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Abstract

We investigate the interaction between two terms of payment, supplier credit sales and customer advance payment. We find evidence that advance payments may signal customer creditworthiness and increase trade credit extension when we control for vendor size in international transactions or for the traded goods characteristics.

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JEL classification: G31, G32

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1. Introduction

Firms use a variety of payment terms to settle their transactions of goods and services. When deciding payment terms, suppliers simultaneously determine their sales on trade credit, their demand for cash in advance, and their cash sales. This paper considers whether, depending on the characteristics of the trading partnership, firms use supplier credit and customer prepayment as substitute or complement payment terms.

We add a different angle to the view that payment terms offer firms contractual solutions to informational asymmetries between buyers and sellers. According to this view, offering trade credit signals seller quality, whilst demanding advance payment may resolve buyer uncertainty.¹ However, trade credit extension may attract high risk buyers and create moral hazard on the buyer side. Similarly, advance payments may exacerbate uncertainty and moral hazard on the seller side. One wonders then whether trade partners may solve mutual information asymmetries by setting payment terms where trade credit and advance payments are used as complements.² Advance payments could signal buyer creditworthiness and lead to larger credit sales. Unilateral informational asymmetries or financial constraints would on the contrary make trade credit and advance payments alternative terms of payment.³ Whether the two terms of payment are complements or substitutes can play a significant role in the diffusion of adverse shocks affecting asymmetrically buyers and sellers.

We use a panel dataset of around 147,000 observations covering French firms over the period 1999-2007. The empirical model allows firms to both sell on credit and receive advance payments from their customers. Our results suggest that the relative use of the two terms of payment depends on the supplier-customer relationship captured by the market scope (domestic vs. international), the transacted goods characteristics, and vendor size. We find that exporters, facing higher transaction risks, extend less trade credit than domestic firms. Although a large proportion of suppliers sell less on credit if they receive cash in

¹ That credit sales may act as a signal of seller quality was originally suggested by Smith (1987) and subsequently investigated both theoretically and empirically in the trade credit literature (e.g., Long et al., 1993).

² Anecdotal evidence suggests it. For instance, the payment options offered by *SymCom* and *SSAC* entail international customers to gain access to trade credit via a sequence of advance payments (www.SymCom.com).

³ Existing studies either consider separately the use of different payment terms (Pike et al., 2005) or focus on the relative use of net terms versus two-part trade credit terms (Ng et al., 1999). Eck et al. (2012) consider separately the case of exporter firms which condition larger export volumes on receiving advance payments from importers as a signal of creditworthiness, and the case of exporters that secure larger sales by signalling quality to importers through trade credit extension.

advance from their customers, we show that small vendors of differentiated goods and exporters of standardized goods increase their credit sales if they receive advance payments.⁴

The following section presents our empirical methodology and data analysis. Section 3 presents our empirical results and the final section concludes.

2. Empirical methodology and data analysis

We use the following baseline specification to explain trade credit extension by firms:

$$TD_{it} = \alpha_i + \beta_1 CIA_{it} + \beta_2 Export_{it} + \beta_3 CIA_{it} * Export_{it} + \beta_4 X_{it} + d_t + v_{jt} + u_{it}$$

where TD is trade credit extended scaled by firm turnover. CIA is a dummy variable taking value 1 if firms receive advance payments, 0 otherwise. A negative coefficient β_1 implies that firms substitute the two terms of payment, i.e. they sell less on credit if they receive advance payments from their customers ($H1$). We gauge firm's export participation ($Export$) with two alternative variables: a dummy variable equal to 1 if the firm exports, 0 otherwise; and the volume of export sales. A negative β_2 implies that exporters extend less credit than firms selling on the domestic market as international transactions generally involve higher risks ($H2$). The interaction term $CIA_{it} * Export_{it}$ allows us to investigate the signalling role of advance payments in international trade predicted by Eck et al. (2012). A positive and significant β_3 would indicate that exporters who receive advance payments increase their volumes of credit sales ($H3$).

The matrix of controls (X) includes the ratio of bank loans to sales ($BankLoans$), as it has been shown that trade credit extension depends on access to external finance allowing firms to continue production (Petersen and Rajan, 1997). The total stock of inventories scaled by sales ($Inventories$) measures the incentives firms have to increase sales (and reduce inventories) by offering trade credit (Bougheas et al., 2009; Daripa and Nilsen, 2011). Other controls include $Liquidity$ (liquid assets to sales), $Profits$ (profit for the period scaled by sales), a measure of the likelihood of company failure in the near future ($Risk$), and firm age (log). Finally, $Size$ (1 if the firm's total assets are below the upper quartile of the assets distribution of all firms in the same industry and year, 0 otherwise) captures vendor bargaining power.

