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Financial constraints and foreign market entries or exits: firm-level evidence from France

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Abstract In contrast to a large strand of the literature that focuses on multi-product firms, this paper examines multi-destinations firms and the effects of financial constraints on newly served and newly exited destinations. Intuitively, financial constraints have a negative impact on firm expansion in new destinations by limiting firm ability to finance entry costs. The effect on exit from existing destinations is ambiguous. Due to financial constraints, a firm may face difficulties financing the recurrent costs of maintaining her market presence. But if financial constraints also affect entry, the firm may have strong incentives to stay in a given destination since it may not be able to fund the fixed entry costs associated to the reallocation of her portfolio of destinations. We develop a simple theoretical model which includes these two effects. We use a unique longitudinal dataset on French firms that contains information on export destinations of individual firms and allows to construct various firm-level measures of financial constraints to test these predictions. The empirical results suggest that financial constraints hamper a firms's ability to cover fixed entry costs as well as recurrent costs associated with maintaining the presence in a foreign market, thereby reducing the probability of entering

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into a new foreign markets and increasing the probability of exiting from an existing foreign market.

Keywords Firm heterogeneity · Financial constraints · Trade

JEL Classification F1 · G1

1 Introduction

The stock of export destinations is the net outcome of both massive entries and massive exits in/from new destinations. For example in France, from 2000 to 2007, whereas net contribution of new destinations to average export growth is only 0.4 %, firm entries in new countries contributed to 11.6 % to export growth while the contribution of equivalent exits is −11.2 %. These gross contributions are almost twice as big as the contributions of firm entries and exits from existing destinations (respectively 6.4 and −5.7 %) and of the same order of magnitude as product entries and exits (Bricongne et al. 2012, Table 2). Whereas firm entries and exits and product entries and exits have been subject to a great deal of empirical analysis, the country destination dimension of export dynamics has been way less investigated. Given the significance of the destination turnover, the dynamics of both entry in new destinations and exit from existing ones seems key to understand international trade performance and the goal of this paper is to study the role of credit constraints on these dynamics.

There is growing evidence that credit constraints are an important determinant of global trade patterns. An important finding of the recent trade literature is that there are sizeable fixed costs associated with entry into export markets (Roberts and Tybout 1997; Das et al. 2007). In the presence of imperfect capital markets some firms that could profitably export may not do so because investors will not be willing to finance their trade costs (Chaney 2013; Manova 2010a). However studies that document the effect of recurrent fixed costs on firm survival in foreign markets are more scarce. Whereas, a large strand of literature deals with the multi-product firms, this paper endeavors to explicit address the question of how the multi-country firm manages her destination portfolio in the presence of entry and recurrent costs.

Intuitively, the effects of credit constraints on exit from existing destinations is ambiguous. Due to financial constraints, a firm may face difficulties financing the recurrent costs of maintaining her market presence. But if financial constraints also affect entry, the firm may have strong incentives to stay in a given destination since she may not be able to fund the reallocation of her portfolio of destinations to new destinations. We develop a simple theoretical model which includes these two effects. Credit constraints influence firm expansion and survival through the firm's ability to finance sunk entry costs and the recurrent fixed costs to serve an export market. The model suggests that financial constraints have a negative impact on firm expansion in foreign markets by limiting firm ability to finance entry costs and

reducing the number of newly created export relations. Additionally, the effect of credit constraints on survival in export markets is ambiguous. In the presence of credit constraints the probability that a firm survives in the export market is reduced because liquidity-strapped firms may not be able to finance the recurrent per-period costs to stay in the market. On the other hand, lower availability of credit increases the option value of staying in the export market. Since the firm knows that it would be difficult to finance the sunk cost of entry, should the firm exit and decide to re-enter in the future, the firm increases its efforts to avoid losing the destination.

We test these predictions empirically using a firm-level dataset for France. The dataset we use merges the Banque de France's FIBEn survey and French Customs data and is particularly well suited for this analysis. First, in contrast to most datasets used in the literature, it contains precise information on each firms' exports to any destination in a given year, thus allowing to analyze the dynamics of entry and exit into the export market. In addition, its panel dimension allows controlling for fixed firm characteristics and trends. Second, the dataset also has precise information on firms' financial ratios providing several measures of firms' credit constraints. In addition to standard measures of liquidity and trade credit, it also contains unique information on firms that default on trade creditors that allows to construct an indirect measure of credit constraints. A final advantage of the dataset is its representativeness of the overall population of French exporters; it contains information on firms across different size classes including an important number of small and medium firms that are particularly likely to be affected by financial constraints.

This paper contributes to a recent literature on trade and finance that investigates the linkages between firm-level financial constraints and international trade. On the theoretical side, two recent contributions have developed novel theories that help to understand how financial constraints affect firm trade activities. First, Chaney (2013) extends Melitz (2003) dynamic industry model with heterogeneous firms to consider the possibility that firms face liquidity constraints in the financing of the costs to enter export markets. A main prediction of his model is that credit constraints will lead to suboptimal entry into export markets and financial underdevelopment will decrease a country's aggregate exports by restricting the number of firms that export. The main underlying mechanism is that if firms must pay some entry costs to access foreign markets and if they face internal liquidity constraints to finance these costs, then only firms with enough liquidity will export. Second, Manova (2010b) develops a more sophisticated modeling of financial constraints by introducing the possibility that firms can borrow externally to finance their trade costs and considering differences across sectors in external finance dependence and asset tangibility. Her model yields the interesting prediction that in the presence of credit constraints a country's aggregate export will depend on the country level of financial development and its production structure.

On the empirical side, a few studies provide micro-level evidence on the importance of financial constrains for firm trade activities.[1] These studies shed new

[1] See, e.g. Campa and Shaver (2002), Bellone et al. (2010), Greenaway et al. (2007), Muûls (2008), Bricongne et al. (2012), Minetti and Zhu (2011), Buch et al. (2014), Auboin and Engemann (2014).

light on the link between export status and firm financial health and on the ways in which financial frictions restrict firms export participation.[2] On the link between financial health and export status the existing studies give mixed results. Greenaway et al. (2007) using panel data for UK firms find that participation in export markets improves a firm's financial health, but ex ante financial health has no effect on the probability that a firm enters export markets. On other hand, Bellone et al. (2010) reach opposite conclusions using French firm-level data. They find that firms that enjoy better ex ante financial health are more likely to start exporting and participation in export markets does not lead to better financial health.

