1998)), opportunistic behavior (Burkart and Ellingsen (2004)), product quality (Long et al. (1993)) and inventory transaction costs (Emery (1987)). This list is far from exhaustive but what these theories have in common is that firms face a

trade-off in choosing the profit maximizing level of trade credit. As a result, these theories hint at the existence of a possible nonmonotonic relationship between trade credit and firm performance.

However, the aforementioned theories are not supported by the related empirical work, which fails to uncover any kind of nonmonotonic relationship between trade credit and firm value or performance. For example, Cuñat (2007) using a sample of UK firms was able to illustrate graphically an inverted "U-shaped" relationship between asset growth and extended trade credit. However the fixed effects regressions with spline variables for several predetermined regimes of firm performance were not able to provide statistically significant results. It is noticeable that the related papers in the literature explored only a linear impact of trade credit on firm performance and most of them focus on either extended or received trade credit, separately, without taking into account the fact that firms engage in both activities, see e.g. Petersen and Rajan (1997) using US data, Love et al. (2007) using data on emerging economies and Ferrando and Mulier (2013) using data from 8 E.U. countries.

Our results are able to bridge this gap in the literature uncovering a consistent non-monotonic relationship between net trade credit and firm performance. The specific relation is of a "U-shape" showing that an increase in trade credit extended , given trade credit received, is beneficial only when it is above a certain threshold. This has implications on managers and shareholders since the use of trade credit extended to customers on its own is not a signal of superior performance. The relative increase of trade credit extended to trade credit received is the best indicator of firm performance

This paper is also related to the literature that examines the effects of a crisis on trade credit. Love et al. (2007) assessed the redistribution view of trade credit during financial crises finding that trade credit reduces in the short-run after the crisis due to the reduction in the supply of funds from other sources. Garcia-Appendini and Montoriol-Garriga (2013) using a dataset with US firms explored the importance of liquidity on trade credit before and after the crisis and they found that firms with higher pre-crisis liquidity levels provide more credit to their liquidity constrained customers after the crisis. Liquid firms, which provided more credit, had better performance during and after the crisis, leading to higher trade credit taken from financially constrained firms. These studies employed empirical models in which the trade credit-performance relationship was assumed to be linear. However, as it is illustrated again in Figure 3, this relationship may as well be nonmonotonic. Such an issue has not been investigated in the recent empirical literature.

Finally, our paper contributes to the stream of literature that assesses the role of the age of the firm on the relationship between firm performance and net trade credit. For example, Ferrando and Mulier (2013) and Guariglia and Mateut (2016) argue that young

firms are more financially constrained and experience more difficulties in obtaining external funds than older more established firms.[2] Therefore, the trade credit channel should play a bigger role for these young firms. In order to examine this hypothesis we split our sample equally into young and old firms. Figure 4 indicates the existence of nonmonotonicity in these subsamples as well, with possibly more pronounced effects for the older firms.

Figures 3-4 here

The relationship between trade credit and firm performance is econometrically difficult to identify because of the simultaneous appearance of endogeneity and nonmonotonicity. While some limited evidence of nonmonotonicity were presented above, endogeneity is a well studied problem in this literature and arises because of firm heterogeneity and simultaneity of trade credit decisions, see e.g. Wintoki et al. (2012). To tackle both issues at the same time, we use the novel method of Seo and Shin (2016) which allows us to estimate a dynamic panel model by GMM, when the nonlinearity can be captured by a threshold regression model. The threshold model has many advantages against other competing models, either parametric or nonparametric. It is a parsimonious nonlinear model with an intuitive interpretation; the threshold parameter is estimated from the sample and confidence intervals can be constructed, and finally, there exists an explicit statistical test of linearity against the alternative of threshold regression. We estimate the relationship between net trade credit and firm performance using a new dataset of 2526 European firms observed between 2003 and 2015. This dataset is attractive because it has many observations which are necessary when estimating nonlinear models and because its time series dimension allows us to control for endogeneity.

Seo and Shin (2016) provide a specific test of linearity against the alternative of a threshold model when the variables of the panel model are endogenous. This test, together with other specification tests available, provides us with ample statistical evidence that the relationship between trade credit and firm profitability is nonmonotonic and that it is adequately described by the threshold model chosen. Specifically, when estimating the model, we find evidence of a "U-shaped" curve. The relationship between net trade credit and firm performance variables is negative initially, ending up to an estimated threshold point and afterwards, it becomes positive. For the estimated threshold points, we derive confidence intervals and compare these to measures of central tendency in order to arrive to policy implications.

To summarize, we find a robust nonmonotonic relationship between net trade credit and

[2] Ferrando and Mulier (2013) used a sample of 8 EU countries and Guariglia and Mateut (2016) used data from four transition economies and UK as a control.

firm performance, only when endogeneity is taken into account. Specifically, the relationship between net trade credit and firm performance is of a "U-shape". In addition, we find that a more disaggregated analysis, using the components of net trade credit (trade credit received and extended separately), cannot generate a consistent nonmonotonic effect on firm performance. This is driven from loss of information from the restriction that only one component of net trade credit at a time has a nonlinear effect on firm performance.[3] Assessing the effect of the recent financial crisis, we find that the uncovered nonmonotonic relationship between net trade credit and firm performance is driven from the pre-crisis period. Finally, we find that the nonmonotonicity is present for both young and old firms, with more pronounced positive effects, once the threshold point is exceeded, for the older firms.

The remainder of the paper is organized as follows: In Section 2 we explain and motivate our methodology. In Section 3 we discuss the data collection and our dataset. Section 4 presents the main results and robustness checks with additional firm performance indicators. Section 5 presents the results under different normalization. Section 6 shows how the recent financial crisis affects our results. In Section 7 we show the impact of age on our key results. Finally, Section 8 concludes our paper.

2 Empirical specifications and methodology

2.1 Endogeneity

The implications of endogeneity in corporate finance research have been recently brought to the spotlight by Wintoki et al. (2012) and Roberts and Whited (2013). Endogeneity leads to biased and inconsistent parameter estimators. In our setting, there are three possible causes of endogeneity: individual firm heterogeneity, the fact that current values of the independent variables used are a function of past values of the dependent variable (firm performance) and reverse causality (simultaneity) between net trade credit and firm performance.

When pooling firms, we need to account for the considerable heterogeneity between them. In panel data models such heterogeneity is modeled by the individual effects. These effects can capture unobserved technological differences, years of education and ability of the managers and other low frequency changing unobserved variables. We start by considering the following linear panel data model:

$$Y_{it} = \beta' X_{it} + \delta' W_{it} + \eta_i + \varepsilon_{it}, \tag{2.1}$$

[3] See for example Asimakopoulos et al. (2017) for the importance of information content in financial economics, albeit on a different setup.

where Y_{it} is the dependent variable, η_i is the individual firm heterogeneity, and X_{it} and W_{it} are vectors which contain two sets of explanatory variables which capture firm characteristics. In our case it is highly likely that such characteristics affect the choices of the firms and thus the individual effects are correlated with the explanatory variables, $E(\eta_i|X_{it}, W_{it}) \neq 0$, for all t. While individual effects can be easily removed in (2.1), that static model does not allow for the case where past firm performance affects current values of the explanatory variables. Econometrically, strict exogeneity does not hold and $E(\varepsilon_{is}|X_{it}, W_{it}) \neq 0$ for $s < t$. This may happen because strong past performance made a firm creditworthy and thus it receives less trade credit and more bank credit. A solution to this problem comes by estimating a dynamic panel data model

$$Y_{it} = \varphi Y_{it-1} + \beta' X_{it} + \delta' W_{it} + \eta_i + \varepsilon_{it}, \tag{2.2}$$

where past performance is introduced as an explanatory variable. The assumptions needed for consistent estimation are $E(Y_{it-s}(\varepsilon_{it}-\varepsilon_{it-1})) = 0$ and $E(X_{it-s}(\varepsilon_{it}-\varepsilon_{it-1})) = E(W_{it-s}(\varepsilon_{it}-\varepsilon_{it-1})) = 0$ for $s \geq 2$ and $t = 3, ..., T$, see e.g. Arellano and Bond (1991). The final possible cause of endogeneity is reverse causality which is an issue when firm performance and explanatory variables such as the net trade credit are the result of an equilibrium mechanism and are determined at the same time. For example, a firm chooses a level of net trade credit in an attempt to increase profits but these profits also determine the level of net trade credit chosen. This means $E(\varepsilon_{it}|X_{it}, W_{it}) \neq 0$. To deal with this issue the static model (2.1) can be estimated as $Y_{it} = \beta' X_{it-1} + \delta' W_{it-1} + \eta_i + \varepsilon_{it}$. For (2.2), the orthogonality conditions presented above are sufficient its consistent estimation.

2.2 Threshold Autoregression

Threshold regression models split the sample in two groups, each of which can be described by the same linear regression model. Their attractiveness lies in the fact that the sample splitting value can be estimated from the data. Consider the following model:

$$Y_{it} = \beta_1' X_{it} I(Q_{it} \leq \gamma) + \beta_2' X_{it} I(Q_{it} > \gamma) + \delta' W_{it} + \eta_i + \varepsilon_{it}, \tag{2.3}$$

where $I(\cdot)$ is the indicator function. In this model, the sample splitting parameter is γ and the threshold variable, which may also appear in X_{it} or W_{it}, is Q_{it}. If the threshold variable is less than γ, then $Y_{it} = \beta_1' X_{it} + \eta_i + \varepsilon_{it}$ while if $Q_{it} > \gamma$, $Y_{it} = \beta_2' X_{it} + \eta_i + \varepsilon_{it}$. Hansen (1999) estimated model (2.3) by least squares under the assumption that the X_{it} are strictly exogenous, and provided an asymptotic limit theory for the estimators of β_1, β_2, δ and γ.

Based on this theory we can test the null hypothesis of linearity $H_0 : \beta_1 = \beta_2$ against the alternative of threshold regression, $H_1 : \beta_1 \neq \beta_2$. Additionally, we can conduct statistical hypothesis testing about the parameter γ and also derive confidence intervals.

