



Paper to be presented at the
35th DRUID Celebration Conference 2013, Barcelona, Spain, June 17-19

Exporting under financial constraints: margins, switching dynamics and prices

Federico Tamagni
Scuola Superiore Sant'Anna
LEM
f.tamagni@sssup.it

Abstract

Using data on cross border transactions together with an informative measure of financing constraints this paper provides new evidence that limited access to external capital narrows the scale of foreign sales, the exporters' product scope and the number of trade partners. It shows that constrained firms have a reduced probability of adding and a higher probability of dropping products and destinations. Further it documents that constrained firms sell their products at higher prices as compared to unconstrained firms. All the results are robust to specific control for unobserved heterogeneity, self-selection into export and potential endogeneity of the financial constraints proxy.

Exporting under financial constraints: margins, switching dynamics and prices

February 28, 2013

1 Introduction

There are a few reasons why access to finance plays a particularly important role for firms involved in export activities. The need to build ad-hoc distributional networks, to acquire specific information on destination markets, or to customize products, all the way to the mere transportation of goods imply that fixed and variable costs tend to be higher for exporters. Moreover the time lag between production and actual realization of the corresponding revenues is, in general, longer, and international sales contracts are usually more complex, riskier and less enforceable than in domestic markets. An increasing number of works show that financial constraints reduce firms' ability to enter international markets and the volume of trade, and limit exporters' product scope as well as the number of trade partners.

This paper provides three distinct contributions, by exploiting detailed data on cross-border transactions (i.e. at product/destination level) for a large and representative sample of Italian manufacturing firms.

First, we explore the role of financial constraints on the dynamics of product/country switching, i.e. of changes in product or geographical diversification over time. The exercise is in the spirit of recent advancements in heterogeneous firms trade theory (cfr. Bernard et al., 2010). The key feature of these models is that product or destination portfolios of firms change over time in response to shocks to firm specific characteristics (ability, productivity, competences) and to product specific attributes (technology, demand for product characteristics). The role of financial frictions is not explicitly considered in these models. However, financing constraints can clearly play a role, making firms more vulnerable to negative shocks and preventing them to fully catch the benefits from positive shocks. Our empirical analysis sheds light on this question, so far largely unexplored.

Second, this paper considers whether there is any relationship between financing constraints and export pricing. The empirical literature on firm heterogeneity in international trade has only recently documented the systematic variation in export prices across firms, products and trade partners (Bastos and Silva, 2010; Manova and Zhang, 2012). The relation between financial frictions and export prices, however, is touched only by Manova et al. (2011). They focus on sectoral rather than on firm-level constraints, and mainly tackle the issue only in light of the relative merits of models of efficiency sorting (Melitz and Ottaviano, 2008) vs. quality sorting (Kneller and Yu, 2008; Kugler and Verhoogen, 2012). Quality models predict that constrained firms, as they cannot afford the additional costs of quality, export lower quality goods at lower prices than unconstrained exporters. Models of productivity-driven selection suggest just the opposite: since constrained firms are assumed to be less productive, they are predicted to operate at higher marginal costs, and thus to set higher prices. Which effect dominates the other is an open empirical question that we investigate in the paper.

Third, this paper also provides methodological improvements regarding the measure of firm financial status and the econometric approach implemented in the analyses.

With respect to the proxy of financial constraints, we base the empirical analysis on an official credit rating issued by an independent institution and available for all the firms in the dataset. The key intuition is that the availability and the cost of external resources depend on many factors, which do not simply map one-to-one with a single variable (e.g. productivity or cash flow) and that financing problems can also arise for otherwise well performing firms, given the substantial informational imperfections characterizing credit markets. Credit ratings incorporate this intuition: they summarize a multidimensional picture of firms' financial status, and at the same time capture the credit markets' view on the creditworthiness of a firm, thus getting close to the actual way investors' decide to provide external finance. A similar approach is followed in Muuls (2008)'s study of financial constraints to export of Belgian firms.

Concerning the econometrics, there are two potential sources of bias that we tackle, i.e. self-selection into export and potential endogeneity problem from joint determination of export performance and availability of external credit. Among previous empirical studies on financial constraints to export, only Minetti and Zhu (2011) address both the potential sources of bias at the same time. Though, their analysis does not control for unobserved heterogeneity in the selection-into-export equation and it is limited to investigation of firm-level export margins. Instead, by resorting to the framework developed in Semykina and Wooldridge (2010), we can fully exploit the panel and transaction level dimension of the data, including diverse sources of unobserved heterogeneity in both selection and main equations, at firm, product or destination level, or combinations of the former, depending on the different empirical specifications. At the same time, the method jointly allow for instrumental variable treatment of potential endogeneity of access to credit.

2 Data and measurement

In this section we describe the data, define our proxy of financial constraints and present the other main variables exploited in the empirical exercises.

Data and sample

The analysis draws upon different sources of data, combining information on export transaction flows and firms' characteristics.