Closer to our work, Berman and Héricourt (2010) find that credit constrained firms are less likely to become exporters using firm-level data for several developing and emerging economies. In addition their results show that financial constraints do not influence the probability of staying in export markets and neither firm's export volumes, suggesting that sunk entry costs are the most important hurdle for credit constrained firms, while the financing of fixed and variable trade costs seems not to be influenced by credit constraints. Moreover, Muûls (2008) tests the empirical implications from Manova (2010b) model on Belgian data and confirms the findings that liquidity constrained firms are less likely to become exporters. She also finds that firms with easier access to finance earn greater export revenues and export more products in line with the idea that firms need external funds to overcome both fixed and variable costs of exporting. Matching together export data with firm-level credit constraints, Bricongne et al. (2012) show that during the 2008–2009 crisis credit constraints emerged as an aggravating factor for firms active in sectors of high financial dependence. Having experienced a payment incident over the past year has a negative impact on the firm's export growth rate in normal time; during the crisis the negative impact was higher but the authors argue that the overall contribution of credit constraints on the trade collapse was limited. Recently, using a survey on 4,700 Italian firm including responses on financial statements, Minetti and Zhu (2011) find in cross-section that credit rationing reduces dramatically both the probability of exporting and foreign sales.

Our paper complements this literature in two respects. First, it provides an analytical framework for disentangling how financial constraints interact with firm entry, on the one hand, and firm exit from foreign markets, on the other hand; it shows that the impact on firm exit is ambiguous depending on the nature of the constraint. In contrast to Minetti and Zhu (2011), the time dimension in our dataset allows controlling for firm heterogeneity with fixed effects. Our findings are consistent with the theoretical prediction of the impact of credit constraints on financing recurrent costs on foreign market. The joint consideration of financial constraints on entry and exit allows a better understanding of the drivers of firm trade dynamics and of the extensive margin of trade, which are important drivers of aggregate export flows.

[2] Other studies investigate whether financial constraints matter for entry into export markets using data for different countries. Manole and Spatareanu (2010) find that Czech exporters are less financially constrained than non-exporters and that less constrained firms self-select into exporting rather than exporting alleviating firms' financial constraints. Arndt et al. (2012) find that less financially constrained firms are more likely to start exporting using German data.

The paper proceeds as follows. In the next section we develop a simple theoretical model describing the relationship between financial constraints and export market entry and exit. Section 3 describes the dataset and discusses the firm-level measures of financial constraints. Section 4 describes the empirical strategy and Sect. 5 presents the baseline results. Section 6 provides some extensions and tests the robustness of our results with respect to alternative definitions of entry and exit. The last section concludes.

2 The model

This section derives a simple theoretical model to study the relationship between credit constraints and firm entry and survival into export markets.

The main outcome of the model is that credit/liquidity constraints reduce the probability to enter a new destination because credit constrains limit the firm's ability to finance the entry costs. But the impact of credit constraints on the exit from the export market is ambiguous. If financial constraints affect the firm's ability to finance the recurrent costs then the probability to exit a destination is higher. However, if credit constraints affect the firm ability to finance entry costs then the probability to exit the market is lower as the firm will increase its efforts to stay in the destination.

2.1 Without credit constraints

Consider a given country x in which the firm can be currently an exporter or not. Assume first the case when the firm is already exporting to x-generating a gross profit π_1-but faces an exogenous probability h to lose this market. This probability is mitigated by the expenses of the firm to maintain this foreign market, which takes the form of distribution and servicing recurrent fixed costs. Formally, reducing by p_1 the probability of quitting the market is associated with a recurrent fixed cost $cp_1^2/2$. Let V_1^x the asset value of the destination x for the firm when it exports in x, and V_0^x the value when the firm does not export. We have the following relation:

$$rV_1^x = \pi_1 + (h - p_1)(V_0^x - V_1^x) - cp_1^2/2, \tag{1}$$

where r is the interest rate.

Assume now that the firm does not export to x. The firm incurs foreign market entry costs cp_0^2 for a probability p_0 to enter in the market x. These entry costs may include the costs of packaging, upgrading product quality, establishing marketing channels, building up information on demand. We have thus:

$$rV_0^x = p_0(V_1^x - V_0^x) - cp_0^2/2. \tag{2}$$

The first-order conditions give the optimal values of p_1 and p_0 without credit constraints:

$$cp_1^* = V_1^x - V_0^x \tag{3}$$

and also

$$cp_0^* = V_1^x - V_0^x \tag{4}$$

Replacing values (3) and (4) in the asset Eqs. (1) and (2) gives the second order equation followed by the unconstrained optimal choices p_1^* and p_0^*:

$$(r+h)p_1^* = \frac{\pi_1}{c} = (r+h)p_0^* \tag{5}$$

Consequently, the probability to quit the destination market, $h - p_1^*$, is a decreasing function of π_1. Conversely, the probability to enter the market, p_0^*, is increasing with potential profits. Intuitively, the higher the revenues in the foreign market x, the harder the firm will try to enter or to stay in this market.

2.2 With credit constraints

Now, assume that the firm faces binding credit constraints. As suggested by Chaney (2013), there are reasons to believe that firms may face credit constraints when financing their export activities. Export investments are intrinsically riskier than domestic ones, due to information asymmetries and contract incompleteness that are more pervasive in international transactions relative to domestic ones. We consider two subcases. First, that credit constraints affect the propensity of the firm to finance the recurrent fixed costs to maintain its market. Second, or alternatively, they affect the capacity to mobilize liquidity to gain a new destination. Sunk and fixed trade costs may include learning about the profitability of potential export markets, making investments in capacity, product customizing and regulatory compliance, or setting up and maintaining foreign distribution networks (Manova 2010a).