Seo and Shin (2016) consider the following dynamic panel data model,

$$Y_{it} = \varphi Y_{it-1} + \beta_1' X_{it} I(Q_{it} \leq \gamma) + \beta_2' X_{it} I(Q_{it} > \gamma) + \delta' W_{it} + \eta_i + \varepsilon_{it}, \tag{2.4}$$

where X_{it} and Q_{it} are endogenous. The estimation method involves estimating (2.4) by GMM for values of γ which belong in a strict subset of the support of Q_{it}, and then minimizing a non-smooth objective function over these γ. In particular, the first step is to select a value for the parameter γ then estimate (2.4) by GMM as in Arellano and Bond (1991) and get $\hat{\varphi}(\gamma)$, $\hat{\delta}(\gamma)$, $\hat{\beta}_1(\gamma)$, $\hat{\beta}_2(\gamma)$ and the GMM objective function $J(\gamma)$. Secondly, the estimator $\hat{\gamma}$ is the value of γ which minimizes $J(\gamma)$ over all possible γ. Additionally, $\hat{\varphi}(\hat{\gamma})$, $\hat{\delta}(\hat{\gamma})$, $\hat{\beta}_1(\hat{\gamma})$, $\hat{\beta}_2(\hat{\gamma})$ are the final estimates. Seo and Shin (2016) show that $\hat{\gamma}$, $\hat{\delta}(\hat{\gamma})$, $\hat{\varphi}(\hat{\gamma})$, $\hat{\beta}_1(\hat{\gamma})$ and $\hat{\beta}_2(\hat{\gamma})$ are asymptotically normal. The proposed Wald test for testing the hypothesis of linearity $H_0 : \beta_1 = \beta_2$ has a nonstandard asymptotic distribution and the p-values have to be computed by a bootstrap method.

The threshold regression models (2.3) and (2.4) have several advantages when compared to other sample splitting methods or dummy variable approaches. In those methods one usually splits the sample using an arbitrary threshold, usually the median, quartiles or percentiles. Furthermore, in these cases firms are usually put in a regime and they stay in that regime for the whole time span of the sample, irrespectively to changes in their sample splitting variable values, (see e.g. Byoun (2008)). In the models above the threshold parameter is estimated from the data and all firms may switch regimes according to the threshold variable Q_{it}.

2.3 Estimation methodology

We start by estimating the following linear models

$$ROA_{it} = \beta NTC_{it-1} + \delta' W_{it-1} + \eta_i + \varepsilon_{it}, \tag{2.5}$$

$$ROA_{it} = \varphi ROA_{it-1} + \beta NTC_{it} + \delta' W_{it} + \eta_i + \varepsilon_{it}, \tag{2.6}$$

where ROA is the return on assets variable and W_{it} contains the explanatory variables and year time dummies. Equation (2.5) is estimated by the within-groups estimator and the explanatory variables are lagged once in order to remove the simultaneity bias. Equation (2.6) is estimated by GMM as in Arellano and Bond (1991), which fully addresses the issue

of endogeneity. These models have also been used in Cuñat (2007) in the trade credit literature. We also estimate the following variants of these models in an attempt to capture the nonmonotonicity by using quadratic terms:

$$ROA_{it} = \beta_1 NTC_{it-1} + \beta_2 NTC_{it-1}^2 + \delta' W_{it-1} + \eta_i + \varepsilon_{it}, \tag{2.7}$$

$$ROA_{it} = \varphi ROA_{it-1} + \beta_1 NTC_{it} + \beta_2 NTC_{it}^2 + \delta' W_{it} + \eta_i + \varepsilon_{it}, \tag{2.8}$$

The threshold models that we estimate are

$$ROA_{it} = \beta_1 NTC_{it-1} I(NTC_{it-1} \leq \gamma) + \beta_2 NTC_{it-1} I(NTC_{it-1} > \gamma) + \delta' W_{it-1} + \eta_i + \varepsilon_{it}, \tag{2.9}$$

which is estimated by the within-groups estimator as in Hansen (1999) and

$$ROA_{it} = \varphi ROA_{it-1} + \beta_1 NTC_{it} I(NTC_{it} \leq \gamma) + \beta_2 NTC_{it} I(NTC_{it} > \gamma) + \delta' W_{it} + \eta_i + \varepsilon_{it}, \tag{2.10}$$

is estimated by GMM as in Seo and Shin (2016). The vector W_{it} contains the rest of the explanatory variables which, together with NTC, are considered to be predetermined; their choice is discussed below.

When estimating the above models by GMM we use the full instrument set because the time dimension is very small compared to the cross-section one, and thus we do not expect small sample biases. We only use the orthogonality conditions of Arellano and Bond (1991) and not those of Blundell and Bond (1998) because their initial condition moment restrictions may not hold in our dataset. Besides, the results show that φ is far away from 1 so the gains using these extra conditions, should they hold, would be minimal.[4] This is also evidence that our instruments are not weak, see e.g. Blundell and Bond (1998). We test the hypothesis $H_0 : \beta_1 = \beta_2$ for both models using the bootstrap tests proposed in Hansen (1999) and Seo and Shin (2016).[5] For every GMM regression we report the m_2 test and the Sargan-Hansen J test of overidentifying restrictions, both of which can be found in Arellano and Bond (1991). The m_2 tests for lack of second order serial correlation in the residuals. If this test rejects the null hypothesis, then the moment restrictions are not valid and the GMM estimator will be inconsistent. The J test is a specification test which means that if

[4] We tested all the variables for nonstationarity using the panel unit root tests of Karavias and Tzavalis (2014). The tests strongly reject the unit root hypothesis for all variables.

[5] In theory the number of bootstrap samples taken should be infinity. In practice, bootstrap tests use a finite number of samples and ideally, the number of bootstrap samples should be large enough so that the randomness of the samples does not affect the outcome of the test and so that the tests do not lose power, see e.g. Davidson and MacKinnon (2000). For the bootstrap test of (2.9) we found that with 400 bootstrap samples the results were very stable. This number was equal to 5000 for the bootstrap tests of (2.10).

it rejects, either the orthogonality conditions, or other assumptions, or both are false.

3 Data

To evaluate the way in which net trade credit affects firm profitability, we construct a unique panel of manufacturing firms for euro area countries using the Amadeus (Analyse Major Database from European Sources) database, distributed by Bureau Van Dijk (BvDEP). Amadeus is a European financial database containing annual accounting information for firms from European countries with a focus on private firms. It offers information regarding consolidated and unconsolidated accounts in a format of 26 balance sheet and 26 profit and loss accounts. Due to its standardized format of annual accounts, it allow us to compare information across countries, since all variables are consistent with each other. Another distinctive characteristic is the wide incidence of SMEs along with large firms across all industries (approximately 98%). Having such detailed financial data is of particular importance as we are able to explore the impact of trade credit on the profitability of firms of all size categories across all industries for euro area countries.

Our original dataset covers the 2003-2015 period.[6] It contains 844,071 firm-year observations on 162,190 quoted and unquoted manufacturing firms for 11 euro area countries (i.e. Austria, Belgium, Finland, France, Greece, Ireland, Italy, Luxembourg, Netherlands, Portugal and Spain). We applied a number of standard criteria in the literature to clean our data. To control for the potential of outliers, all variables used in the empirical models are winsorized at the top and bottom 1% of their distribution. Observations with negative sales and assets are dropped. Firms without complete records on our key variables are also dropped. We only consider firms with unconsolidated accounts, to avoid double-counting firms and subsidiaries or operations abroad (Guariglia et al., 2015). After performing our data filtering, we end up with a balanced panel of 30,312 firm-year observations. Finally, the GDP deflator is collected from the World Development Indicators dataset.

3.1 Data description

Our main variable of interest is the net trade credit, following Love et al. (2007). However, Ferrando and Mulier (2013) define as trade credit the sum of extended trade credit and received trade credit. This total trade credit gives an idea of the aggregate trade credit channel, however, we argue that the net position of the firm with respect to trade credit is

[6] A maximum of 10 years of complete data history can be downloaded at once. Our dataset was obtained in 2012 and it was updated in 2016 allowing us to have information for 13 years.

the most appropriate measurement of the trade credit channel. This is because trade credit extended is associated with future earnings and trade credit received with future payments. When a firm receives more trade credit from its suppliers it is more likely to provide trade credit to its customers. This means that net trade credit represents firms' relative willingness for trade credit provision (Love et al., 2007). We follow the standard literature on trade credit(Love et al., 2007; Giannetti et al., 2011; Ferrando and Mulier, 2013) and define trade credit extended as accounts receivable over total assets (*Trade extended*) whereas trade credit taken is calculated as accounts payable over total assets(*Trade received*).

Central to the ideas we explored in this paper is the definition of firm profitability. Following previous literature (Andres, 2008; Gao et al., 2013; Bena and Ortiz-Molina, 2013), we consider ROA as our benchmark indicator of firm profitability. This variable is calculated as earnings before interest, tax, depreciation and amortization scaled to total assets (*EBITA/Total Assets*). We also include two additional firm performance indicators, i.e., return on invested capital (ROIC) defined as *EBITA* minus interest expenses to invested capital, where invested capital is equal to total assets minus trade received ((*EBITA-interest expenses)/Invested Capital)*; and sales efficiency (SalEff) defined as: total assets scaled by total number of employees(*Total Assets/NumberEmployees*). We consider the former to be a good alternative to ROA as it measures the levels of efficient allocation of firm resources, taking into account debt obligations.[7] The latter captures the sales-per-employee ratio. A higher ratio indicates that firms can actually work at lower overhead costs. In other words, they are able to produce more with fewer employees and increase their profits, as in Chen et al. (2008). Finally, as a robustness check we also employ the operating margin (OpMargin) as a proxy for firm performance. Following the work of Campa and Kedia (2002), this is measured as earnings before interest and tax to total sales (*EBIT/TotalSales*).[8] Overall, these measures have been previously used in the literature (Dewenter and Malatesta, 2001; Chen et al., 2006, 2008) and ensure the robustness of our results .

The level of performance depends on the firm's overall financial situation. In other words, firm performance is influenced by its capacity to retrieve prepayment deals from its customers, request for advance payments and from its access to other sources of external finance (Mateut, 2014). We take all these into account by including control variables which capture many firm characteristics. Specifically, we use three different information sets. First,

[7] According to Reboul and Toldrà-Simats (2016), ROIC can be considered as a proxy for firms' performance level as it has a positive effect on profit margins. Greater efficiency allows firms to expand capacity at a lower cost.