Trade data are from the COE dataset maintained by the Italian Statistical Office (ISTAT). This is the official source for trade flows of the universe of Italian firms. It records separately the f.o.b. value (in Euros) and the quantity (in kilos) involved in each export and import cross-border transaction performed by a firm, thus allowing to compute export and import prices (unit values), for a total of 5,329 product categories (HS6 level) and 236 different destination countries. This dataset is matched with data on annual reports of all Italian *limited liability* firms from the CEBI-CERVED-CADS dataset over the years 2000-2003, through a link with the ASIA register (maintained by ISTAT), covering the universe of Italian firms active in the same time span, irrespectively of their export status (and also reporting info geographical location).¹

The sample thus covers the entire population of Italian limited firms (exporters and non exporters) active in manufacturing, over the period 2000-2003. The panel is open and includes a total of 149,414 firms. With respect to the whole Italian manufacturing, we cover about 60% of all exporting firms and about 84% of the total value of exports.

¹The data have been made available for work after careful screening to avoid disclosure of individual information. The data were accessed at the ISTAT facilities in Rome.

Financing constraints

Our measure of financing constraints is based on the credit rating index available through the CEBI-CERVED-CADS dataset. Compared to the ratings issued by well known international agencies, CEBI ratings enjoy three specific advantages. Firstly, they give an assessment of the *overall* situation of a firm, rather than judging the quality of a single liability of a company. Second, all the firms included in the dataset receive a rating, whereas international rating institutions typically target a much less representative sub-sample of firms. Third, our index is perceived as an official rating, due to the long lasting relationship of CEBI with the Italian banking and credit systems. This fact motivates the heavy reliance of banks on this specific rating index, and the tight link between the index and the availability and cost of external finance: it is very unlikely that a firm with poor rating can receive any credit, and there is evidence that bad ratings have a strong association with higher cost of credit (Panetta et al., 2009). Finally, and related, our rating score works as a proxy of what banks do, rather than a generic benchmark for potential lenders. This feature is particularly appropriate, given the well known disproportionate dependence of the Italian industrial system on bank credit due to underdevelopment of bond and stock markets in Italy as compared to other countries.

The original index ranks firms in 9 categories of creditworthiness. In keeping with the binary categorization traditionally employed in the literature, we distinguish between Non Financially Constrained (NFC) firms, rated from 1 to 7, and Financially Constrained (FC) firms, with rating 8 or 9. Accordingly, we build a FC dummy that takes value 1 if a firm is rated 8 or 9, and 0 otherwise. Firms can switch between the FC and the NFC class over the period, but the degree of persistence is very high, also due to the short time window available. Since the index is updated at the end of each year, it is the rating in $t - 1$ that is relevant for credit suppliers' present decisions on credit provision. The FC dummy is therefore taken with a 1 year lag.

Previous studies find that the CEBI rating index is highly correlated with banks' internal definition of default status (Bottazzi et al., 2011) and that an important fraction of highly productive, highly profitable and fast growing firms receive poor scores (Bottazzi et al., 2008, 2010). These results imply that the index does not merely reflect firms' performances, but actually captures a more complex set of information that a bank would consider when lending to firms.

Controls and Instruments

Although export performances do not enter the construction of credit scores, it is likely that firm characteristics can simultaneously affect financing problems and export performance. Thus, a series of firm level controls are intended to separate out from the rating index some of the factors that influence both credit conditions and exporting activities.

First, given the well established result that smaller and younger firms tend to be more prone to financing problems, we proxy for size via the number of employees (*Empl*), and compute age (*Age*) by year of foundation. Secondly, in keeping with the vast literature on financing constraints and firm dynamics (cfr. for instance Almeida et al., 2004), we consider two key factors that reduce the probability to be constrained, namely the amount of internally generated resources and the stock of collateral available as contractual guarantee to investors. Among several alternatives in previous studies, we proxy internal resources with the Gross Operating Margin (*GOM*, equivalent to the EBIDTA) and the stock of Total Assets (*Assets*) is used as a proxy for collateral.²

While controls indirectly help in mitigating possible endogeneity of the FC classification, we also construct a set of instrumental variables.

In the absence of firm level variables allowing to identify exogenous variation in firm level access to credit, it is become common in the empirical literature on Italy to follow Guiso et al. (2004) and look for exogenous variation in credit availability at the local level. The logic is to exploit exogenous

²All the nominal variables are deflated with 2-digit sectoral price indexes, base year 2000.

variation in provincial credit supply determined by the progressive removal, during the 1990s, of a series of restrictions to banking services introduced in 1936 by the Bank of Italy. The removal freed up banks' possibility to open new affiliates, with differentiated impact across provinces also in relation to the different types of banks active at the local level (with saving banks less restricted and cooperative banks more constrained by the 1936 law). Minetti and Zhu (2011) are the first to apply the approach to the context of financing constraints to export. In the same spirit, we instrument ratings with three variables that capture the degree of constrictiveness of the legislation as well as the shock induced by its removal, at the provincial level: (1) number of saving banks and (2) number of cooperative banks per 1000 inhabitants in 1936; (3) number of branches created annually by banks per 1000 inhabitants, imputed as the average in 1990-1998.³

In addition, we need also to consider a measure of fixed costs of entry into foreign markets, providing the exclusion restriction required by the procedures implemented to correct for potential selection bias. This proxy is constructed starting from the concept of Local Labour Systems (LLSs), i.e. geographical areas defined by the Italian Statistical Office as an aggregation of municipalities according to the degree of connectivity of labour market, and thus identifying local areas where production-labour relationships are tight. Thus, being in the same LLS proxy for variation in the access to a pool of factors that facilitate exports, such as sharing same trade services, established distribution networks or exploiting neighbors' experience in dealing with foreign contracts and foreign legislations. For each firm f , we define a proxy for the sunk cost of entry into exports ($ExpCost_f$) computed as the minimum between firm export entry and exit rates in the LLS wherein a firm is located. An higher rate of entry or exit indicates lower sunk costs of exporting.