2.2.1 Case 1: Recurrent costs are binding

We assume now that the per period fixed costs to serve a destination market are binding, say $cp_1^2/2 \leq (V_1^x - V_0^x)^2/(2c\beta_1^2)$ with $\beta_1 > 1$ being a parameter increasing with the tightness of credit constraints. By convexity, the optimum follows $cp_1 = (V_1^x - V_0^x)/\beta_1$ and still $cp_0 = (V_1^x - V_0^x)$. Replacing these new values in the asset Eqs. (1) and (2) gives:

$$(r+h)p_0 = \frac{\pi_1}{c} + \left(2/\beta_1 + 1/\beta_1^2 - 1\right)p_0^2/2 = \frac{\pi_1}{c} + (1 - 1/\beta_1)^2 p_0^2/2 \tag{6}$$

Alternatively,

$$(r+h)(p_0 - p_0^*) = -(1 - 1/\beta_1)^2 p_0^2/2 < 0. \tag{7}$$

Then $p_0 < p_0^*$ and thus $p_1 < p_1^*$. Finally the propensity to quit the destination x is naturally higher than in the unconstrained case, but the effort to gain a market is also reduced. Intuitively, the opportunity cost of a new destination is magnified by the higher risk of losing this market (i.e. constraints on recurrent cost reduce the

probability of entry). However, since $p_1 = \frac{p_0}{\beta_1}$, p_1 is more affected than p_0 by changes in credit conditions for recurrent costs.

2.2.2 Case 2: Foreign market entry costs are binding

Assuming that the entry costs are binding, say $cp_0^2/2 \leq (V_1^x - V_0^x)^2/(2c\beta_0^2)$ with $\beta_0 > 1$. By convexity, the optimum follows $cp_0 = (V_1^x - V_0^x)/\beta_0$ and $cp_1 = (V_1^x - V_0^x)$. Then

$$(r+h)\left(p_1 - p_1^*\right) = -(1 - 1/\beta_0)^2 p_1^2/2 < 0. \tag{8}$$

Then, contrary to case 1, $p_1 > p_1^*$. Intuitively, because of the liquidity constraint, it is more difficult to regain a lost market; so, the firm increases its efforts to avoid to lose the destination. On the contrary, as in the case 1, $p_0 < p_0^*$.

In both cases therefore, the credit/liquidity constraints reduce the probability of entering the foreign market. But, their impact on the probability to exit the foreign market is ambiguous depending on the nature of the constraint. If credit constraints affect the financing of recurrent costs, the probability of exit increases. If it affects the financing of entry costs, the probability of exit decreases as the cost of re-entering a market at a later stage are higher.

3 Data description

We construct our dataset from custom data gathered by the French custom services and from profit and loss and balance sheet data gathered by the Banque de France. The dataset has several advantages that make it particularly well suited for analyzing the effect of financial constraints on firms' export entries and exits. First, the dataset contains information on financial variables that allows to construct firm-level measures of financial constraints. Second, for each firm it allows us to precisely observe its exports to any destination in a given year. A final advantage of the dataset is that it includes an important number of small and medium firms that are particularly likely to be affected by financial constraints. The dataset contains information on an average of 42,000 firms operating in the manufacturing sector during the period 1995–2007.[3]

The French Customs database is a very comprehensive source of information on exports. It reports the amount of exports and the country of destination, for each firm located on the French territory (without non-European territories) covering close to the totality of the value of national trade (97 %). For each firm it allows to precisely observe its exports to any destination. In our database there are about 170 countries of destination.

[3] Although the sources of data also contain information on firms in service sectors, we restrict our attention to the manufacturing sector for the sake of homogeneity. Exports in the services sector are quite different from manufacturing since not all the services are traded.

3.1 Exporting status

For our empirical analysis, we refine the definition of exporting status and thus of entry in and exit from a market. Let v_{ict}, the value exported by the firm i in country c at date t. We define an export entry (or a newly created export relation) whenever we observe that a firm exports to a destination in the current year but did not export to that destination in the previous 2 years: $v_{ict-2} = 0$ and $v_{ict-1} = 0$ and $v_{ict} > 0$. In opposite terms, we define an export exit (or a terminated relation) whenever we observe that a firm exported to a destination during the previous years, but it does not export to that destination in the current year nor in the next year: $v_{ict-1} > 0$ and $v_{ict} = 0$ and $v_{ict+1} = 0$. By considering two lags when constructing the entry and exit variables, we assume that firms completely lose their sunk startup costs if they are absent from a market for 2 years. This is in line with previous empirical evidence suggesting that sunk start-up costs depreciate very quickly and that firms that most recently exported 2 years ago have to pay nearly as much to re-enter foreign markets as first time exporters (Roberts and Tybout 1997; Das et al. 2007).

We complement the exports data with information on firms' balance sheets from the FIBEn database, a large French firm-level dataset constructed by the Banque de France. The FIBEn database is based on firms' fiscal documents, including balance sheet and profit and loss statements, and thus includes information on both stock and flow account variables. Using this information we construct a number of financial ratios that we use to measure credit constraints. In addition, we obtain firm-level information on trade credit defaults from an internal longitudinal database of the Banque de France to construct a proxy for credit constraints: payment incidents, which we describe in detail below together with the description of the complete set of financial ratios.

The merging of the different datasets and the lack of data for some observations leave a maximal sample of about 30,000 firms. The resulting dataset is fairly representative of the population of French firms. Table 1 reports mean and standard deviations for the main variables used in the empirical analysis, including the financial measures for credit constraints, which we describe in the next subsection. The sample is unbalanced. It includes about 16 % of all exporting firms, covering about two-third of the top 1 % exporters and accounting for about 40 % of total French exports. The sample includes firms of various sizes, especially numerous small firms that account for the great majority of the observations: the median employment, 30 workers, is rather low. On average, these firms serve 8.2 destinations, and enter or exit from slightly more than one foreign market each year, according to the above definitions of entry and exit. There are therefore a sizeable number of entries and exits from the export market each year.

Firms in the merged sample are bigger than firms in the French Customs database. This biased toward bigger firms is visible when the number of destinations, of entries and of exits (our proposed measures for the two latter) are compared. Table 1 reports these statistics on the two samples. Very small firms are present in the Customs database and as a result the statistics are much higher in the merged sample: the ratio of the means is 2.5 for the number of exits, 3 for entries and even 4.5 for the number of destinations. But if we restrict both samples to

Table 1 Descriptive statistics

Variable	Mean	Median	SD	Obs.
Employment	86.42	28.00	361.69	227,060
ln(TFP)	−1.68	−1.64	0.58	227,060
Liquidity ratio	0.61	0.58	0.41	227,060
Inverse trade credit ratio	8.99	6.85	16.64	227,038
Equity to assets ratio	0.03	0.03	1.44	226,992
Payment incidents	0.06	0.00	0.24	203,158
Firms exporting at least 1 year—merged dataset				
Number of destinations	8.20	3.00	13.56	270,420
Number of entries	1.40	1.00	2.68	270,420
Number of exits	1.10	0.00	1.93	270,420
Firms exporting at least 1 year—French customs dataset				
Number of destinations	1.82	0.00	5.99	2,890,890
Number of entries	0.46	0.00	1.45	2,890,890
Number of exits	0.44	0.00	1.38	2,890,890
Permanent exporters—merged dataset				
Number of destinations	14.30	8.00	16.59	92,547
Number of entries	1.96	1.00	2.48	92,547
Number of exits	1.64	1.00	2.15	92,547
Permanent exporters—French customs dataset				
Number of destinations	10.01	5.00	13.11	337,329
Number of entries	1.64	1.00	2.34	337,329
Number of exits	1.48	1.00	2.37	337,329

Payment incidents are not available for 2005; continuous exporters are defined as those firms that export in t, and also exported in $t - 1$ and $t - 2$

permanent exporters, we get much more similar figures: the ratio of the mean number of destination is 1.4, for entries 1.2 and for exits 1.1. When only permanent exporters, are considered standard error and median are also similar.