[8] In line with Kabir and Roosenboom (2003), we argue that dividing EBIT with total sales creates an addional advantage of overcoming the historial cost problem associated with total assets. As a result, we also normalize our key variable (net trade credit) by the same flow variable (total sales) for consistency, similarly to Barrot (2016), when using OpMargin as the dependent variable.

we consider a balance sheet approach including firm-specific characteristics which are standard in the literature (Giannetti et al., 2011; Ferrando and Mulier, 2013; Gao et al., 2013; Erel et al., 2015; Guariglia and Mateut, 2016). We use the size of the firms defined as the logarithm of firms' total assets (*log of total assets*); leverage (measured as *Long Term Debt plus Loans*); sales growth (calculated as the *Growth Rate of Sales*); liquidity (employed as *Cash and Cash Equivalents*) and cash flow (*Cash Flow*). In the second information set we account for the firms' lending channel by adding to the balance sheet variables, firms' bank loans (*Loans*), interest payments (calculated as *Interest paid*/(*Long Term Debt + Loans*)) and collateral (calculated as *Total Fixed Assets*). Finally, the third information set contains all the variables from the second information set plus two different measures of firms' efficiency levels: net working capital (measured as *Current Assets - Current Liabilities - Cash and Equivalents*) and capital expenditures (calculated as these variables as *Change in Fixed Assets + Depreciation).* All nominal variables are normalized by total assets and are adjusted using the GDP deflator at the 2005 price level.[9]

4 Results

4.1 The case of ROA

The empirical analysis begins with the use of return on assets (ROA) as the firm performance indicator.[10] Table 1 shows the results assuming a linear (first 6 columns) and quadratic (last six columns), effect of net trade credit on ROA. Specifically, the first three columns of the table, labelled as "Linear-Fixed effects", contain the estimation results of 2.5, whereas the columns labelled as "Linear-GMM" contain the results of 2.6. The columns labeled as "Quadratic-Fixed effects" contain the results of 2.7 and the columns under the "Quadratic-GMM" case contain the results of 2.8. For each of the above cases we present three different sets of results depending on the information set. The first information set illustrates the standard balanced sheet approach. The second information set adds to the previous case the firm lending channel and finally the third information set introduces firm efficiency. All regressions contain year time dummies.

Regarding the linear-fixed effects estimations, we observe that the beta coefficient of net trade credit on firm performance is positive when firm efficiency is taken into account and negative or not statistically significant in the other two cases. Therefore, we cannot obtain

[9] Table A in the appendix provides a summary statistics of our variables. Table B provides the correlation matrix.

[10] Later on we will use more firm performance indicators such as the return on invested capital, sales efficiency and operating margin.

a robust outcome using the linear estimations. Under the linear GMM approach the effect of net trade credit on ROA is positive across the information sets. However, the model is misspecified according to the Hansen specification test. Furthermore, when we add the quadratic term in our regressions we observe that there is no consistent outcome regarding the nonlinearity of net trade credit for any of our cases and econometric estimations (OLS and GMM). Note that the quadratic GMM model is again misspecified according to Hansen test.

Moving on to Table 2, we present two nonlinear approaches based on threshold estimation for net trade credit. The first approach utilizes Hansen's methodology,Hansen (1999), under an OLS approach, as in equation (2.9). Here we observe an inconsistent indication of nonmonotonicity that is affected by the choice of information set. In more detail, under the standard (first) information set we observe a "U-shaped" relationship which disappears once we incorporate the richer information sets. Therefore, the effect before and after the estimated threshold is not statistically significant and robust across all the experiments we perform.

However, when we implement the threshold GMM approach using Seo and Shin (2016) methodology we find a consistent nonmonotonic effect of net trade credit on ROA for every information set we utilize. The strength and key distinction of the latter approach is the fact that it takes endogeneity into account. The uncovered nonmonotonic relationship between net trade credit and firm performance is of a "U-shape". This means that net trade credit has an initial negative effect on firm performance but as it grows beyond the threshold point there will be a positive effect on firm performance. The linearity test rejects the null hypothesis in favour of a threshold regression. The m_2 test accepts the null of no remaining serial correlation and, for the first time, the Hansen specification test also does not reject.[11]

The estimated threshold in this case is negative. This indicates that even when the firm is relatively more exposed to its suppliers compared to its customers (trade credit received is higher than trade credit extended) there are significant benefits from an increase in trade credit extended conditionally on its trade credit received channel. The negative and positive beta coefficients (below and above the threshold) are symmetric under the first two information sets. However, once firm efficiency is taken into account, there are lower negative effects when operating below the threshold net trade credit level and stronger positive effects on its performance (ROA) once it exceeds it. This indicates that the net trade credit channel

[11]It is well known that the power of the Hansen test drops when the number of instruments is too large compared to the sample size. This cannot be the case in our results because the number of instruments is small compared to the number of firms and also, it is of the same order of magnitude in both the linear GMM regressions, where the Hansen test easily rejects and in the threshold regression, where it strongly accepts.

is more beneficial once efficiency is taken into account.

The average net trade credit in our sample is 0.119.[12] This indicates that our estimated threshold is well below the average net trade credit, or in other words that the average firm in our sample is in the positive part of the "U-shape" curve. Therefore, our estimations show that in our sample on average firms benefit from the increase in their net trade credit activities, whereas a share of about 2.5% of the firms is negatively affected by the increase in net trade credit.

Regarding the remaining control variables we observe consistent results with the related literature. In more detail, the lagged ROA has a significant and positive effect on current ROA with a consistent coefficient across our experiments of about 0.16, indicating a low persistence in ROA. In addition, size has a positive and significant effect only when efficiency is taken into account. Sales growth, liquidity and cash flow have expected positive effects on firm profitability, whereas liquidity has no significant effect on firm performance once efficiency is taken into account. Moreover, under the third information set leverage has the expected positive effect. We also observe a positive effect from higher capital expenditure indicating the importance of investment in capital. Finally, bank loans and collateral have negative effect on firm performance showing the impact of bank borrowing and opportunity cost respectively, while interest rates are marginally positive.[13]

4.1.1 The components of net trade credit

In this section we investigate the possibility of nonmonotonicity for each of the two components of net trade credit (Tables 4-5). Our results indicate that trade credit extended has a positive effect on ROA before and after the threshold point with stronger positive effects at the lower level of trade credit extended. Trade credit received exhibits a strong positive effect below the threshold but after the threshold there is no significant effect on ROA.

The combination of the above in a nonlinear setup indicates that the "U-shaped" outcome we uncovered in the benchmark regressions is driven from the stronger positive initial effect of trade credit received in the first instance, below the threshold. However, when net trade credit exceeds the threshold point, trade credit extended becomes the dominant component of net trade credit that drives the overall positive effect of net trade credit on firm performance. The remaining control variables are similar to the benchmark case presented earlier.

Tables 1-4 here

[12] See Table A in appendix.

[13] The effect of interest rates turns negative, as expected from the related literature, once we introduce a different firm performance indicator which takes into account debt obligations.

4.2 Additional firm performance indicators

In our analysis so far we have utilized only one firm performance indicator. In this section we consider two additional ones, return on invested capital (ROIC) defined as: $(EBITDA - interest\ expenses)/invested\ capital$, where $invested\ capital = Total\ assets - Trade\ Payables$; and sales efficiency (SalEff) defined as: $Total\ sales/no.\ employees$. ROIC captures overall firm performance, like ROA, taking into account debt obligations. SalEff is captures firm performance in terms of overall sales per employee.

Our findings indicate that under the linear and quadratic specifications the effect of net trade credit on firm performance is not robust, similarly to ROA. In addition, under Hansen's methodology there is a statistically significant nonlinear effect of net trade credit on ROIC but only marginally for SalEff. However, when we implement the threshold GMM approach we find again a consistent nonmonotonic effect of net trade credit for every firm performance indicator.

Therefore, our results in this section show that when endogeneity is taken into account there is a consistent nonmonotonic effect of net trade credit on firm performance for both indicators. This effect exhibits again a "U-shape" with negative beta coefficient of net trade credit at very low levels and with positive beta coefficient once the estimated threshold point is exceeded.

Similarly to ROA, under ROIC we have a negative threshold. In particular, the estimated threshold in this case is -0.113 which is below its average value, similarly to ROA. However, in this case we have a share of about 6% of the firms operating at the negative part of the "U-shape" curve. Moreover, the negative and positive betas (below and above the threshold) of net trade credit on ROIC are not symmetric under the full information set with significant negative betas when operating below the estimated threshold.

When we incorporate SalEff as a firm performance indicator we observe that the threshold of net trade credit is not statistically significant different from zero. Thus, in this case we have 19% of the firms being negatively affected by an increase in net trade credit. However, we still observe the asymmetric effects before and after the estimated threshold with significant negative effects when operating below that. Finally, for both ROIC and SalEff, the remaining control variables are similar with the case of ROA.

4.2.1 Trade credit extended and received

When we assess the components of net trade credit separately (trade credit extended and received) we observe again that under ROIC trade credit extended has a positive effect on firm performance before and after the threshold point with marginally higher positive effect

at the lower regime. In addition, trade credit received exhibits a weaker positive effect below the threshold, with a stronger positive effect above the threshold. However, the combination of the two components into net trade credit leads to a significant nonmonotonic effect on firm performance with a "U-shape" indicating that trade credit received is the dominant component below the threshold, similarly to ROA.

When SalEff is being used as a firm performance indicator we observe a negative effect of trade credit extended below and above the estimated threshold. In addition, trade credit received exhibits a "U-shape" pattern with firm performance. As a result, the driving force of the nonmonotonic results obtained in the benchmark estimation are driven from trade credit extended in this case.

These heterogeneous results indicate that when we use a disaggregate approach, via trade credit extended and received separately, to estimate the impact of trade credit channel on firm performance there is no consistency across the different firm performance indicators. This is due to the loss of information from the disaggregated approach since we assume that each time only one of the two components of net trade credit has a nonlinear effect on firm performance.

Tables 5-8 here

5 Yet another firm performance indicator

So far in our analysis the firm performance indicators are normalized with a stock variable, either total assets or number of employees. However, it is also possible to use a different firm performance indicator with a different normalization using a flow variable like total sales. The indicator in this case will be the operating margin (OpMargin) defined as: $EBIT/Total\ Sales$. The key difference with the previous regressions is that now the net trade credit variable will also be normalized with the same flow variable as the firm performance indicator for consistency.

The results presented in Tables 7-9 confirm our key findings. In more detail, the linear and quadratic regressions (Table 7) indicate a linear and positive relationship between net trade credit and OpMargin, with the Hansen test indicating a misspecified model when a GMM approach is used. When we perform the threshold estimations in Table 8 we find that under the Threshold OLS approach the effect of net trade credit on OpMargin is not statistically significant when it is below the estimated threshold point.

However, once endogeneity is taken into account, under the Threshold GMM approach, we are able to uncover a consistent nonmonotonic relationship of a "U-shape" between net trade credit and OpMargin, similarly to the previous firm performance indicators. The

estimated threshold is once again negative, -0.13, with about 2% of the firms operating at the negative part of the "U-shape" curve. Regarding the remaining control variables we observe again that they are broadly similar to the previous cases.

When we assess the individual components of net trade credit, trade credit received and extended, we obtain similar results with ROA and ROIC. Trade credit extended has a U-shape effect on OpMargin, whereas trade credit received has only a positive and statistical significant effect below the estimated threshold point. This indicates that the nonmonotonic U-shape effect we observe in the basic regression of net trade credit is driven from both trade credit received and extended when operating below the estimated threshold point. However, as net trade credit exceeds the threshold its positive slope is driven by trade credit extended.