3 Econometric procedures

This section provides details on the econometric procedures followed in our empirical analysis. We adopt two basic strategies, exploiting the different firm- or transaction- level information of the data. Both strategies entail an application of the Heckman type 2-stage approach developed in Semykina and Wooldridge (2010), which provides consistent estimation of panel data models with selection controlling for heterogeneity also in presence of correlated unobserved effects and endogenous regressors.

In a first set of empirical investigations we explore to what extent financing constraints affect export margins using data at the firm level. The model includes two equations

$$\ln Y_{f,t} = \gamma_1 FC_{f,t-1} + \beta \mathbf{Z}_{f,t-1} + FE_{1f} + \epsilon_{1f,t} \quad (1)$$

$$s_{f,t} = 1 [\gamma_2 IV_{f,t-1}^{FC} + \delta_t \mathbf{W}_{f,t-1} + FE_{2f} + \epsilon_{2f,t} > 0] \quad (2)$$

Equation (1) is the equation of interest, where the dependent variable $Y_{f,t}$ is the export performance of firm f at time t along the different margins (the value of foreign sales, the number of exported products or the number of destination countries) and $FC_{f,t-1}$ is our potentially endogenous dummy for constrained firms. The set $\mathbf{Z}_{f,t-1}$ includes firm-level controls (*Empl*, *Age*, *Assets* and *GOM*) all in logs. With the only exception of *Age* which is taken at time t , all variables are measured at year $t - 1$, thus reducing simultaneity problems.⁴ Further, FE_{1f} is a firm fixed effect possibly correlated with the other regressors, and $\epsilon_{1f,t}$ is a standard error term. Equation (2) is a Probit selection equation, where s_{ft} is a binary indicator for firms' export status (1 if a firm is exporter in t , 0 otherwise), $1[\cdot]$ is the indicator function, $IV_{f,t-1}^{FC}$ is an instrumental variable for $FC_{f,t-1}$, $\mathbf{W}_{f,t-1}$ is

³As expected from the different degree of restrictions imposed by the 1936 law, the share of FC over NFC firms in a province is negatively correlated with the number of saving banks (Spearman coefficient -0.192) and the net creation of branches (-0.278) in the province, while positively correlated with the number of cooperative banks in the province (0.0882).

⁴We use the subscript $t - 1$ for the set of controls, bearing however in mind that *Age* is measured at time t .

a set of exogenous explanatory variables, FE_{2f} is an unobserved firm fixed effect, and $\epsilon_{2f,t}$ a usual error term. Note that $\mathbf{Z}_f \subset \mathbf{W}_f$, since \mathbf{W}_f includes firm-level controls and also the proxy of sunk cost of exports, $ExpCost_f$, as the exclusion restriction variable.

The parameter of main interest is γ_1 , which captures differences in export performance due to financial constraints. Because of the presence of unobserved effects also in the selection equation (2), adding the inverse Mills ratio and simply using Fixed Effects does not produce consistent estimates of equation (1). However, a solution is available (see Semykina and Wooldridge, 2010, for details) via adding time averages of all the exogenous explanatory variables both in the main equation (controls and instruments for FC) and in the selection equation (controls, $ExpCost_f$ and the instruments for FC).

A consistent estimate of γ_1 is obtained with the following procedure:

Procedure 3.1

1. generate the instrument $IV_{f,t-1}^{FC}$ as the fitted probability from a Probit regression of our binary indicator FC on the controls in \mathbf{Z}_f , on their time averages and on the 3 provincial level instruments for credit conditions: (1) number of saving banks and (2) number of cooperative banks per 1000 inhabitants in 1936, and (3) number of branches created annually by banks, per 1000 inhabitants and imputed as the average in 1990-1998;⁵
2. for each t, obtain the inverse Mills ratio $\hat{\lambda}_{f,t}$ from a Probit estimate of equation (2) augmented with the time averages of the instrument $IV_{f,t-1}^{FC}$ and time averages of the controls in \mathbf{W}_f ;
3. estimate via pooled 2SLS-IV equation (1) augmented with the time averages of the generated instrument $IV_{f,t-1}^{FC}$, with the time averages of the explanatories in \mathbf{Z}_f , and with the inverse Mills ratio $\hat{\lambda}_{f,t}$ obtained in Step 2 together with its interactions with time dummies; use \mathbf{Z}_f , $IV_{f,t}^{FC}$, all the time averages and $\hat{\lambda}_{f,t}$ as instruments;
4. use a “panel bootstrap”, sampling across sectional units, to obtain asymptotic standard errors corrected for problems related to general heteroskedasticity, serial correlation and generated regressors.