3.2 Measuring credit constraints

We use four different variables to measure firm-level credit constraints. Existing studies on the effects of financial constraints on firms' investment typically compute the correlation between firm investment and measures of firm internal liquidity or external debt to identify credit constraints (e.g. Fazzari and Petersen 1993). Significant correlations are typically interpreted as financial markets having an effect on firm investment and denoting financing constraints. We build on this literature to construct standard variables that are typically used to measure firm financial constraints. Table 2 gives the list and description of the variables used to measure credit constraints.

First, we start by using a measure of credit constraints that has been used extensively in the literature: firm liquidity, measured by the ratio of short term debt to current assets. This is an indicator of the general indebtedness of the firm, which shows whether short-term liabilities are backed with relatively liquid assets. A high

Table 2 Description of financial variables used in the paper

Financial variables	Description
Liquidity ratio	Short term debts over current assets
Inverse trade credit ratio	Turnover over accounts payable to suppliers
Equity to asset ratio	Total shareholders equality over total assets
Payment incidents	Dummy equal 1 if the firm has defaulted to its trade creditors, 0 otherwise

liquidity ratio indicates lower firm ability to meet its current obligations and less liquidity. If current liabilities exceed current assets then the firm may have problems meeting its short-term obligations and financing its investment. In addition such firms may face bigger hurdles in accessing external sources of capital, so they may also be more credit constrained (Jensen and Meckling 1976; Myers 1977).

Second, we use a commonly used measure of trade credit: the amount of trade credit payable as a share of turnover. This is a standard measure in the trade credit literature that measures the amount of credit that is extended to the firm by its suppliers (See e.g. Levchenko et al. 2010; Love et al. 2007). The higher the trade credit, the more the credit suppliers allow firms delaying paying their bills, and thus the more working capital the firm has to finance other investments (Cuñat 2007). We take the inverse of the trade credit ratio, so that an increase in ratio represents an increase in financial constraints.

The third measure of financial constraints that we use is the ratio of equity to total assets, that is the share of the total assets that are owned by the firm's shareholders. This is a standard ratio to evaluate the overall financial stability of a company, or the firm ability to repay its debts if all assets were to be sold. To the extent that owner's equity is often not considered as eligible for collateral when firms try to secure a business loan, a high assets to equity ratio indicates easier access to external financing or lower credit constraints. In the analysis we use the inverse of this ratio, equity to total assets, so in line with the other proxies an increase in the ratio represents an increase in financial constraints.

Finally, a unique feature of our dataset is that it contains information on firms that are credit strapped because they cannot access external banking finance. Since 1992 all French banks have a legal obligation to report any previous default on trade creditors to the "Système Interbancaire de Télécompensation" within four business days. These defaults on trade credit are called payment incidents. The Banque de France aggregates this information on payment incidents and makes it available to commercial banks on a weekly basis; so banks can evaluate the current trustworthiness of potential clients and adjust their lending accordingly. In addition, firms that have no more payment incident are removed from this "black list" after 1 year. Aghion et al. (2012) are the first to exploit these longitudinal data on payment incidents and show that being notified on that list under the heading "incident de paiement" is indeed negatively and significantly correlated with a firm's access to loans during the next year. Thus suggesting that firms that had a payment incident in the past year are credit constrained. Based on this information we follow Aghion et al. (2012) and build a proxy for credit constraints as a binary

Table 3 Correlation between financial variables

	Liquidity ratio	Inverse trade credit	Equity to asset ratio	Payment incidents
Liquidity ratio	1.0000			
Inverse trade credit	−0.0053	1.0000		
	(0.0453)			
Equity to asset ratio	0.0073	−0.0001	1.0000	
	(0.0057)	(0.9845)		
Payment incidents	0.1257	−0.0279	−0.0012	1.0000
	(0.0000)	(0.0000)	(0.6629)	

Significance levels are given in parentheses

variable equal to 1 whenever the firm has experienced at least one payment incident during the previous year, and zero otherwise. Actually, as in Aghion et al. (2012), we observe that the number of payment incidents nor the level of these incidents for a given year are more correlated with the interest variables than the binary variable. This observation is consistent with the interpretation that more than their precise financial situation, being black listed (capturing by the payment incident variable) is the main channel.

Table 3 reports the correlation between our four measures. While the liquidity ratio and payment incident are positively correlated, the correlation between equity to asset ratio and the three other measures are virtually null. The inverse trade credit ratio is even negatively correlated with the liquidity. This confirms that these various variables may provide complementary indirect measures of credit constraints.

4 Empirical model

The theoretical model in Sect. 2 implies that credit constraints influence the number of newly served destinations and the number of destinations that ceased to be served by a firm through the effects of financial constraints on the financing on trade costs. To test these theoretical predictions we run a set of specifications and model the count of the number of newly served destinations by a firm and the number of destinations stopped to be served as a function of a firm's credit constraints. The variances of both entries and exits exceed their means by a factor 3. Two methods are used to correct for overdispersion: negative binomial regressor and Poisson with clustered standard errors.[4]

In the negative binomial regression model, the number of entries or exits—denoted both as Y_{it} for simplicity in notation- follows a negative binomial such that:

$$E(Y_{it}|FC_{it-1}, Z_{it-1}, \varepsilon_{it}) = \exp(\beta FC_{it-1} + Z_{it-1}.\Phi + \varepsilon_{it}) \quad (9)$$

[4] See Hilbe (2011).

where FC measures financial constraints and $\varepsilon_{it} \sim \Gamma(\frac{1}{\vartheta}, \frac{1}{\vartheta})$ is an unobserved heterogeneity term that captures overdispersion. The rest of the explanatory variables included in the vector Z_{it-1} controls for a set of firm characteristics that influence the probability to enter or quit the export market.