We expect trade credit usage to vary significantly across industries, but be rather similar within industries (Ng et al, 1999). To account for transacted goods characteristics, in

⁴ Rooted in the risks surrounding international trade, the last result supports the signalling role of advance payments suggested by Eck et al. (2012) for international trading relationships. The importance of advance payments in international trade is also stressed by Ahn, et al. (2011).

line with Giannetti et al. (2011), we use the SIC industry codes to separate firms producing differentiated goods (often tailored to the needs of particular customers) from firms trading standardized (heterogeneous off-the-shelf) products. Thus, we control for sector-specific (v_{jt}), firm-specific (α_i), and time-invariant effects (d_t) in our estimations.

Our empirical approach reflects the fact that firms' sales strategies simultaneously impact on their sales on credit, the advance payments demanded from their customers, their use of bank loans and their stocks of inventories. We therefore opt to rely on a reduced form two stage least squares analysis and implement the GMM estimation of the fixed-effects panel data models with endogenous regressors.⁵

We draw our sample from the Diane database collected by Bureau van Dijk for French manufacturing firms. Most firms in our sample are not quoted on the stock exchange. Firms with less than three consecutive yearly observations and the one percent tails for the main variables are dropped to control for the potential influence of outliers. The final sample includes about 147,000 observations over the period 1999-2007.

3. Empirical results

The estimates in Table 1 show that firms use supplier credit and cash in advance (*CIA*) as substitute terms of payment (*HI*). Consistent with the view that international transactions involve higher risks, exporters extend less trade credit (relative to sales) than firms selling at home (*H2*). Exporters receiving *CIA* do not significantly extend more credit than domestic firms not paid in advance by their customers, as evidenced by the insignificant coefficient associated with the interaction term $CIA_{it} * Export_{it}$.

Consistent with evidence that larger firms are more likely to receive *CIA* (Mateut, 2012) and to export (Greenaway et al., 2007) than their smaller counterparts, columns 3 and 5 present the estimates of the model augmented with interactions of our three main variables with vendor size. Importantly, the positive coefficient associated with $CIA_{it} * Export_{it}$ becomes highly significant suggesting that exporters increase their credit sales if they receive advance payments (*H3*). This result is consistent with the signalling role of *CIA* suggested by Eck et al. (2012). Since all interactions with $Size_{it}$ attract significant coefficients of opposite sign, the *CIA* substitution with trade credit and the signalling effect of importer advance payments are weaker for small firms.

⁵ All models are estimated with the `xtivreg2` command developed by Schaffer (2010) using the first lag of the endogenous regressors as instruments.

Trading specialised goods involves both higher seller uncertainty and stronger customer dependency on successful transactions. This increases both credit sales volumes (Cuñat, 2007; Giannetti et al., 2011) and the likelihood of advance payments (Mateut, 2012). Columns (6)-(9) report estimates for producers of differentiated vs. standardized products separately. We notice that the signalling effect of *CIA* is present for all size types of exporters of homogenous goods. Interestingly, in the differentiated sector, the coefficients for the main variables change sign across size classes (magnitudes for small firms are given by the sum of the coefficients for the interacted and non-interacted variables). Small producers of specific goods use credit sales and advance payments as complements. Export participation enhances credit sales of these firms, probably until they establish a reputation in foreign markets. Our results imply that *CIA* could resolve one dimension of transaction uncertainty: seller uncertainty – transactions involving specific products; buyer uncertainty - homogenous goods sold abroad.

In separate tests, we replace the dummy variable CIA_{it} with the amount paid in advance (relative to sales). Our results suggest that larger advance payments reduce the proportion of credit sales but we fail to find evidence of a signalling role for advance payments. This would imply that not the *volume* but the *decision* to (partially) pay in advance helps resolve uncertainty in international trade. The following sensitivity tests confirm the results above: excluding purely domestic firms from our sample; changing the cut-off for the size classification to the top third of the assets distribution for all firms in the same industry and year; replacing the sector-specific with more detailed industry-specific effects.

4. Conclusions

We show that, although many firms use supplier credit and cash in advance as substitutes, advance payments and credits sales are complementary terms of payment for some categories of firms, namely small vendors of differentiated goods and exporters of standardized goods.