In a second set of exercises we exploit the transaction level disaggregation of the data to explore the role of financing constraints on firms’ switching among products and destinations, and on their pricing strategies. The methodology is quite similar to the procedure employed above. However, the more detailed information available allows to model selection into export as the outcome of a Tobit regression. The advantage is that, in this case, there is no need for an exclusion restriction, since the variation in the dependent variable in the Tobit is used to identify the parameters in the main equation. Moreover a pure Fixed Effects approach is allowed and more appropriate in estimating the main equation.

In general terms, the model still consists of two equations

$$Y_{.,t} = \gamma_1 FC_{f,t-1} + \beta \mathbf{Z}_{f,t-1} + FE_{1.,t} + \epsilon_{1.,t} \quad (3)$$

$$ExpVal_{.,t} = \text{Max} [0, \gamma_2 IV_{f,t-1}^{FC} + \delta \mathbf{Z}_{f,t-1} + FE_{2.,t} + \epsilon_{2fpc,t}] \quad , \quad (4)$$

where a “.” in the subscript indicates that the variables can be taken at different combination of firm-product-country level, depending on the precise specification we intend to estimate. In the primary equation the dependent variable of interest (the probability of dropping products or destinations, or the log of unit values) is regressed against the FC dummy, the firm level controls \mathbf{Z}_f and a set of fixed effect FE_1 controlling for diverse sources of unobserved factors. The selection equation is a

⁵This follows the Procedure 19.2 in Wooldridge (2010)

Tobit on the (log of the) value of export, $ExpVal$, with explanatory variables given by the generated instruments $IV_{f,t-1}^{FC}$, the firm-level controls and a fixed effect capturing the same type of unobserved heterogeneity modeled in the primary equation. Notice that in this equation, as in Procedure 3.1 above, the fixed effects are inserted by adding the time averages of the proper explanatory variables. As we control for country-level fixed effects in some specifications, the selection equation, when appropriate, will be also augmented with a set of standard gravity-like destination country characteristics, \mathbf{Z}_c , including market size, consumer income and an iceberg trade costs.⁶

Consistent estimates are obtained through the following procedure

Procedure 3.2

1. build the instrument $IV_{f,t-1}^{FC}$ as in Procedure 3.1;
2. for each t , obtain the residuals from a Tobit estimate of equation (4) augmented with the time averages of firm-level and/or country-level controls, depending on the type of fixed effects chosen for the main equation (3);
3. estimate via pooled 2SLS-IV equation (3) with appropriate fixed effects and with the residuals obtained in Step 2 together with their interactions with time dummies; use $IV_{f,t-1}^{FC}$, firm-level and/or country-level controls, and the Step 2 residuals as instruments;
4. use a “panel bootstrap”, sampling across sectional units, to obtain asymptotic standard errors corrected for problems related to general heteroskedasticity, serial correlation and generated regressors.

Compared to previous studies, explicit controls for unobserved heterogeneity both in the selection and primary equation give additional confidence of proper identification of the key parameters. For completeness and comparison with previous findings, the following Sections also reports more standard estimates (OLS, Probit or Fixed Effects) of the main equations of interest.

4 Financing constraints and firm export margins

This section explores how financing constraints relate with export activities at the firm level. The bulk of previous empirical studies focuses on similar regressions.

We start by exploring the relation between financing constraints and the (log of the) value of firm level exports ($Exports$). The equation of interest is

$$Exports_{f,t} = \gamma FC_{f,t-1} + \beta \mathbf{Z}_{f,t-1} + FE_f + \epsilon_{f,t} \quad (5)$$

where FC_f is our dummy variable identifying constrained firms, \mathbf{Z}_f is the set of firm level control variables, and FE_f is a firm fixed effect. Identification therefore comes from variation within firm over time.

Columns 1-2 of Table 1 report pooled OLS (POLS) and Fixed Effects (FE) estimates. These results already provide a clear picture: financing constraints are significantly associated with reduced export values. The coefficient of the FC dummy in the FE specification is significantly smaller in absolute value than the OLS estimates. This suggests a negative correlation between omitted variables and assignment to the FC class, as it is indeed expected for unmeasured factors such as managerial ability or productivity, for instance.

⁶We measure these variables by GDP, GDP per capita (GDPPC) and bilateral geographical distance (DIST). Data on GDP and GDP per capita are taken from the World Bank Development Indicators (nominal figures). Distance of destination countries from Italy is computed via the great circle method (Mayer and Zignago, 2005) on the CEPII database.