It can be shown that:

$$E(Y_{it}|FC_{it-1}, Z_{it-1}) = \lambda_{it} = \exp(\beta FC_{it-1} + Z_{it-1}.\Phi) \tag{10}$$

$$V(Y_{it}|FC_{it-1}, Z_{it-1}) = \lambda_{it} + \vartheta\lambda_{it}^2 \tag{11}$$

Note that the variance is thus larger than that of a Poisson (λ_{it}). The coefficient of main interest β measures the effect of financial constraints on the number of entries or exits. Following the intuition from the theoretical model, credit constraints reduce the probability to serve a new foreign destination. This would be reflected in a negative and significant β coefficient on the number of entries. On the other hand, credit constraints may have a positive effect on the number of exits, $\beta > 0$, if financial constraints diminish the firm ability to finance the recurrent fixed costs to stay in an export destination. Alternatively financial constraints may have a negative effect on the number of exits, $\beta < 0$, if financial constraints force firms to increase their efforts to avoid losing the export destination, as suggested by Eq. (8) in the theoretical model. As suggested by Eq. (5) in the theoretical model the probability to quit the destination market is a decreasing function of firm profits in this market π_1. Following *à la* Melitz (2003) models, we assume that profits π_1 on this market are an increasing function of the size of the firm and the technological advance of the firm. More precisely, in such models, the size and the productivity level are joint. In our reduced form, in order to take into account the maximal heterogeneity (Redding 2011), we control both for the size of the firm measured by the total number of employees, and for the technological level measured by the firm total factor productivity. Using measures of capital stocks in volume that account for differences in the average age of capital, we compute a total factor productivity index (TFP) for each firm based on a revenue function. Following the Solow residual method, TFP is computed as the ratio of value added over a Cobb–Douglas combination of labor and capital, where the parameter for labor is firm specific (taken as the time average of the share of the wage bill in value added and the parameter of the capital stock equals one minus the parameter of labor).[5] Additionally, we control for the total number of export destinations served by the firm. All the explanatory variables are lagged 1 year to avoid potential simultaneity bias. Finally, firm specific idiosyncratic effect and a full set of year dummies that control for macro effects, such as exchange rate changes or other macroeconomic shifts are introduced.[6] Note that the firm fixed effects also control for time specific trends since the explained variables reflect changes in the number of export destinations.

[5] For a detailed description of the estimation of total factor productivity based on the Solow residual, together with the approach used to construct the stock of capital see Irac (2008). If we remove TFP or employment, the magnitudes of the estimated key coefficients are slightly larger.

[6] Alternatively, we clustered observations according to firm Ids. In that case, the estimated coefficients (not reported) for the various measures of credit constraints are larger and more significant.

5 Baseline results

5.1 Effects of credit constraints on export entries

We look first at the effect of credit constraints on the number of newly served destinations. Table 4 presents the baseline results of estimating Eq. (9) with the number of entries as a dependent variable using a fixed-effect negative binomial. Alternatively, in order to control for unobserved heterogeneity in a different way, we also estimate a fixed-effects Poisson model with standard errors clustered by firms. Results of the alternative model are given in Table 9 of the "Appendix". Each of the columns of Table 4 refers individually to a different measure of credit constraints. The results confirm the theoretical hypothesis that credit constraints restrict firm access to new export markets. The coefficients on credit constraints are negative and strongly significant for all specifications, regardless of the proxy used to measure credit constraints.

The variables of main interest are the variable measuring firms' credit constraints. A negative and significant coefficient on the credit constraints variables suggests that credit constraints are associated with lower export entries. The first column of Table 4 reports the results using as a proxy for credit constraints the liquidity ratio. The coefficient on the liquidity ratio is negative and highly significant at the 1 % level. This result indicates that firms with a higher level of debt have difficulties to finance entry costs into new export destinations. Given that the liquidity ratio can be interpreted as a measure of the firm's lack of collateral, this result suggests that highly indebted firms may have problems to raise external

Table 4 Baseline regression results—effects of financial constraints on entries into the export market (negative binomial fixed effects model of count of number of entries)

Dependent variable: number of newly served export destinations by firm *i* in *t*				
Financial variables	Liquidity ratio (1)	Inverse trade credit (2)	Equity to asset ratio (3)	Payment incidents (4)
Financial variable *it* − *1*	−0.062	−0.006	−0.246	−0.025
	(3.00)***	(7.05)***	(2.24)***	(1.94)***
InEmp *it* − *1*	00.189	0.190	0.194	0.204
	(20.47)***	(20.63)***	(20.47)***	(19.99)***
InTFP *it* − *1*	0.110	0.121	0.108	0.118
	(9.74)***	(10.76)***	(9.32)***	(9.65)***
Total no destinations *it* − *1*	−0.003	−0.003	−0.003	−0.005
	(5.16)***	(5.44)***	(5.51)***	(8.50)***
Intercept	0.966	0.992	0.944	1.108
	(24.26)***	(24.86)***	(23.56)***	(26.12)***
Observations	194,304	193,964	187,537	171,121
Number of firms	28,050	28,030	27,409	26,998

The regressions include year and firm fixed effects. Absolute value of *z*-statistics in parentheses

* Significant at 10 %; ** significant at 5 %; *** significant at 1 %

financing to cover entry costs into a new destination. This finding is confirmed by the negative and highly significant estimated relation between the equity to total assets ratio and the number of export entries in the second column. This result indicates that less solvent firms enter a smaller number of export markets.

In column 3, the inverse of the trade credit ratio has a negative and highly significant effect at the 1 % level on the number of export entries. As discussed above, there is evidence that firms often rely on trade credit rather than on bank credit to finance their production and export costs (Levchenko et al. 2010). The negative effect of the inverse trade credit ratio on the number of newly served export destinations indicates that the higher the volume of trade credit the larger the number of newly served export destinations possibly because firms can finance entry costs. The results in column 4 also suggest that firms having had a payment incident serve a smaller number of new destinations. To the extent that as shown by Aghion et al. (2012) a payment incident decreases the firm ability to borrow from external sources, this result suggests that limited access to external finance reduces firms' ability to finance new export investments.