Therefore, using a differently normalized firm performance indicator generates similar results with the case studies we presented in the previous sections.

Tables 9-11 here

6 Net trade credit before and after crisis

What is the effect of the recent financial crisis on net trade credit? It has been shown in the literature that trade credit increases when credit from alternative sources is not available (Love et al., 2007; Garcia-Appendini and Montoriol-Garriga, 2013). These papers mainly examine the effect of crisis on trade credit and they illustrate a positive and linear relationship between trade credit and firm's performance under a shock in liquidity provision from alternative sources, i.e. bank loans.

In this section we examine how crisis affects the nonmonotonic relationship between net trade credit and the various firm performance indicators we uncovered in the previous section. We use the whole sample so as to identify the threshold and the control variables, as in the previous cases, but we base the estimation of the indicator function coefficients in two sub-samples. The first sample is for the period 2004-2008 (pre-crisis period) and the second sample is for the period 2009-2015 (during crisis period).[14] Econometrically this is done by estimating the following model in which $D_P = 1$ if $t <= 2008$ and 0 otherwise and

[14] Of course we can use a different break down of the various periods. However, we believe that the break down we have used here is general enough and it effectively captures well the pre-crisis period (note that we have EU countries here) and the onset of the crisis together with the convergence period following the crisis.

$D_A = 1$ if $t > 2008$ and zero otherwise.[15]

$$\begin{aligned} ROA_{it} &= \varphi ROA_{it-1} + \beta_{1PRE} D_{PRE} NTC_{it} I(NTC_{it} \leq \gamma) \\ +\beta_{2PRE} D_{PRE} NTC_{it} I(NTC_{it} &> \gamma) + \beta_{1POST} D_{POST} NTC_{it} I(NTC_{it} \leq \gamma) \\ +\beta_{2POST} D_{POST} NTC_{it} I(NTC_{it} &> \gamma) + \delta' W_{it} + \eta_i + \varepsilon_{it}. \end{aligned} \tag{6.1}$$

The results show that following the crisis the net trade credit channel has become more important to firm profitability, compared to the pre-crisis period. In particular, firms that where engaging in trade credit activities where having positive spillover effects to their profitability (in most of our cases) even at the lowest possible net trade credit level. This indicates that the trade credit channel has become a vital source of financing during and after the crisis due to the shortage of alternative sources of financing. This result confirms the findings of Garcia-Appendini and Montoriol-Garriga (2013) and Love et al. (2007).

However, we extend their findings in showing the possible nonmonotonic effects of trade credit on firm performance with the estimation of two different regimes around a common threshold for the two periods. Combining these results with those presented earlier we can see that the nonmonotonic U-shape effect of net trade credit on firm's performance is mainly attributed to the pre-crisis period. This means that during the crisis the firms that managed to survive will have positive effects on their profitability just by engaging on trade credit. We should note though that this result entails a survival bias since our sample includes firms that managed to survive the recent financial crisis.

Table 12 here

7 Net trade credit and age

Many papers have focused on the effect of age on trade credit and firm performance (i.e. Ferrando and Mulier (2013)). They key argument is that young firms are more financially constrained and experience more difficulties in obtaining external funds than older, more established firms. Therefore, net trade credit should play a bigger role for these young firms. In order to assess this hypothesis we use again the whole sample to identify the threshold and the controls but now we base the estimation of the indicator function coefficients into subsamples containing young and old firms. We use the median age to split the sample and

[15] This regression is estimated in first differences and thus there is no dummy variable trap. We impose homogeneity of the explanatory variable coefficients and of the threshold variable in order to gain efficiency. Simply breaking the sample in two leads to relatively small-in therms of number of observations-subsumples.

estimate the following regression

$$\begin{aligned} ROA_{it} &= \varphi ROA_{it-1} + \beta_{1Y} D_Y NTC_{it} I(NTC_{it} \leq \gamma) \\ +\beta_{2Y} D_Y NTC_{it} I(NTC_{it} &> \gamma) + \beta_{1O} D_O NTC_{it} I(NTC_{it} \leq \gamma) \\ +\beta_{2O} D_O NTC_{it} I(NTC_{it} &> \gamma) + \delta' W_{it} + \eta_i + \varepsilon_{it}, \end{aligned} \tag{7.1}$$

where $D_Y = 1$ if the starting age of the firm is less than the median starting age and 0 otherwise and $D_O = 1 - D_Y$. The firms for which $D_Y = 1$ are termed "young" and the firms for which $D_Y = 0$ are termed "old".

The results show a consistent and robust nonmonotonic relationship of a "U-shape" for the young and old firms under every firm performance indicator.[16] It is interesting to point out that the positive effects of net trade credit are more pronounced for older firms. This indicates that established firms have stronger links with the market and are able to exploit all the benefits from trade credit activities. However, at the lower regime there is no consensus on which type of firm is benefiting the most. It is worth noting that young firms exhibit quantitatively lower negative effects at the lower regime compared to the older firms. This is mainly attributed to the fact that young firms might rely more on their suppliers during the early stages compared to old more established firms with higher values of assets and sales when compared with their younger counterparts (Gertler and Gilchrist, 1994; Guariglia and Yang, 2016).

In the case where operating margin is used as a firm performance indicator we observe a positive effect of net trade credit on firm performance for young firms even below the estimated threshold. This indicates that when sales are taken into account instead of assets, young firms exhibit a positive effect from net trade credit even at the initial stages of their trade activity. This result extends Bougheas et al. (2009) conclusion that firms (especially small ones) prefer to sell on credit their stock in order to boost their sales and avoid costly stock of inventories. Therefore, young firms will rely more on sales rather than assets increasing the importance of net trade credit when normalized by sales, which in turn drives the positive effect on firm performance even below threshold.

Table 13 here

[16] With the exception of operating margin for the young firms where we have a positive effect even at the lower regime.

8 Conclusions

In this paper we assessed the relationship between net trade credit and firm performance using a threshold model suitable for endogenous regressors under a panel dataset of 2526 European firms for the period 2003-2015.

We found a nonmonotonic "U-shaped" relationship between net trade credit and firm performance. This result was only evident for our threshold specification where endogeneity was taken into account. Moreover, the specific nonmonotonic relationship we uncovered was robust under different firm performance indicators and different information sets. In addition, we found that a more disaggregated analysis, using the components of net trade credit (trade credit received and extended separately), cannot generate a consistent nonlinear effect on firm performance. This was driven from a loss of information from the restricted assumption that only one component of net trade credit at a time had a nonlinear effect on firm performance.

We also assessed the effect of the recent financial crisis on net trade credit and firm performance nexus and we found that the uncovered nonmonotonic relationship between the two variables is driven from the pre-crisis period. Finally, we found that nonmonotonicity is present for both young and old firms, with more pronounced positive effects, once the threshold point is exceeded, for the older firms.

To summarize, our results have shown that an increase in trade credit extended , given trade credit received, is beneficial only when it is above a certain threshold. This has implications on managers and shareholders since the use of trade credit extended to customers on its own is not a signal of superior performance. The relative increase of trade credit extended to trade credit received is the best indicator of firm performance. Moreover, we were able to shed light on the significance of trade credit channel as an alternative source of financing when firms are under tightening financing conditions and liquidity shortage. Finally, we uncovered an asymmetrically lower negative effect of net trade credit on young firms when they are relatively more exposed to their suppliers (when trade credit received is significantly higher than trade credit extended). This result could be used as a positive indication of future firm performance for these firms so as to be able to access alternative cheaper sources of financing.

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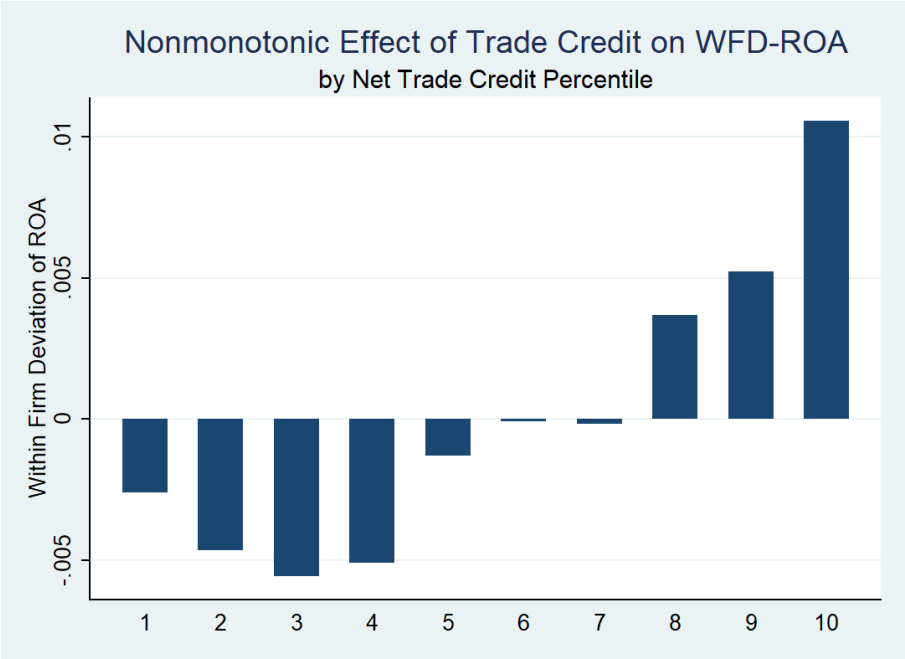

Figure 1: Net trade credit and firm performance (ROA) histogram.

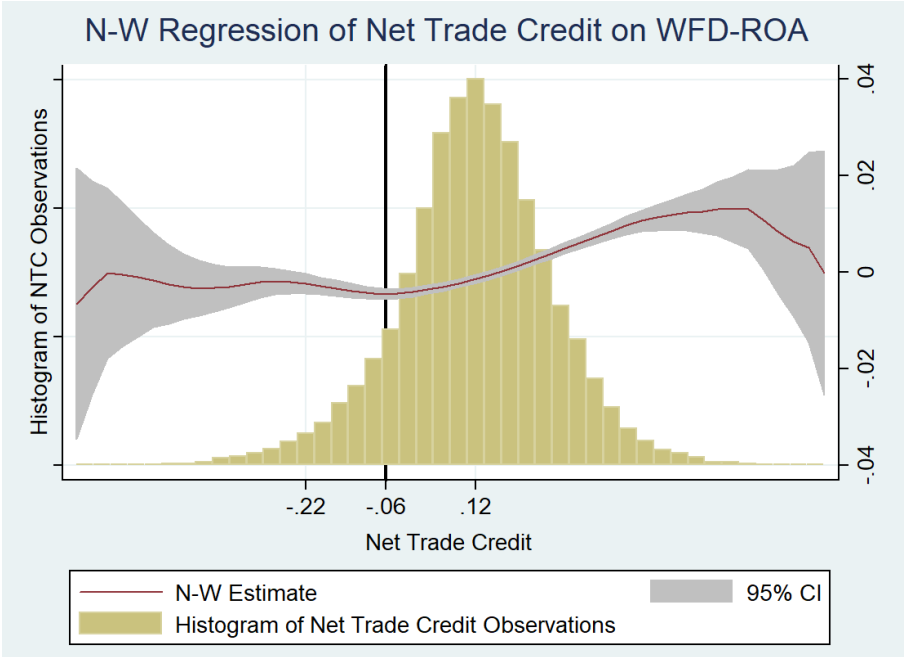

Figure 2: Net trade credit and firm performance (ROA) histogram.