Table 1: Within-Firm Financial Constraints and Total Exports

	$\ln Exports_{f,t}$	$\ln Exports_{f,t}$	$\ln Exports_{f,t}$	$\ln Exports_{f,t}$
	POLS	FE	Procedure 3.1*	Procedure 3.1
	(1)	(2)	(3)	(4)
$FC_{f,t-1}$	-0.227*** (0.028)	-0.091*** (0.028)	-0.061** (0.027)	-0.603** (0.278)
$\ln Empl_{f,t-1}$	0.211*** (0.012)	0.130*** (0.020)	0.033* (0.018)	0.024 (0.022)
$\ln Age_{f,t}$	-0.116*** (0.012)	-0.037 (0.076)	0.462*** (0.088)	0.259*** (0.100)
$\ln ASSETS_{f,t-1}$	0.943*** (0.011)	0.515*** (0.031)	0.475*** (0.029)	0.450*** (0.029)
$\ln GOM_{f,t-1}$	0.063*** (0.0044)	0.022*** (0.004)	0.023*** (0.004)	0.001 (0.001)
$\hat{\lambda}_{f,t}$			0.645*** (0.087)	0.415*** (0.092)
Year FE	Yes	Yes	Yes	Yes
Firm FE	No	Yes	Yes	Yes
R-squared	0.443	0.911	0.403	0.401
N.Observations	123597	123597	123597	113216
N.Firms	53173	53173	53173	487762

Note: Table reports regression using data on 2001-2003. The dependent variable used is reported at the top of each column. $FC_{f,t-1}$ is a dummy for financially constrained firms. Column 1 includes sectoral and province fixed effects. All the regressions include a constant term. Robust standard errors clustered at firm level are reported in parenthesis below the coefficients: in columns 3 and 4 these are computed out of 500 bootstrap runs. Asterisks denote significance levels (***:p<1%; **: p<5%; *: p<10%). Procedure 3.1* controls only for selection by performing Procedure 3.1 without instruments for $FC_{f,t-1}$.

In columns 4 we directly address selection and endogeneity bias via the Procedure 3.1 described in Section 3. The term $\hat{\lambda}_{f,t}$ is the inverse Mills ratio estimated in step 2 of the procedure: significance of the coefficient on $\hat{\lambda}_{f,t}$ confirms that selection is indeed an issue. We shall also notice that the relevance and the validity of the instrument for FC , i.e. the fitted probabilities IV^{FC} , is confirmed in the preliminary Probit from step 1 of the procedure, where we observe that the coefficients on the number of saving banks, on the number of cooperative banks per 1000 inhabitants in 1936, and on the number of branches created annually by banks during the 1990s, are jointly statistically significant ($\chi^2 = 29.45$ with $p - value < 0.000$).

The main message remain valid, though: firms with limited or no access to external finance export significantly less in value than unconstrained firms. The reduction is sizeable, as the estimated coefficient of -0.603 implies that constrained firms export about 45% less, *ceteris paribus*.⁷ This value is close to the lower bound of the estimates obtained in Minetti and Zhu (2011) on a more restricted sample of Italian firms. It is also remarkable that the negative effect is stronger than what we could conclude from OLS or FE estimates. The latter turn upward biased (smaller coefficients in absolute value), suggesting that the endogenous component of our FC classification produces an underestimation of the true detrimental effect of being constrained on exporting activities.⁸

Our second exercise investigates the role of financing constraints along the product and destination margins. We replace the dependent variable in equation (5) with either the (log of the) number of destinations served ($\#Countries$) or the (log of the) number of exported products, while selection is still modeled as the export participation decision detailed above (with firm fixed effects and including $ExpCost$ as the exclusion restriction variable).

Table 2 reports the results, again for POLS, FE with firm fixed effects, and selection-endogeneity

⁷This figure is obtained by $exp(-0.603) - 1$.

⁸Indeed, in the first stage of the 2SLS-IV estimates from Step 3 of the procedure, the fitted probabilities IV^{FC} is positively and significantly correlated with the FC dummy (coefficient ~ 0.823 , with a standard error of 0.051), confirming the upward bias in OLS and FE estimates.

Table 2: Within-Firm Financial Constraints and the Extensive Margins of Trade

	$\#Countries_{f,t}$	$\#Countries_{f,t}$	$\#Countries_{f,t}$	$\#Countries_{f,t}$	$\#Products_{f,t}$	$\#Products_{f,t}$	$\#Products_{f,t}$	$\#Products_{f,t}$
	POLS	FE	Procedure 3.1*	Procedure 3.1	POLS	FE	Procedure 3.1*	Procedure 3.1
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$FC_{f,t-1}$	-0.085*** (0.014)	-0.048*** (0.012)	-0.034*** (0.012)	-0.320** (0.127)	-0.086*** (0.013)	-0.045*** (0.014)	-0.031*** (0.011)	-0.389*** (0.122)
$\ln Empl_{f,t-1}$	0.131*** (0.006)	0.079*** (0.009)	0.026*** (0.008)	0.022** (0.009)	0.078*** (0.006)	0.065*** (0.009)	0.024*** (0.008)	0.021** (0.009)
$\ln Age_{f,t}$	0.025*** (0.007)	0.022 (0.033)	0.267*** (0.040)	0.162*** (0.048)	-0.031*** (0.006)	-0.055 (0.037)	0.144*** (0.042)	0.052 (0.048)
$\ln ASSETS_{f,t-1}$	0.350*** (0.006)	0.201*** (0.013)	0.136*** (0.012)	0.128*** (0.014)	0.339*** (0.005)	0.196*** (0.014)	0.180*** (0.013)	0.173*** (0.013)
$\ln GOM_{f,t-1}$	0.029*** (0.002)	0.005*** (0.002)	0.004** (0.002)	-0.008 (0.005)	0.019*** (0.002)	0.006*** (0.002)	0.005*** (0.002)	-0.009 (0.005)
$\hat{\lambda}_{f,t-1}$			-0.066 (0.042)	-0.148*** (0.047)			0.388*** (0.045)	0.334*** (0.046)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	No	Yes	Yes	Yes	No	Yes	Yes	Yes
R-squared	0.364	0.929	0.303	0.302	0.342	0.876	0.249	0.248
N.Observations	123597	123597	123597	113216	123597	123597	123597	113216
N.Firms	53173	53173	53173	48766	53173	53173	53173	48766