The results from the control variables are in line with expectations. Firm size, as measured by the log of total employment, always has a positive and significant effect on the number of export entries suggesting that larger firms establish export relations with a larger number of export destinations. Second, the positive and highly significant effect on productivity suggests that more productive firms enter a larger number of export markets. This result suggests that because more productive firms earn bigger revenues, they can finance the entry costs into a larger number of export destinations. Finally, the negative and significant effect of the total number of export destinations on new entries indicates that the higher the number of export destinations served by the firm, the less likely the firm is to add a new export destination to its portfolio.

5.2 Effects of credit constraints on export exits

We now investigate the effect of credit constrains on the number of exits from the export market. The theoretical model predicts an ambiguous effect of credit constraints on the probability to survive in the export market. The model suggests that credit constraints will affect negatively firm survival if credit constraints prevent firms from financing recurrent fixed export costs. However, credit constrains will have a positive effect on survival if firms intensify their efforts to keep an export destination because they know that financing re-entry into the export market would be difficult precisely because of credit constraints.

In Table 5 we present our baseline results of estimating Eq. (9) with the number of exits as the dependent variable using a fixed-effect negative binomial specification. Similarly to above each of the columns of Table 5 refers individually to a different measure of financial constraints. The coefficients on the credit constrains variables are positive and significant, regardless of the credit constraint proxy, indicating that credit constraints are associated with a larger number of export exits.

Table 5 Baseline regression results—effects of financial constraints on exits the export market (negative binomial fixed effects model of count of number of exits)

Dependent variable: number of newly served export destinations by firm *i* in *t*				
Financial variables	Liquidity ratio (1)	Inverse trade credit (2)	Equity to asset ratio (3)	Payment incidents (4)
Financial variable *it* − *1*	0.042	0.004	0.629	0.027
	(2.06)**	(4.54)***	(6.19)***	(2.37)**
InEmp *it* − *1*	−0.251	−0.248	−0.239	−0.253
	(21.22)***	(20.98)***	(19.44)***	(19.24)***
InTFP *it* − *1*	−0.117	−0.126	−0.108	−0.119
	(10.33)***	(11.12)***	(9.20)***	(9.72)***
Total no destinations *it* − *1*	0.072	0.072	0.072	0.078
	(113.25)***	(113.18)***	(111.42)***	(109.98)***
Intercept	2.417	2.355	2.424	2.426
	(38.92)***	(38.29)***	(38.09)***	(33.76)***
Observations	151,806	151,594	146,890	134,980
Number of firms	24,717	27,704	24,126	23,706

The regressions include year and firm fixed effects. Absolute value of *z*-statistics in parentheses

* Significant at 10 %; ** significant at 5 %; *** significant at 1 %

The first column of Table 5 reports the results on the standard measure of firm liquidity -the ratio of short term debt to total assets. The results indicate that a higher liquidity ratio is associated with a higher number of exits from the export market suggesting that indebted firms have difficulties to finance the recurrent fixed period costs to keep an export destination. As discussed in the theoretical section, we may expect that recurrent costs are binding if credit constraints are driven by lack of collateral, but may be alleviated by sufficient trade credit. The results in the second column of Table 5 confirm this intuition. The positive coefficient on the inverted trade credit variable indicates that firms with a lower share of trade credit over turnover (a higher ratio) stop serving a larger number of export destinations suggesting that less trade credit is associated with lower probability of export market survival.

The other two credit constraints proxies, the equity to total assets ratio and the payment incidents variable, further have a positive effect on the number of exits at the 1 and 5 % significance level respectively. The positive effect of the equity to total assets ratio suggests that lower firm solvency makes it difficult to finance the recurrent fixed trade costs. While the positive effect of the payment of incident variable indicates that firms that fail to repay their creditors in the past exit a larger number of export destinations than those firms that duly pay their creditors. This result suggests that payment incidents by reducing external finance to firms limit the firm ability to keep financing their activity in export markets. As before the results from the control variables are in line with priors. Larger and more productive firms stop serving a smaller number of export destinations. The positive coefficient on the

number of export destinations further suggests that the higher the total number of export destinations served, the higher the number of exits.

In order to get a sense of the economic significance of the estimated coefficients, it is useful to come back to Eq. 10, from which it is easy to derive the impact of a given shock on the endogenous variable on the percentage change of the number of entries/exits. Formally, this incidence ratio can be written as $100 \times (\exp(\beta \times shock(FC)) - 1)$.

Table 10 in the "Appendix" gives these percentages for the different financial constraints, normalizing the shock to $Q_3 - Q_1$ except for payment incidents for which the shock is taken as one standard deviation. The impacts of the shocks are of similar magnitude according to the selected indicators and for exits/entries and relatively small: a normalized increase in the financial constraint decreases the number of entries by a percentage ranging from 0.6 to 2.04 % and increase the number of exits by 0.65–1.38 %. The size of these effects can be viewed as relatively small but one has to keep in mind that yearly effects are given here, with possible large cumulative effects over time if the shock is long-lasting.

To sum up, the results presented in this section provide support to the predictions of the theoretical model. The results using alternative measures of financial constraints suggest, first, that credit constraints have a negative impact on the expansion of firms activities abroad through their negative impact on the number of newly served export destinations. Second, that credit constraints not only seems to deter firm entry into export markets, but also seems to have a negative effect on firm survival in the export market. Clustering standard errors at the firm level with a Poisson model yields similar estimated coefficients (see Table 9 in the "Appendix"), especially for exits, with, quite expectedly, higher standard errors.

As credit constraints are associated with both a reduction of entry and an increase of exit, the cumulative estimated impact may become large. For example, a firm facing a one standard-deviation rise of the inverse trade credit ratio may experience a net loss of about 0.5 destinations; if this rise maintains 5 years, the cumulative impact reaches 2.5 destinations, while exporting firms in our sample serve on average 8.5 destinations. The magnitude of our results is comparable to the findings of other papers which examine the cross-section exporting status of firms. In the next section we investigate the robustness of the results along several dimensions.

6 Extensions and sensitivity analysis

6.1 Effect of credit constraints on different types of exporters

The previous results investigate the effects of credit constraints on all exporting firms. However, we may expect different effects of credit constraints on firm export entries depending on whether a firm is a new exporter or it already exported in the past. Financial constraints may deter firm entry more if firms are first time exporters because these firms may have more trouble raising external financing for their export expenditures because they don't have a previous export record. Alternatively,

although our model abstracts from this possibility for simplicity, firms that were already serving the export market may use export revenues generated in other markets to ease their financial constraints and finance entry into other export markets. Campa and Shaver (2002) suggest that exporting firms are less tied to the domestic cycle, and less subject to financial constraints because they enjoy diversification benefits if economic activity in the markets in which they sell is not perfectly correlated.