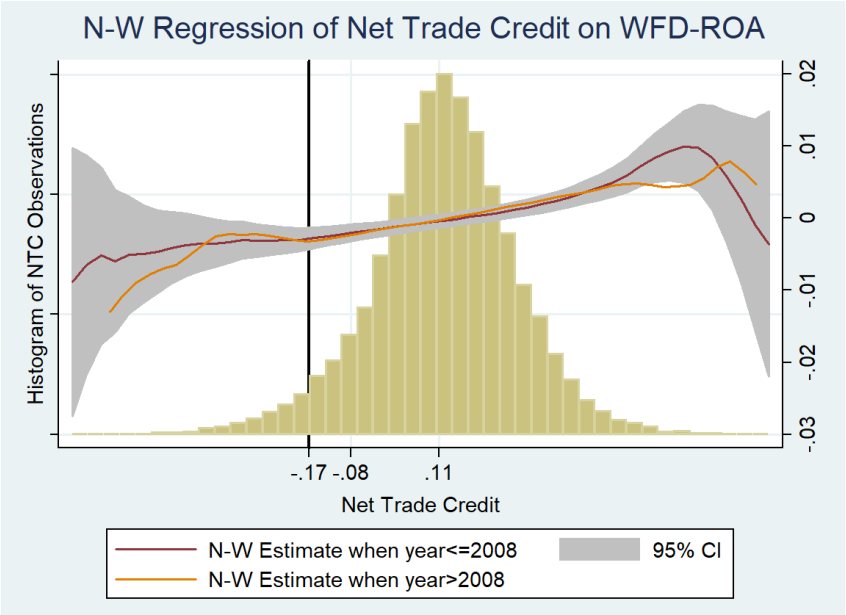

Figure 3: Net trade credit and firm performance before and after crisis.

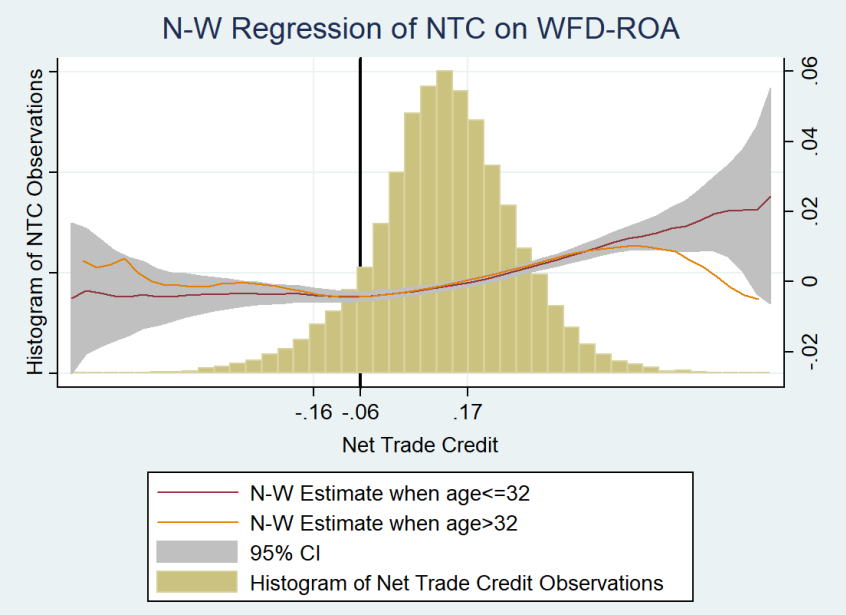

Figure 4: Net trade credit and firm performance (ROA) histogram for young and old firms

Table 1: Results of estimations on ROA using Net Trade Credit

Estimation	Linear-Fixed effects			Linear-GMM			Quadratic-Fixed effects			Quadratic-GMM		
Inform. set	1	2	3	1	2	3	1	2	3	1	2	3
Net trade Credit Linear term	-0.000	-0.011**	0.012**	0.050***	0.047***	0.067***	-0.014**	-0.022***	0.002	0.049***	0.046***	0.067***
	(0.005)	(0.005)	(0.006)	(0.007)	(0.007)	(0.007)	(0.006)	(0.006)	(0.006)	(0.007)	(0.007)	(0.008)
Squared term							0.068***	0.052***	0.045***	0.012	0.010	0.001
							(0.015)	(0.015)	(0.015)	(0.015)	(0.015)	(0.015)
L.ROA				0.182***	0.184***	0.178***				0.182***	0.184***	0.178***
				(0.007)	(0.007)	(0.007)				(0.007)	(0.007)	(0.007)
Size	-0.020***	-0.017***	-0.019***	-0.010*	-0.006	0.004	-0.019***	-0.016***	-0.018***	-0.009	-0.005	0.005
	(0.003)	(0.003)	(0.003)	(0.006)	(0.005)	(0.005)	(0.003)	(0.003)	(0.003)	(0.006)	(0.005)	(0.005)
Leverage	-0.006	0.022***	0.043***	-0.028***	-0.013	0.034***	-0.004	0.023***	0.043**	-0.027***	-0.012	0.033***
	(0.006)	(0.008)	(0.008)	(0.008)	(0.009)	(0.011)	(0.006)	(0.008)	(0.008)	(0.008)	(0.009)	(0.011)
Sales gr.	0.032***	0.029***	0.024***	0.046***	0.045***	0.039***	0.031***	0.029***	0.024***	0.046***	0.045***	0.040***
	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)	(0.003)	(0.002)	(0.002)	(0.003)	(0.003)	(0.003)
Liquidity	0.022***	0.006	-0.041***	0.099***	0.087***	0.004	0.025***	0.009	-0.038***	0.101***	0.089***	0.008
	(0.007)	(0.007)	(0.009)	(0.010)	(0.010)	(0.012)	(0.007)	(0.007)	(0.009)	(0.010)	(0.010)	(0.012)
Cash flow	0.323***	0.331***	0.344***	0.986***	0.967***	0.987***	0.322***	0.330***	0.344***	0.985***	0.967***	0.986***
	(0.013)	(0.013)	(0.013)	(0.019)	(0.018)	(0.018)	(0.013)	(0.013)	(0.013)	(0.019)	(0.018)	(0.018)
Bank loans		0.014	-0.053***		-0.033***	-0.118***		0.014	-0.052***		-0.032***	-0.114***
		(0.008)	(0.010)		(0.008)	(0.013)		(0.008)	(0.010)		(0.008)	(0.013)
Int. paym.		0.003***	0.002***		0.001	0.001**		0.002***	0.002***		0.001	0.001**
		(0.001)	(0.001)		(0.001)	(0.001)		(0.001)	(0.001)		(0.001)	(0.001)
Collateral		-0.086***	-0.121***		-0.065***	-0.147***		-0.084***	-0.119***		-0.064***	-0.144***
		(0.008)	(0.009)		(0.014)	(0.016)		(0.008)	(0.009)		(0.014)	(0.016)
Net work. capital			-0.076***			-0.093***			-0.076***			-0.090***
			(0.007)			(0.010)			(0.007)			(0.010)
Cap. exp.			-0.010			0.029***			-0.010			0.030***
			(0.007)			(0.006)			(0.007)			(0.006)
Obs.	27,786	27,786	27,786	25,260	25,260	25,260	27,786	27,786	27,786	25,260	25,260	25,260
N of id	2,526	2,526	2,526	2,526	2,526	2,526	2,526	2,526	2,526	2,526	2,526	2,526
Adj. R^2	0.143	0.151	0.159				0.144	0.152	0.159			
m_2				0.110	0.079	0.090				0.111	0.080	0.088
J (p-value)				0.000	0.000	0.000				0.000	0.000	0.000

The first three columns, Linear-FIxed effects, estimate equation 2.5 under three different information sets. The next three columns, Linear-GMM, estimate equation 2.6 under the tree different information sets. The Quadratic-Fixed effects illustrate the estimations of equation 2.7 that includes the squared term of net trade credit. Similarly, the Quadratic-GMM illustrate the estimation of equation 2.8 which includes the squared term of net trade credit. m_2 tests for the validity of the instruments and J tests for the specification of the model. Robust standard errors in the parentheses. ***: p<0.01, **: p<0.05, *: p<0.1

Table 2: Results of estimations on ROA using Net Trade Credit

Estimation	Threshold OLS			Threshold GMM		
Information set	1	2	3	1	2	3
Threshold	0.113**	0.115**	0.115**	-0.176***	-0.227***	-0.227***
				(0.048)	(0.056)	(0.058)
Net Trade Credit						
$\hat{\beta}_1$	-0.032***	-0.008***	0.003	-0.084***	-0.082***	-0.042**
	(0.007)	(0.002)	(0.002)	(0.029)	(0.023)	(0.021)
$\hat{\beta}_2$	0.010**	-0.003	-0.007***	0.080***	0.076***	0.095***
	(0.005)	(0.002)	(0.002)	(0.033)	(0.026)	(0.023)
L.ROA				0.159***	0.167***	0.161***
				(0.005)	(0.005)	(0.005)
Size	-0.019***	-0.016***	-0.019***	-0.004	-0.001	0.008***
	(0.002)	(0.002)	(0.002)	(0.005)	(0.004)	(0.004)
Leverage	-0.004	0.023***	0.044***	-0.026***	-0.027***	0.026***
	(0.005)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)
Sales growth	0.031***	0.029***	0.024***	0.042***	0.041***	0.034***
	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)	(0.002)
Liquidity	0.025***	0.009*	-0.039***	0.101***	0.093***	0.010
	(0.005)	(0.005)	(0.006)	(0.008)	(0.007)	(0.008)
Cash flow	0.322***	0.330***	0.344***	1.038***	1.009***	1.039***
	(0.009)	(0.009)	(0.009)	(0.0112)	(0.010)	(0.009)
Bank loans		0.014*	-0.053***		-0.023***	-0.111***
		(0.008)	(0.009)		(0.006)	(0.008)
Interest payments		0.002***	0.002***		0.000	0.001***
		(0.000)	(0.000)		(0.000)	(0.000)
Collateral		-0.084***	-0.120***		-0.058***	-0.135***
		(0.006)	(0.007)		(0.011)	(0.010)
Net working capital			-0.076***			-0.095***
			(0.005)			(0.007)
Capital exp.			-0.010			0.037***
			(0.007)			(0.004)
Observations	27,786	27,786	27,786	25,260	25,260	25,260
N of id	2,526	2,526	2,526	2,526	2,526	2,526
R^2	0.145	0.152	0.160			
95% Conf. interval	[0.109, 0.113]	[0.110, 0.115]	[0.110, 0.115]	[-0.272,-0.08]	[-0.339,-0.115]	[-0.342,-0.111]
Linearity test (p-value)	0.000	0.000	0.000	0.000	0.000	0.000
m_2				0.057	0.070	0.092
J (p-value)				0.959	0.601	0.965