Note: Table reports regressions using data on 2001-2003. The dependent variable is reported at the top of each column. $FC_{f,t-1}$ is a dummy for financially constrained firms. Columns 1 and 5 include sectoral and province fixed effects. All the regressions include a constant term. Robust standard errors clustered at firm level are reported in parenthesis below the coefficients: in columns 3-4 and 7-8 these are computed out of 500 bootstrap runs. Asterisks denote significance levels (***: p<1%; **: p<5%; *: p<10%). Procedure 3.1* controls only for selection by performing Procedure 3.1 without instruments for $FC_{f,t-1}$.

corrected estimates from Procedure 3.1. The main finding is that financing problems hamper the ability of firms to operate along both margins: FC firms export a narrower range of products to a smaller number of countries as compared to unconstrained exporters. The result does not vary much across different estimation methods, although, similarly to the above regression on export values, the POLS and FE estimates of the FC coefficient are upward biased with respect to the more reliable selection-endogeneity corrected coefficients. Taking these latter estimates (in Column 4 and 8), we find that financing constraints associate with a 27% reduction in the number of destination countries, and with a 32% reduction in the number of exported products.

5 Financing constraints and product/country switching

In this section we take a dynamic perspective and investigate to what extent firm-level financing constraints play a role in the process of dropping or adding products and destinations. These relations are rarely addressed in previous studies, and never investigated with explicit controls for unobserved heterogeneity, selection and endogeneity.

Product-Country dropping

In examining dropping dynamics we exploit the firm-product and firm-destination dimensions of the data, over time. We define two indicator variables of dropping. For product dropping, the indicator $DropP_{fpt}$ takes value 1 if product p is exported by firm f at time $t - 1$, but not exported in year t , and 0 otherwise. Symmetrically, for destination dropping we define the indicator $DropC_{fct}$, that equals 1 if country c is served by firm f at time $t - 1$, but not served in year t , and 0 otherwise.

Then, we explore the impact of being constrained in one year on the subsequent year probability of dropping products

$$\Pr(DropP_{fpt} = 1) = \gamma FC_{f,t-1} + \beta \mathbf{Z}_{f,t-1} + FE_{fp} + \epsilon_{fpt} \quad (6)$$

or dropping destinations

$$\Pr(DropC_{fct} = 1) = \gamma FC_{f,t-1} + \beta \mathbf{Z}_{f,t-1} + FE_{fc} + \epsilon_{fct} \quad , \quad (7)$$

where \mathbf{Z}_f is our usual set of firm-level controls, and we also include firm-product or firm-country fixed effects, accounting for any time invariant firm-product or firm-destination characteristic that may influence the decision to drop a product or a destination. The analysis only considers those firms who do not drop all their products or withdraw from all the destinations in two consecutive years (surviving firms). This shall avoid confounding factors related to the likely different motivations behind the choice to completely exit from export markets.

Columns 1-4 of Table 3 presents results of the product dropping equation. In column 1 we report marginal effects of Probit estimates, ignoring fixed effects. Then, in column 2, we follow Bernard et al. (2010) and estimate a linear probability model with firm-product fixed effects, so that identification comes from variation within firm and product, across time and destinations. Finally, in columns 3-4 we address selection and endogeneity. Estimates are in this case obtained following Procedure 3.2 presented in Section 3, with the Tobit selection equation involved in step 2 appropriately modified to include firm-product fixed effects.

The findings across the different estimation methods indicate that FC firms are more likely to discard products. FE estimates reveal a downward distortion of POLS estimates. This is consistent with standard omitted variable bias, given the expected negative correlation between product drop and unmeasured firm-product factors (firm ability in a specific product market, for instance), and the likely negative correlation between these factors and being financially constrained. The magnitude of the