To test whether the effect of credit constraints on the number of newly served destinations differs for continuous exporters, as compared to all firms, we estimate Eq. (9) with the number of entries as dependent variables only on the sample of continuous exporters. These are defined as those firms that export in t, and also exported in $t-1$ and $t-2$. The results reported in first panel of Table 6 suggest that the effect of financial constraints on entry is negative and of very similar size as that on the sample of all firms that also contains new exporters, suggesting that financial constraints affect similarly continuous and first time exporters.

Next, we investigate whether financial constraints matter differently for firms that quit the export markets altogether as opposed to firms that exit some export destinations, but still keep some presence abroad. We may expect the effect of financial constraints to have a larger effect on firms that exit completely the export market. To test this hypothesis, we estimate Eq. (9) over the sample of firms that stay in the export market. The results reported in second panel of Table 6 suggest that the effects of credit constraints on the number of exits are positive and of very similar magnitude as for the complete sample of firms, including also firms that quit the export market altogether.

Table 6 Extensions—effect of financial constraints on different types of exporters (negative binomial fixed effects model of count of number of entries)

Dependent variable: number of newly served export destinations by firm i in t				
Financial variables	Liquidity ratio (1)	Inverse trade credit (2)	Equity to asset ratio (3)	Payment incidents (4)
Effect of financial constraints on entries into the export market—continuous exporters				
Financial variable $it-1$	−0.051	−0.005	−0.240	−0.024
	(2.39)**	(6.00)***	(2.10)**	(1.85)*
Observations	145,224	144,983	140,753	129,244
Number of firms	22,571	22,550	22,104	21,773
Effect of financial constraints on exits from the export market—firms that remain exporters				
Financial variable $it-1$	0.046	0.003	0.668	0.026
	(2.19)**	(4.06)***	(6.38)***	(2.19)*
Observations	140,198	140,010	135,870	124,754
Number of firms	21,838	21,825	21,380	21,024

The regressions include the same controls as in Tables 4 and 5. The regressions include year and firm fixed effects. Absolute value of z-statistics in parentheses

* Significant at 10 %; ** significant at 5 %; *** significant at 1 %

6.2 Alternative definitions of entry and exit

By considering two lags when constructing the entry and exit variables, we assume that firms completely lose their sunk startup costs if they are absent from a market for 2 years. An additional advantage of our preferred measure is that it abstracts from possible statistical noise in the recorded entries and exits. However, evidence based on French firm-level data by Buono et al. (2008) suggests that entries and exits into the export market are very frequent and firms enter and exit many markets from 1 year to the other. To verify that our results are not driven by the definition of entry and exit we re-estimate the baseline model considering an alternative more standard definition. For any two subsequent years we alternatively define a export entry (or a newly created export relation) whenever we observe that a firm does not export to a destination the previous year but it exports there the year after $(v_{ict-1} = 0 \, and \, v_{ict} > 0)$. In opposite terms we define a export exit (or a terminated relation) whenever we observe that a firm exported to a destination the previous year, but it does not export there the year after $(v_{ict-1} > 0 \, and \, v_{ict} = 0)$.

Table 7 reports the results using these alternative definitions of entry and exit. The results are in line with the previous findings using the baseline definitions. Overall credit constraints have a negative effect on the number of newly created export destinations. The coefficients on the credit constraints variables are negative, significant and of similar or a bit smaller size, except for the payment of incident proxy, which is no longer significant. The second panel of Table 7 further confirms that credit constraints have a positive effect on the number of export exits. However, the coefficient on the liquidity and the payment incident variable is no longer significant.

Table 7 Sensitivity with respect to alternative definitions of entry and exit (negative binomial fixed effects model of count of number of entries)

Dependent variable: number of newly served export destinations by firm i in t				
Financial variables	Liquidity ratio (1)	Inverse trade credit (2)	Equity to asset ratio (3)	Payment incidents (4)
Alternative definition of entry				
Financial variable $it-1$	−0.050	−0.006	−0.179	−0.010
	(3.62)***	(10.80)***	(2.49)**	(1.11)
Observations	271,115	270,671	261,283	225,158
Number of firms	32,462	32,448	31,733	30,501
Alternative definition of exit				
Financial variable $it-1$	0.006	0.004	0.300	0.012
	(0.49)	(6.69)***	(4.61)***	(1.48)
Observations	200,595	200,282	193,975	168,597
Number of firms	28,467	28,451	27,771	26,591

The regressions include the same controls as in Tables 4 and 5, and year and firm fixed effects. Absolute value of z-statistics in parentheses

* Significant at 10 %; ** significant at 5 %; *** significant at 1 %

6.3 Remarks on endogeneity

Although in the previously discussed results we include fixed effects and lag the explanatory variables, this may not completely correct for endogeneity and omitted variable bias. A more satisfying approach would be to use instruments to control for endogeneity bias. Some instruments are natural for payment incidents. For instance, one possibility would be to use information on the supply of credit available to the firm. Following Amiti and Weinstein (2011), a good candidate would be the health of banks providing credit to firms. However one would have to match firms with banks which, given data available, would be extremely difficult for large firms and impossible for SMEs. A less demanding approach would be to use information on the overall characteristics of the credit supply available to the firms, such as the number of bank establishments in the region the firm is located in. Used in a cross section analysis such indexes of local banking supply [e.g. by Minetti and Zhu (2011)] would have little or no time variability, therefore it would not be possible to used them in our firm fixed effects specification. A promising possibility would be to use existing information on the payment incidents by creditors of the firms: we may consider as exogenous the negative shock for a firm due to non payment by its creditors. However, these data are not still available for research and should require investigation on their quality.

6.4 Working on the euro area

In order to account for macro-economic shocks, year dummies are included in the baseline empirical model. However, since exchange rate shocks include also a country dimension, they are imperfectly captured by year fixed effects. In order to check the robustness of our results to this possible non inclusion of control variables, we run the regressions on the euro area (EA-11) only. Precisely, we restrict the sample to the 1999–2007 period and we consider entries and exits on the markets of the 10 countries that composed with France the first euro area in 1999. Only destinations in the euro area are taken into account in the count of destinations, newly served destinations and newly exited destinations. Firms that have no euro area destinations over the sample period are excluded and, quite logically, only firms serving strictly less than ten countries in the EA-11 are included in the "entries" regression. Results are displayed in Table 8 and we observe that the coefficients are globally unchanged by working on this sub-sample.