The first three columns, under the Threshold OLS, estimate equation 2.9 using Hansen (1999) approach and three different information sets. The next three columns, under the Threshold GMM, , estimate equation 2.10 using Sheo and Shin (2016) approach and tree different information sets. m_2 tests for the validity of the instrments and J tests for the specification of the model. Robust standard errors in the parentheses. ***: p<0.01, **: p<0.05, *: p<0.1

Table 3: Results of estimations on ROA using Trade Credit extended

Estimation	Threshold GMM		
Information set	1	2	3
Threshold	0.331***	0.331***	0.596***
	(0.051)	(0.038)	(0.056)
Net Trade Credit			
$\hat{\beta}_1$	0.205***	0.214***	0.118***
	(0.023)	(0.018)	(0.008)
$\hat{\beta}_2$	0.131***	0.127***	0.076***
	(0.014)	(0.010)	(0.006)
L.ROA	0.159***	0.172***	0.158***
	(0.005)	(0.005)	(0.004)
Size	-0.017***	-0.007**	-0.001
	(0.004)	(0.004)	(0.003)
Leverage	-0.013**	-0.015***	0.033***
	(0.007)**	(0.007)	(0.006)
Sales growth	0.038***	0.041***	0.034***
	(0.002)	(0.002)	(0.001)
Liquidity	0.125***	0.112***	0.025***
	(0.008)	(0.008)	(0.009)
Cash flow	1.035***	1.017***	1.029***
	(0.011)	(0.009)	(0.009)
Trade received	-0.018***	-0.026***	-0.067***
	(0.006)	(0.006)	(0.006)
Bank loans		-0.027***	-0.103***
		(0.005)	(0.008)
Interest payments		0.001***	0.002***
		(0.000)	(0.000)
Collateral		-0.019	-0.112***
		(0.012)	(0.011)
Net working capital			-0.087***
			(0.006)
Capital exp.			0.034***
			(0.003)
Observations	25,260	25,260	25,260
N	2,526	2,526	2,526
m_2	0.074	0.012	0.015
J (p-value)	1.000	0.980	0.999

This table illustrate the results from the estimation of equation 2.10 using Sheo and Shin (2016) approach and tree different information sets. In this case the dependent variable is trade credit extended. m_2 tests for the validity of the instrments and J tests for the specification of the model. Robust standard errors in the parentheses. ***: p<0.01, **: p<0.05, *: p<0.1

Table 4: Results of estimations on ROA using Trade Credit Received

Estimation	Threshold GMM		
Information set	1	2	3
Threshold	0.052***	0.055***	0.052***
	(0.002)	(0.003)	(0.003)
Net Trade Credit			
$\hat{\beta}_1$	1.430***	0.913***	1.045***
	(0.189)	(0.117)	(0.114)
$\hat{\beta}_2$	-0.022	-0.028	-0.067
	(0.190)	(0.118)	(0.114)
l.ROA	0.158***	0.170***	0.160***
	(0.005)	(0.005)	(0.004)
Size	-0.012***	-0.005	0.005
	(0.004)	(0.003)	(0.003)
Leverage	-0.020***	-0.019***	0.020***
	(0.007)	(0.007)	(0.007)
Sales growth	0.040***	0.042***	0.037***
	(0.002)	(0.002)	(0.002)
Liquidity	0.124***	0.114***	0.036***
	(0.008)	(0.008)	(0.009)
Cash flow	1.046***	1.020***	1.043***
	(0.011)	(0.009)	(0.009)
Trade extended	0.086***	0.079***	0.081***
	(0.006)	(0.007)	(0.006)
Bank loans		-0.018***	-0.092***
		(0.005)	(0.008)
Interest payments		0.001*	0.001***
		(0.000)	(0.000)
Collateral		-0.016	-0.111***
		(0.011)	(0.011)
Net working capital			-0.076***
			(0.006)
Capital exp.			0.037***
			(0.004)
Observations	25,260	25,260	25,260
N	2,526	2,526	2,526
m_2	0.074	0.012	0.015
J (p-value)	0.999	0.098	0.999

This table illustrate the results from the estimation of equation 2.10 using Sheo and Shin (2016) approach and tree different information sets. In this case the dependent variable is trade credit received. m_2 tests for the validity of the instrments and J tests for the specification of the model. Robust standard errors in the parentheses. ***: p<0.01, **: p<0.05, *: p<0.1

Table 5: Results of estimations on ROIC and SalEff using Net Trade Credit

Estimation	Linear-Fixed effects		Linear-GMM		Quadratic-Fixed effects		Quadratic-GMM	
Firm perf. ind. (y)	ROIC	SalEff	ROIC	SalEff	ROIC	SalEff	ROIC	SalEff
Net Trade Credit								
linear term	-0.006	-8.610	0.003	-24.970	-0.020**	-42.891	0.006	-51.091*
	(0.007)	(18.790)	(0.009)	19.119	(0.009)	(27.746)	(0.011)	(26.091)
quadratic term					0.067***	110.519*	-0.008	109.195*
					(0.021)	(56.456)	(0.021)	(59.551)
L.y			0.174***	0.344***			0.174***	0.346***
			(0.007)	(0.085)			(0.007)	(0.083)
Size	-0.032***	50.077***	-0.009	15.890	-0.032***	50.644***	-0.008	22.952*
	(0.003)	(9.818)	(0.006)	(12.636)	(0.003)	(9.815)	(0.006)	(13.243)
Leverage	0.041***	-2.276	-0.007	-37.530	0.042***	-0.941	-0.006	-34.816
	(0.010)	(24.285)	(0.012)	(38.952)	(0.010)	(24.171)	(0.012)	(36.942)
Sales growth	0.030***	40.762***	0.051***	107.266***	0.030***	39.960***	0.051***	107.309***
	(0.003)	(8.586)	(0.003)	(15.186)	(0.003)	(8.578)	(0.003)	(14.619)
Liquidity	-0.113***	-82.362***	-0.080***	36.439	-0.109***	-82.102***	-0.077***	30.037
	(0.011)	(27.429)	(0.015)	(37.559)	(0.011)	(27.488)	(0.015)	(35.083)
Cash flow	0.502***	94.617***	1.327***	92.628**	0.502***	95.987***	1.326***	97.752***
	(0.016)	(33.931)	(0.025)	(36.516)	(0.016)	(34.034)	(0.025)	(36.797)
Bank loans	-0.105***	-37.630	-0.169***	86.254**	-0.104***	-37.717	-0.166***	93.814**
	(0.014)	(33.812)	(0.015)	(43.939)	(0.014)	(33.658)	(0.015)	(44.073)
Interest payments	0.000	0.237	-0.002***	1.043	0.000	-0.027	-0.002**	1.364
	(0.001)	(1.880)	(0.001)	(1.887)	(0.001)	(1.875)	(0.001)	(2.053)
Collateral	-0.071***	-50.769**	-0.155***	49.996	-0.068***	-47.503**	-0.153***	49.197
	(0.011)	(23.064)	(0.019)	(40.702)	(0.011)	(22.975)	(0.019)	(38.123)
Net working capital	-0.144***	-42.867**	-0.132***	80.908**	-0.143***	-41.904*	-0.129***	79.015**
	(0.009)	(21.534)	(0.013)	(32.491)	(0.009)	(21.569)	(0.013)	(31.674)
Capital exp.	-0.040***	-54.601***	-0.042***	-31.475*	-0.040***	-55.117***	-0.041***	-29.178*
	(0.008)	(19.393)	(0.007)	(16.490)	(0.008)	(19.384)	(0.007)	(16.698)
Observations	27,786	4,961	25,260	4,510	27,786	4,961	25,260	4,510
N of id	2,526	451	2,526	451	2,526	451	2,526	451
Adj. R^2	0.191	0.136			0.191	0.138		
m_2			0.155	0.028			0.154	0.030
J (p-value)			0.000	1.000			0.000	1.000

The first two columns, Linear-FIxed effects, estimate equation 2.5 using ROIC and SalEff as firm performance indicators. The next two columns, Linear-GMM, , estimate equation 2.6 under the ROIC and SalEff. The Quadratic-Fixed effects illustrate the estimations of equation 2.7 which includes the squared term of net trade credit. Similarly, the Quadratic-GMM illustrate the estimations of equation 2.8 which includes the squared term of net trade credit. We only show the full information set in these estiamtions. m_2 tests for the validity of the instruments and J tests for the specification of the model. Robust standard errors in the parentheses. ***: p<0.01, **: p<0.05, *: p<0.1

Table 6: Results of of non-linear estimations on ROIC and SalEff using Net Trade Credit