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Table 1. Empirical results

The dependent variable is trade credit extended scaled by sales. CIA equals 1 if the firm receives advance payments, 0 otherwise. Export participation is proxied by a dummy taking value 1 if the firm exports, 0 otherwise, in columns 1–3, 6-9 and by the logarithm of export sales in columns 4-5. Controls include the ratios to sales of the stocks of inventories (Inventories); short-term bank loans (BankLoans); firm's profit (or loss) for the period (Profits); firm's liquid assets (cash, bank deposits, and other current assets) (Liquidity). Risk measures the likelihood of company failure, where a higher value indicates that the firm is more risky. Age is the logarithm of the number of years since the firm was established; Size is a dummy variable equal to 1 if firm's assets are below the upper quartile of the assets distribution for all firms in the same industry and year, 0 otherwise. Time effects and sector-specific time effects (columns 1-5) or industry-specific effects (columns 6-9) are included.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
		Export dummy		Exports sales (log)		Differentiated		Standardized	
CIA	-0.0162*** (0.00434)	-0.0195** (0.00942)	-0.138*** (0.0281)	-0.0177*** (0.00558)	-0.0561*** (0.0132)	-0.0139 (0.0128)	-0.163*** (0.0406)	-0.0320** (0.0129)	-0.128*** (0.0399)
Export	-0.0105*** (0.00348)	-0.0116*** (0.00428)	-0.113*** (0.0153)	-0.00893*** (0.00144)	-0.0159*** (0.00209)	-0.00812 (0.00624)	-0.156*** (0.0252)	-0.0119** (0.00544)	-0.0511*** (0.0164)
CIA*Export		0.00514 (0.0127)	0.133*** (0.0320)	0.00187 (0.00235)	0.0108*** (0.00379)	-0.0133 (0.0179)	0.155*** (0.0465)	0.0378** (0.0167)	0.144*** (0.0457)
CIA * Size			0.136*** (0.0301)		0.0467*** (0.0149)		0.172*** (0.0446)		0.109*** (0.0399)
Export * Size			0.120*** (0.0170)		0.0140*** (0.00320)		0.176*** (0.0281)		0.0476*** (0.0178)
CIA*Export*Size			-0.146*** (0.0356)		-0.0108* (0.00628)		-0.197*** (0.0538)		-0.121*** (0.0466)
Inventories	-0.452*** (0.0231)	-0.452*** (0.0231)	-0.457*** (0.0237)	-0.447*** (0.0230)	-0.451*** (0.0233)	-0.609*** (0.0356)	-0.616*** (0.0365)	-0.220*** (0.0266)	-0.220*** (0.0275)
BankLoans	0.0293*** (0.00746)	0.0292*** (0.00746)	0.0250*** (0.00768)	0.0288*** (0.00743)	0.0260*** (0.00750)	0.0365*** (0.0129)	0.0341** (0.0135)	0.0160** (0.00810)	0.0141* (0.00827)
Risk	0.000352 (0.000238)	0.000355 (0.000238)	0.000391 (0.000242)	0.000269 (0.000238)	0.000316 (0.000240)	0.00163*** (0.000391)	0.00175*** (0.000402)	-0.000675** (0.000264)	-0.000711*** (0.000267)
Profits	0.0300*** (0.00741)	0.0301*** (0.00742)	0.0290*** (0.00756)	0.0327*** (0.00738)	0.0311*** (0.00742)	0.0422*** (0.0103)	0.0422*** (0.0107)	0.0226** (0.0104)	0.0209** (0.0105)
Liquidity	-0.237*** (0.00539)	-0.237*** (0.00539)	-0.237*** (0.00550)	-0.238*** (0.00538)	-0.237*** (0.00540)	-0.272*** (0.00711)	-0.272*** (0.00733)	-0.161*** (0.00796)	-0.162*** (0.00808)
Age (log)	0.00159 (0.00174)	0.00159 (0.00174)	0.000767 (0.00179)	0.00186 (0.00173)	0.00121 (0.00175)	0.00329 (0.00247)	0.00257 (0.00258)	-0.00112 (0.00230)	-0.00184 (0.00235)
Size (dummy)	-0.0288*** (0.00132)	-0.0287*** (0.00132)	-0.124*** (0.0136)	-0.0300*** (0.00133)	-0.0592*** (0.00634)	-0.0338*** (0.00184)	-0.169*** (0.0223)	-0.0198*** (0.00177)	-0.0580*** (0.0142)
Observations	147,065	147,065	147,065	147,065	147,065	92,239	92,239	54,826	54,826
Number of firms	21,017	21,017	21,017	21,017	21,017	13,059	13,059	7,958	7,958

Robust standard errors in parentheses
 *** p<0.01, ** p<0.05, * p<0.