7 Conclusion

This paper develops a simple theoretical model to study the role of financial imperfections on the expansion and survival of firms in export markets and sheds more light on how credit constraints affect firms' internationalization via their destination portfolio. The main predictions of the model are that financial constraints hinder the expansion of firms into new export markets. But their impact on export survival is ambiguous depending on the nature of the constraint. We test

Table 8 Negative binomial fixed effects model of count of number of entries/exits (euro area only)

Dependent variable: number of newly served export destinations by firm *i* in *t*				
Financial variables	Liquidity ratio (1)	Inverse trade credit (2)	Equity to asset ratio (3)	Payment incidents (4)
Effect of financial constraints on entries into the export market				
Financial variable $_{it-1}$	−0.086*	−0.0084***	0.083	−0.047*
	(−1.95)	(−4.77)	(0.37)	(−1.69)
Observations	125,762	125,495	121,263	126,001
Number of firms	17,372	17,355	16,937	17,393
Effect of financial constraints on exits into the export market				
Financial variable $_{it-1}$	0.133**	0.009***	0.438*	0.055*
	(2.66)	(5.20)	(1.77)	(1.94)
Observations	96,589	96,485	93,188	96,807
Number of firms	15,251	15,246	14,836	15,283

The regressions include the same controls as in Tables 4 and 5, and year and firm fixed effects. Absolute value of *z*-statistics in parentheses

* Significant at 10 %; ** significant at 5 %; *** significant at 1 %

these predictions using data on French firms containing information on firms' individual export destinations and on several proxies for firms' credit constraints. Our large dataset allows controlling for firm heterogeneity.

We find that credit constraints are associated with fewer newly served export destinations. Furthermore, we also find that credit constraints seem to have a positive effect on the number of exits from the export market suggesting that credit constraints decrease firm export survival. We perform a number of sensitivity checks and show that these findings are not sensitive to the measure of financial constraints, nor to the particular definition of firm entry or exit.

These results have implications for the understanding of firm trade dynamics and show a potential role for credit market imperfections on a country's aggregate exports. Credit market imperfections decrease firms' ability to gain new markets but, maybe more significantly, decrease also firms export survival. This in turn has an effect on the number of firms exporting in an economy and on aggregate exports. The results are also consistent with the prediction of the model that credit constraints, besides acting on the capacity to finance entry costs, influence firms' capacity to finance recurrent costs on a foreign market.

The magnitude of the estimated connection between our measures of credit constraints entry and exit from foreign market is apparently small. However, cumulatively, year after year, credit constraints may significantly affect the extensive margin of trade. Assuming that they were less binding in competitors, credit constraints may be a partial candidate for the bad exporting performances and the relative decline of French exports observed during the 2000 decade.

There are future extensions we plan to undertake. First, along with using additional data to correct for endogeneity, the paper may be extended through an exploitation of other dimensions of the customs database. Our empirical strategy

collapses the information on destination of exports into (the change in) the number of destinations. An alternative strategy, would be to estimate logit models modeling the dependent variable as the existence of a positive flow to a given destination. However a possible drawback of this approach is that the number of observations would be huge and we would only be able to introduce the country dimension in the left-hand side of the equation whereas the payment incidents variable would remain firms-time specific. Second, future work will also estimate logit models for French exports to specific markets (US, Germany, China, etc.). These would have the advantage of providing us with country specific coefficients on the effects of credit constraints on exports. Indeed it would be interesting to know for instance if credit constraints are more binding for exports to remote or less financially developed countries.

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Appendix

See Tables 9 and 10.

Table 9 Fixed effects Poisson model, firm level clustering

Dependent variable: number of newly served export destinations by firm *i* in *t*				
	Liquidity ratio	Inverse trade credit	Equity to asset ratio	Payment incidents
Effect of financial constraints on entries into the export market				
Financial variable *it* − *1*	0.030	−0.006***	−0.045	−0.014
	(1.07)	(−5.87)	(−0.34)	(−0.95)
InEmp *it* − *1*	0.337***	0.341***	0.342***	0.346***
	(17.79)	(18.07)	(18.18)	(16.89)
InTFP *it* − *1*	0.146***	0.153***	0.135***	0.148***
	(9.58)	(10.01)	(8.76)	(9.05)
Total no destinations *it* − *1*	−0.021***	−0.021***	−0.021***	−0.024***
	(−19.08)	(−19.20)	(−19.42)	(19.93)
Observations	194,304	193,964	187,537	171,121
Number of siren	28,050	28,030	27,409	26,998
Effect of financial constraints on exits into the export market				
Financial variable *it* − *1*	0.0414	0.0043***	0.627***	0.0269*
	(1.261)	(3.096)	(4.478)	(1.883)
InEmp *it* − *1*	−0.213***	−0.210***	−0.197***	−0.217***
	(−9.731)	(−9.623)	(−8.747)	(−9.041)

Table 9 continued

Dependent variable: number of newly served export destinations by firm *i* in *t*				
	Liquidity ratio	Inverse trade credit	Equity to asset ratio	Payment incidents
InTFP *it − 1*	−0.133***	−0.143***	−0.124***	−0.132***
	(−8.276)	(−8.861)	(−7.379)	(−7.749)
Total no destinations *it − 1*	0.0767***	0.0765***	0.0763***	0.0820***
	(33.39)	(33.47)	(32.45)	(33.17)
Observations	151,806	151,594	146,890	134,980
Number of siren	24.717	27.704	24.126	23.706

The regressions include the same controls as in Tables 4 and 5, and year and firm fixed effects. Absolute value of *z*-statistics in parentheses

* Significant at 10 %; ** significant at 5 %; *** significant at 1 %

Table 10 Effectsz of an increase of the ratio by (Q3–Q2) on the percentage change in the number of destinations

	Entries (%)	Exits (%)	Size of the shock
Liquidity ratio	−1.16	0.79	0.19
Inverse trade credit ratio	−2.04	1.38	3.43
Equity to asset ratio	−0.42	1.08	0.02
Payment incidents	−0.60	0.65	0.24
Payment incidents	−2.47	2.74	1.00

The shock is equal to one standard deviation for the payment incident indicator

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