Table 3: Product-Country dropping and firm's financial constraints

	Surviving firms <i>DropP_{fpt}</i> Probit (1)	Surviving firms <i>DropP_{fpt}</i> FE (2)	Surviving firms <i>DropP_{fpt}</i> Procedure 3.2* (3)	Surviving firms <i>DropP_{fpt}</i> Procedure 3.2 (4)	Surviving firms <i>DropC_{fct}</i> Probit (5)	Surviving firms <i>DropC_{fct}</i> FE (6)	Surviving firms <i>DropC_{fct}</i> Procedure 3.2* (7)	Surviving firms <i>DropC_{fct}</i> Procedure 3.2 (8)
<i>FC_{f,t-1}</i>	0.035*** (0.005)	0.028** (0.013)	0.036*** (0.004)	0.362*** (0.037)	0.042*** (0.004)	0.036*** (0.008)	0.040*** (0.003)	0.412*** (0.037)
$\ln Empl_{f,t-1}$	-0.003 (0.002)	-0.024*** (0.007)	-0.045*** (0.003)	-0.038*** (0.003)	-0.014*** (0.001)	-0.037*** (0.006)	-0.057*** (0.002)	-0.052*** (0.002)
$\ln Age_{f,t}$	-0.002 (0.001)	0.168*** (0.020)	0.213*** (0.008)	0.236*** (0.009)	0.004*** (0.001)	0.158*** (0.123)	0.064*** (0.006)	0.081*** (0.007)
$\ln ASSETS_{f,t-1}$	-0.013*** (0.002)	-0.097*** (0.013)	-0.112*** (0.004)	-0.106*** (0.004)	-0.013*** (0.001)	-0.079*** (0.009)	-0.108*** (0.003)	-0.093*** (0.003)
$\ln GOM_{f,t-1}$	-0.005*** (0.001)	-0.001 (0.004)	-0.001** (0.000)	0.008*** (0.001)	-0.010*** (0.000)	-0.002** (0.001)	-0.003*** (0.000)	0.007*** (0.001)
$\hat{\epsilon}_2$			0.001** (0.000)	0.001** (0.000)			-0.024*** (0.000)	-0.024*** (0.000)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Product-Firm FE		Yes	Yes	Yes				
Country-Firm FE						Yes	Yes	Yes
R-squared	0.004	0.528	0.539	0.094	0.018	0.558	0.561	0.041
N.Observations	1257193	1257193	1256899	680620	1414292	1414292	1362606	992519

Note: Table reports regression using data on 2001-2003. The regression sample is firms that export at least one product or serve at least one destination in both $t - 1$ and t (Surviving firms). The dependent variable is a dummy indicating a firm-product drop or firm-country drop between $t - 1$ and t . All the regressions include a constant term. Robust standard errors clustered at firm level are reported in parenthesis below the coefficients: in columns 3-4 and 7-8 these are computed out of 200 bootstrap runs. Asterisks denote significance levels (***: $p < 1\%$; **: $p < 5\%$; *: $p < 10\%$). Procedure 3.2* controls only for selection by performing Procedure 3.2 without instruments for $FC_{f,t-1}$.

Table 4: Adding new Products-Country and firm's financial constraints

	Surviving firms <i>AddP_{f,t}</i> Probit (1)	Surviving firms <i>AddP_{f,t}</i> FE (2)	Surviving firms <i>AddP_{f,t}</i> 2SLS-IV (3)	Surviving firms <i>AddC_{f,t}</i> Probit (4)	Surviving firms <i>AddC_{f,t}</i> FE (5)	Surviving firms <i>AddC_{f,t}</i> 2SLS-IV (6)
<i>FC_{f,t-1}</i>	-0.018*** (0.005)	-0.022** (0.007)	-0.024*** (0.006)	-0.021*** (0.006)	-0.015** (0.007)	-0.018** (0.006)
$\ln Empl_{f,t-1}$	0.015*** (0.002)	-0.003 (0.004)	-0.002 (0.002)	0.017*** (0.002)	-0.006* (0.003)	-0.005* (0.002)
$\ln Age_{f,t}$	-0.024*** (0.002)	-0.019*** (0.003)	-0.020*** (0.002)	-0.013*** (0.002)	-0.023*** (0.003)	-0.022*** (0.002)
$\ln ASSETS_{f,t-1}$	0.033*** (0.002)	0.028*** (0.004)	0.029*** (0.003)	0.061*** (0.002)	0.024*** (0.005)	0.024*** (0.003)
$\ln GOM_{f,t-1}$	0.004*** (0.001)	0.002 (0.001)	0.002** (0.001)	0.004*** (0.001)	-0.001 (0.001)	0.001 (0.001)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Product-Mix*Year FE	No	Yes	Yes			
Country-Mix*Year FE				No	Yes	Yes
R-squared	0.035	0.091	0.010	0.062	0.182	0.005
N.Observations	110425	110425	98374	110247	110247	88021
N.Firms	45722	45722	41860	45648	45648	41789

Note: Table reports regression using data on 2001-2003. The regression sample is firms that export at least one product or serve at least one destination in both $t - 1$ and t (surviving firms). The dependent variable is a dummy indicating a firm adding at least a new product or a new destination country between $t - 1$ and t . All the regressions include a constant term. Robust standard errors clustered at product-mix or country-mix level are reported in parenthesis below the coefficients. Asterisks denote significance levels (***: $p < 1\%$; **: $p < 5\%$; *: $p < 10\%$).

effect of FCs is however severely underestimated if we do not control for selection and endogeneity.⁹ Taking the more robust estimates in Column 4, we find that financing constraints increase of 36.2 percentage points the probability of firm-product drop. Given an average drop rate of 42.7% among unconstrained firms, this means that the probability of product dropping is about 85% higher for constrained firms.