Estimation	Threshold OLS		Threshold GMM	
Firm Perf. Ind. (y)	ROIC	SalEff	ROIC	SalEff
Threshold	0.115**	0.038	-0.133***	0.279
			(0.037)	(0.176)
Net Trade Credit				
$\hat{\beta}_1$	-0.006***	30.430***	-0.113***	-111.518***
	(0.002)	(4.510)	(0.021)	(30.865)
$\hat{\beta}_2$	-0.016***	32.550	0.043	50.204***
	(0.002)	(4.547)	(0.025)	(18.437)
L.y			0.147***	0.279***
			(0.004)	(0.011)
Size	-0.032***	50.550***	-0.008***	35.834***
	(0.002)	(4.977)	(0.004)	(7.293)
Leverage	0.043***	-1.535	0.000	-52.034***
	(0.008)	(15.972)	(0.007)	(17.398)
Sales growth	0.030***	38.836***	0.043***	80.891***
	(0.003)	(5.871)	(0.002)	(3.027)
Liquidity	-0.110***	-81.021***	-0.080***	107.086***
	(0.008)	(17.197)	(0.009)	(15.862)
Cash flow	0.501***	93.928***	1.370***	98.907***
	(0.011)	(24.183)	(0.011)	(14.853)
Bank loans	-0.105***	-38.027*	-0.158***	173.470***
	(0.011)	(21.530)	(0.009)	(17.845)
Interest payments	0.000	-0.032	-0.002***	2.389**
	(0.001)	(1.1447)	(0.000)	(0.959)
Collateral	-0.068***	-48.097***	-0.140***	118.492***
	(0.009)	(14.940)	(0.011)	(17.240)
Net working capital	-0.144***	-43.041***	-0.130***	149.791***
	(0.006)	(12.774)	(0.007)	(13.385)
Capital exp.	-0.040***	-54.761***	-0.025***	-6.899
	(0.008)	(17.006)	(0.004)	(7.089)
Observations	27,786	4,961	25,260	4,510
N of id	2,526	451	2,526	451
R^2	0.192	0.142		
95% Conf. interval	[0.110; 0.113]	[-0.097,0.039]	[-0.207,-0.059]	[-0.073,0.631]
Linearity test (p-value)	0.000	0.105	0.000	0.000
m_2			0.140	1.000
J (p-value)			1.000	0.030

The first two columns, under the Threshold OLS, estimate equation 2.9 using Hansen (1999) approach and the full information set for two firm performance indicators (ROIC and SalEff). The next two columns, under the Threshold GMM, estimate equation 2.10 using Sheo and Shin (2016) approach and the full information set. m_2 tests for the validity of the instrments and J tests for the specification of the model. Robust standard errors in the parentheses.
***: p<0.01, **: p<0.05, *: p<0.1

Table 7: Results of estimations on ROIC and SalEff using Trade Credit extended

Estimation	Threshold GMM	
Firm Perf. Ind. (y)	ROIC	SalEff
Threshold	0.596***	0.329***
	(0.098)	(0.070)
Net Trade Credit		
$\hat{\beta}_1$	0.140***	-218.324***
	(0.009)	(24.990)
$\hat{\beta}_2$	0.112***	-54.526***
	(0.007)	(12.082)
L.y	0.143***	0.277***
	(0.004)	(0.012)
Size	-0.021***	28.964***
	(0.003)	(6.295)
Leverage	0.020***	4.473
	(0.007)	(15.864)
Sales growth	0.037***	77.384***
	(0.002)	(3.223)
Liquidity	0.062***	89.045***
	(0.010)	(17.427)
Cash flow	1.375***	113.789***
	(0.010)	(13.661)
Trade received	0.124***	59.539***
	(0.007)	(13.460)
Bank loans	-0.092***	135.040***
	(0.008)	(18.332)
Interest payments	-0.000	6.283***
	(0.000)	(0.979)
Collateral	0.017	104.168***
	(0.012)	(16.216)
Net working capital	-0.070***	135.291***
	(0.007)	(14.380)
Capital exp.	-0.023***	15.320***
	(0.004)	(6.406)
Observations	25,260	4,510
N	2,526	451
m_2	0.095	0.043
J (p-value)	1.000	1.000

This table illustrate the results from the estimation of equation 2.10 using Sheo and Shin (2016) approach and tree different information sets. In this case the dependent variable is trade credit extended. m_2 tests for the validity of the instrments and J tests for the specification of the model. Robust standard errors in the parentheses. ***: p<0.01, **: p<0.05, *: p<0.1

Table 8: Results of estimations on ROIC and SalEff using Trade Credit Received

Estimation	Threshold GMM	
Firm Perf. Ind. (y)	ROIC	SalEff
Threshold	0.407***	3.996***
	(0.063)	(0.941)
Net Trade Credit		
$\hat{\beta}_1$	0.041***	-619.584***
	(0.011)	(165.647)
$\hat{\beta}_2$	0.136***	950.794***
	(0.010)	(140.532)
L.y	0.141***	2.950***
	(0.004)	(0.096)
Size	-0.016***	382.47***
	(0.003)	(59.159)
Leverage	0.003	-303.358***
	(0.007)	(145.726)
Sales growth	0.038***	815.445***
	(0.002)	(27.805)
Liquidity	0.075***	1086.53***
	(0.010)	(137.816)
Cash flow	1.390***	1208.598***
	(0.010)	(131.507)
Trade extended	0.121***	298.027***
	(0.007)	(105.936)
Bank loans	-0.072***	1505.373***
	(0.008)	(168.326)
Interest payments	-0.001	43.077***
	(0.000)	(8.557)
Collateral	0.021*	1020.213***
	(0.012)	(152.663)
Net working capital	-0.051***	1487.129***
	(0.007)	(122.231)
Capital exp.	-0.017***	113.037***
	(0.004)	(55.310)
Observations	25,260	4,510
N	2,526	451
m_2	0.110	0.028
J (p-value)	1.000	1.000

This table illustrate the results from the estimation of equation 2.10 using Sheo and Shin (2016) approach and tree different information sets. In this case the dependent variable is trade credit received. m_2 tests for the validity of the instrments and J tests for the specification of the model. Robust standard errors in the parentheses. ***: p<0.01, **: p<0.05, *: p<0.1

Table 9: Results of estimations on Op. Margin using Net Trade Credit

Estimation	Linear-Fixed effects	Linear-GMM	Quadratic-Fixed effects	Quadratic-GMM
Information set	3	3	3	3
Net Trade Credit				
linear term	0.025***	0.048***	0.023***	0.049***
	(0.009)	(0.013)	(0.008)	(0.014)
squared term			0.006	-0.004
			(0.018)	(0.025)
L.OpMargin		0.221***		0.219***
		(0.023)		(0.024)
Size	-0.002	0.040***	-0.002	0.037***
	(0.002)	(0.008)	(0.002)	(0.006)
Leverage	0.026***	0.023**	0.026***	0.023**
	(0.007)	(0.010)	(0.007)	(0.010)
Sales growth	0.011***	0.022***	0.011***	0.022***
	(0.002)	(0.022)	(0.002)	(0.002)
Liquidity	0.005	-0.022*	0.005	-0.018
	(0.006)	(0.012)	(0.006)	(0.012)
Cash flow	0.223***	0.606***	0.223***	0.605***
	(0.009)	(0.014)	(0.009)	(0.014)
Bank loans	-0.021***	-0.075***	-0.021***	-0.072***
	(0.008)	(0.011)	(0.007)	(0.011)
Interest payments	0.001***	0.001	0.001***	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)
Collateral	-0.065***	-0.129***	-0.065***	-0.121***
	(0.006)	(0.013)	(0.006)	(0.014)***
Net working capital	-0.030***	-0.060***	-0.030***	-0.057
	(0.005)	(0.009)	(0.005)	(0.009)
Capital exp.	0.008	0.030***	0.008	0.030***
	(0.006)	(0.005)	(0.006)	(0.005)
Observations	27,786	25,260	27,786	25,260
N	2,526	2,526	2,526	2,526
Adj. R^2	0.131		0.131	
m_2		0.443		0.450
J (p-value)		0.000		0.000

The first column, Linear-FIxed effects, estimate equation 2.5 using OpMargin as a firm peformance indicator. The next column, Linear-GMM, , estimate equation 2.6 for OpMargin. The Quadratic-Fixed effects illustrate the estimations of equation 2.7 which includes the squared term of net trade credit. Similarly, the Quadratic-GMM illustrate the estimation of equation 2.8 which includes the squared term of net trade credit. We only show the full information set in these estiamtions. m_2 tests for the validity of the instruments and J tests for the specification of the model. Robust standard errors in the parentheses. ***: p<0.01, **: p<0.05, *: p<0.1

Table 10: Results of non-linear estimations on op. margin using Net Trade Credit

Estimation	Threshold OLS	Threshold GMM
Information set	3	3
Threshold	0.115**	-0.130***
		(0.043)
Net Trade Credit		
$\hat{\beta}_1$	0.003	-0.063***
	(0.002)	(0.020)
$\hat{\beta}_2$	-0.007***	0.069***
	(0.002)	(0.020)
L.OpMargin		0.195***
		(0.005)
Size	-0.002*	0.040***
	(0.001)	(0.030)
Leverage	0.026***	0.017***
	(0.004)	(0.005)
Sales growth	0.012***	0.020***
	(0.001)	(0.001)
Liquidity	0.006	-0.014***
	(0.004)	(0.006)
Cash flow	0.223***	0.607***
	(0.006)	(0.007)
Bank loans	-0.021***	-0.072***
	(0.006)	(0.006)
Interest payments	0.001***	-0.000
	(0.000)	(0.000)
Collateral	-0.064***	-0.129***
	(0.005)	(0.007)
Net working capital	-0.031***	-0.063***
	(0.003)	(0.005)
Capital exp.	0.008*	0.034***
	(0.005)	(0.003)
Observations	27,786	25,260
N	2,526	2,526
R^2	0.133	
95% Conf. interval	[0.110,0.115]	[-0.216,-0.044]
Linearity test (p-value)	0.000	0.000
m_2		0.347
J (p-value)		1.000

The first column, under the Threshold OLS, estimate equation 2.9 using Hansen (1999) approach and the full information set for OpMargin. The next column, under the Threshold GMM, estimate equation 2.10 using Sheo and Shin (2016) approach and the full information set. m_2 tests for the validity of the instrments and J tests for the specification of the model. Robust standard errors in the parentheses. ***: p<0.01, **: p<0.05, *: p<0.1

Table 11: Results of estimations on Op.Margin using Trade Credit Components

Estimation	Threshold GMM	
y-variable	Trade Credit extended	Trade Credit received
Threshold	0.122***	0.038***
	(0.019)	(0.004)
Net Trade Credit		
$\hat{\beta}_1$	-0.075***	0.983***
	(0.024)	(0.143)
$\hat{\beta}_2$	0.066***	-0.036
	(0.023)	(0.143)
L.y	0.202***	0.199***
	(0.005)	(0.005)
Size	0.029***	0.031***
	(0.002)	(0.003)
Leverage	0.014***	0.014***
	(0.005)	(0.005)
Sales growth	0.022***	0.022***
	(0.001)	(0.001)
Liquidity	0.024***	0.023***
	(0.006)	(0.006)
Cash flow	0.606***	0.604***
	(0.006)	(0.006)
trade received/ extended	-0.042***	0.079**
	(0.005)	(16.919)
Bank loans	-0.048***	-0.047***
	(0.006)	(0.006)
Interest payments	0.000	0.000
	(0.000)	(0.000)
Collateral	-0.086***	-0.094***
	(0.007)	(0.007)
net working capital	-0.040***	-0.039***
	(0.005)	(0.005)
capital exp.	0.034***	0.035***
	(0.003)	(0.003)
Observations	25,260	25,260
N	2,526	2,526
m_2	0.548	0.442
J (p-value)	1.000	1.000

This table illustrate the results from the estimation of equation 2.10 using Sheo and Shin (2016) approach. First column shows the case where the dependent variable is trade credit extended, whereas the second column illustartes the case where the dependent variable is trade credit received. m_2 tests for the validity of the instrments and J tests for the specification of the model. Robust standard errors in the parentheses. ***: p<0.01, **: p<0.05, *: p<0.1

Table 12: Results of estimations before and after crisis

Estimation	Threshold GMM			
Firm perf. ind. (y)	ROA	ROIC	SaleEff	OpMargin
Threshold	-0.176***	0.089***	0.245***	0.061***
	(0.036)	(0.026)	(0.045)	(0.021)
Net Trade Credit				
$\hat{\beta}_1 - pre$	-0.079***	-0.163***	-228.814***	-0.295***
	(0.012)	(0.009)	(-13.698)	(0.013)
$\hat{\beta}_1 - post$	0.339***	0.118***	-94.598***	-0.005
	(0.019)	(0.008)	(6.514)	(0.008)
$\hat{\beta}_2 - pre$	0.112***	0.086***	56.978***	0.130***
	(0.021)	(0.005)	(2.231)	(0.002)
$\hat{\beta}_2 - post$	0.034***	0.030***	5.019**	0.058***
	(0.018)	(0.008)	(2.272)	(0.005)
L.y	0.181***	0.172***	0.283***	0.219***
	(0.012)	(0.004)	(0.002)	(0.005)
Size	0.006***	-0.003	30.382	0.038***
	(0.011)	(0.004)	(1.798)***	(0.003)
Leverage	0.049**	-0.023***	-36.956***	0.009
	(0.028)	(0.008)	(4.555)	(0.006)
Sales growth	0.037***	0.049***	94.944***	0.024***
	(0.003)	(0.002)	(0.958)	(0.001)
Liquidity	-0.026	-0.049***	87.701***	0.007
	(0.031)	(0.009)	(4.472)	(0.007)
Cash flow	1.051***	1.333***	120.115***	0.618***
	(0.025)	(0.011)	(5.039)	(0.007)
Bank loans	-0.244***	-0.167***	140.146***	-0.068***
	(0.032)	(0.009)	(5.660)	(0.006)
Interest payments	-0.002***	-0.004***	3.056***	-0.002***
	(0.001)	(0.000)	(0.300)	(0.000)
Collateral	-0.160***	-0.136***	92.459***	-0.102***
	(0.037)	(0.011)	(5.211)	(0.008)
Net working capital	-0.125***	-0.120***	140.098***	-0.045***
	(0.025)	(0.008)	(3.872)	(0.005)
Capital exp.	0.016	-0.038***	-14.856***	0.028***
	(0.011)	(0.004)	(2.047)	(0.003)
Observations	25,260	25,260	25,260	25,260
N	2,526	2,526	2,526	2,526
m_2	0.069	0.242	0.027	0.464
J (p-value)	0.292	1.000	1.000	1.000

This table shows the results from the estimation of equation 6.1 using Sheo and Shin (2016) approach and the full information set for all the firm performance indicators controlling for the effect of the recent financial crisis. m_2 tests for the validity of the instrments and J tests for the specification of the model. Robust standard errors in the parentheses. ***: p<0.01, **: p<0.05, *: p<0.1

Table 13: Results of estimations for young and old firms

Estimation	Threshold GMM			
Firm perf. ind. (y)	ROA	ROIC	SaleEff	OpMargin
Threshold	-0.170***	-0.215***	0.510***	0.182***
	(0.037)	(0.035)	(0.051)	(0.052)
Net Trade Credit				
$\hat{\beta}_1 - young$	-0.019***	-0.180***	-28.042***	0.112***
	(0.006)	(0.009)	(5.764)	(0.007)
$\hat{\beta}_1 - old$	-0.078***	-0.163***	-59.737***	-0.078***
	(0.010)	(0.011)	(8.729)	(0.014)
$\hat{\beta}_2 - young$	0.091***	0.036***	46.158***	0.052***
	(0.009)	(0.009)	(4.179)	(0.006)
$\hat{\beta}_2 - old$	0.111***	0.057***	136.450***	0.064***
	(0.009)	(0.010)	(4.197)	(0.005)
L.y	0.180***	0.173***	0.337***	0.224***
	(0.004)	(0.004)	(0.004)	(0.005)
Size	0.008***	-0.010***	17.176***	0.040***
	(0.003)	(0.003)	(2.636)	(0.003)
Leverage	0.034***	-0.006	-28.869***	0.016***
	(0.007)	(0.007)	(7.532)	(0.005)
Sales growth	0.039***	0.050***	105.566***	0.024***
	(0.002)	(0.002)	(1.605)	(0.001)
Liquidity	0.016***	-0.068***	22.547***	-0.012**
	(0.008)	(0.009)	(6.616)	(0.006)
Cash flow	0.990***	1.324***	95.562***	0.608***
	(0.009)	(0.010)	(7.517)	(0.007)
Bank loans	-0.113***	-0.164***	66.639***	-0.067***
	(0.008)	(0.009)	(8.713)	(0.006)
Interest payments	0.001***	-0.002***	0.984***	-0.001**
	(0.000)	(0.000)	(0.353)	(0.000)
Collateral	-0.143***	-0.148***	42.893***	-0.115***
	(0.009)	(0.011)	(7.436)	(0.007)
Net working capital	-0.091***	-0.131***	72.167***	-0.053***
	(0.006)	(0.007)	(5.273)	(0.005)
Capital exp.	0.032***	-0.040***	-34.620***	0.029***
	(0.003)	(0.004)	(3.920)	(0.003)
Observations	25,260	25,260	25,260	25,260
N	2,526	2,526	2,526	2,526
m_2	0.079	0.140	0.041	0.315
J (p-value)	0.996	1.000	1.000	1.000

This table shows the results from the estimation of equation 7.1 using Sheo and Shin (2016) approach and the full information set for all the firm performance indicators controlling for the effect of age. m_2 tests for the validity of the instrments and J tests for the specification of the model. Robust standard errors in the parentheses. ***: p<0.01, **: p<0.05, *: p<0.1

Table A: Descriptive Statistics

Variable	Mean	Std	Q1	Median	Q3	N
Trade extended	0.334	0.153	0.223	0.324	0.437	30,312
Trade received	0.214	0.117	0.127	0.197	0.284	30,312
Net trade credit	0.119	0.155	0.032	0.122	0.215	30,312
ROA	0.075	0.075	0.027	0.066	0.117	30,312
ROIC	0.142	0.098	0.075	0.131	0.200	30,312
SalEff	192.222	130.976	116.240	157.606	223.128	30,312
OpMargin	0.050	0.053	0.018	0.042	0.076	30,312
Size	8.167	1.142	7.285	8.027	8.915	30,312
Leverage	0.150	0.133	0.050	0.112	0.218	30,312
Sales growth	0.035	0.179	-0.047	0.037	0.122	30,312
Liquidity	0.140	0.131	0.030	0.099	0.220	30,312
Cash flow	0.098	0.058	0.060	0.094	0.133	30,312
Bank loans	0.070	0.085	0.015	0.042	0.089	30,312
Interest payments	69.673	161.797	8.215	22.179	65.913	30,312
Collateral	0.205	0.143	0.094	0.172	0.285	30,312
Net working capital	0.174	0.174	0.058	0.171	0.288	30,312
Capital expenditures	0.054	0.061	0.014	0.035	0.073	30,312

Table B: Correlation Matrix

Variable	Trade extended	Trade received	Net trade credit	Net trade 2	ROA	ROIC	SalEff	OpMargin	Size
Trade extended	1.000								
Trade received	0.353***	1.000							
Net trade credit	0.714***	-0.401***	1.000						
Net trade credit^2	0.565***	-0.066***	0.602***	1.000					
ROA	0.123***	-0.026***	0.140***	0.089***	1.000				
ROIC	0.153***	0.120***	0.060***	0.052***	0.910***	1.000			
SalEff	0.049***	0.194***	-0.098***	0.104	0.108***	0.106***	1.000		
OpMargin	0.045***	-0.157***	0.162***	0.073***	0.882***	0.753***	0.075**	1.000	
Size	-0.028***	-0.046***	0.007	-0.003	-0.029***	-0.056***	0.262**	0.060***	1.000
Leverage	-0.088***	-0.160***	0.034***	0.024***	-0.173***	-0.191***	0.055**	-0.088***	0.144***
Sales growth	0.137***	0.156***	0.017***	0.052***	0.280***	0.289***	0.122**	0.229***	0.015**
Liquidity	-0.133***	-0.204***	-0.097***	0.234***	0.196***	-0.082***	0.258**	-0.183***	-0.309***
Cash flow	0.040***	-0.144***	0.147***	0.055***	0.765***	0.844***	0.019**	0.680***	-0.071***
Bank loans	0.065***	-0.014**	0.074***	0.109***	-0.131***	-0.164***	0.092**	-0.072***	0.135***
Interest payments	-0.049***	-0.006	-0.044***	0.002	-0.049***	-0.095***	0.186**	-0.003	0.638***
Collateral	-0.246***	-0.258***	-0.048***	-0.094***	-0.151***	-0.027***	-0.024**	-0.062***	0.150***
Net working capital	0.134***	-0.197***	0.278***	0.181***	0.035***	-0.080***	0.022**	0.067***	0.078***
Capital expenditures	-0.107***	-0.080***	-0.045***	-0.058***	-0.003	0.077***	-0.028**	0.030***	0.036***

Table B: Correlation Matrix (cont.)

Variable	Leverage	Sales growth	Liquidity	Cash flow	Bank loan	Interest payments	Collateral	Net working capital	Capital expenditures
Leverage	1.000								
Sales growth	-0.020***	1.000							
Liquidity	-0.016***	-0.016**	1.000						
Cash flow	-0.115***	0.222***	0.240***	1.000					
Bank loans	0.705***	0.003	-0.306***	-0.139***	1.000				
Interest payments	0.337***	0.015**	-0.217***	-0.093***	0.292***	1.000			
Collateral	0.458***	-0.033***	-0.223***	0.101***	0.195***	0.176***	1.000		
Net working capital	-0.107***	-0.078***	-0.261***	-0.062***	-0.173***	-0.020***	-0.264***	1.000	
Capital expenditures	0.188***	0.094***	-0.074***	0.145***	0.040***	0.039***	0.391***	-0.203***	1.000