Columns 5-8 of Table 3 then show the corresponding findings from the destination dropping equation (7). In this case the main equation includes firm-country fixed effects. In line with results on product dropping, we find that constrained firms have a significantly higher probability to leave a destination market. The main finding does not change if we estimate a Probit, a linear probability model, or a selection-endogeneity corrected model. Taking corrected estimates in column 8, financing constraints increase the probability of country dropping by 41 percentage points. Against an average drop rate of 21.8% among unconstrained firms, this implies that the probability of country drop is almost twice as big as that for constrained firms.¹⁰

Product-Country adding

Differently from the dropping regressions, recording the adding decisions at firm-product or firm-country level is unfeasible. Indeed, it would require to create, for each firm, an observation for each product-country combination present in the dataset at time $t - 1$ (even for transactions not actually performed by the firm), and then to see which of these products or destinations are added at time t . This cannot be managed given the high number of firms, products and destinations in the data. We therefore aggregate the information at the firm level and, following Bernard et al. (2010), we examine the probability that a current exporter adds at least a new product or a new destination to its export portfolio between two consecutive years. We define an indicator of product adding, $AddP_{f,t}$, that takes value 1 if at least one product which was not exported by firm f at time $t - 1$ is exported at time t , and 0 otherwise. Likewise, we construct an indicator of country adding, $AddC_{f,t}$, which equals 1 if at least one new destination is served by firm f at time t , as compared to the set of countries served at time $t - 1$, and 0 otherwise.

⁹Estimated coefficient on IV^{FC} in the first stage of the 2SLS-IV is 0.718, standard error 0.018.

¹⁰Estimated coefficient on IV^{FC} in the first stage of the 2SLS-IV is 0.716, standard error 0.020.

The equations of interest are

$$\Pr(AddP_{f,t} = 1) = \gamma FC_{f,t-1} + \beta \mathbf{Z}_{f,t-1} + FE_{p-mix} \times t + \epsilon_{f,t} \quad (8)$$

for product adding, and

$$\Pr(AddC_{f,t} = 1) = \gamma FC_{f,t-1} + \beta \mathbf{Z}_{f,t-1} + FE_{c-mix} \times t + \epsilon_{f,t} \quad (9)$$

for country adding, where FC is the usual indicator of constrained firms and \mathbf{Z}_f the usual set of firm characteristics. We also include product-mix or country-mix fixed effects (FE_{p-mix} and FE_{c-mix}), interacted with year fixed effects, controlling for common characteristics of those firms that export the same bundle of products or serve the same geographical area in the initial year $t - 1$.¹¹

Since selection does not represent an issue, as indeed adding new markets is equivalent to the entry decision itself, the two equations are estimated via a simple Probit, ignoring fixed effects, and via a linear probability model with appropriate fixed effects. In this second case, we also employ a standard 2SLS-IV estimator to correct for endogeneity of the FC dummy, with usual instrument given by the fitted probabilities IV^{FC} . Symmetrically to the dropping analysis, the regressions are performed on the sub-sample of firms who export at least one product or are active in at least one country in $t - 1$ (surviving firms). This helps to get rid of confounding factors behind a firm's choice to start exporting for the first time.

Columns 1-3 of Table 4 show the results for product adding. The three specifications provide a consistent picture: constrained firms are significantly less likely to add new products than unconstrained firms. Endogeneity-corrected estimates show that the probability of observing a constrained firm that adds at least one product is 2.9% lower than for an unconstrained firm (2.4 percentage points less compared to an average add rate of 84% among unconstrained firms).¹²

The results for country adding are then presented in columns 4-6. The findings fit well with the picture emerged from product adding regressions. We still observe a negative and significant coefficient on the FC dummy: problems to access external finance significantly reduce the ability to widen geographical diversification. According to the endogeneity-corrected estimates, constrained firms have a 2.3% lower probability to add at least one destination (1.8 percentage points lower compared to an average add rate of 78% among unconstrained firms).¹³

6 Financing constraints and export prices

We now turn to the association of financing constraints with export prices exploiting our dataset at the transaction level. Labeling with UV_{fpc} the (log of the) unit value of export by firm f in product p to country c , we estimate the model

$$UV_{fpc,t} = \gamma FC_{f,t-1} + \beta \mathbf{Z}_{f,t-1} + FE_{pc} + \epsilon_{fpc,t} \quad , \quad (10)$$

where FC_f is the usual dummy for constrained firms, \mathbf{Z}_f the usual set of firm-level controls, and we also include product-country fixed effects, FE_{pc} . This greatly helps identification, as it indeed implies that we ask whether financing constraints influence price variation across firms performing the same product-country transactions.

¹¹Product-mixes are defined as the main sections of the HS classification. Country-mixes aggregate countries into the geo-economic areas defined by the European Commission (see <http://www.coeweb.istat.it/english/default.htm>). The US, Canada, Japan, Brazil, India, China and major European countries are each treated as independent geographical destinations.

¹²Estimated coefficient on IV^{FC} in the first stage of the 2SLS-IV is 1.409 with a standard error of 0.047.

¹³Estimated coefficient on IV^{FC} in the first stage of the 2SLS-IV is 1.321 with a standard error of 0.042.

Table 5: Financial constraints and price setting at transaction level

	$\ln UV_{fpct}$ FE (1)	$\ln UV_{fpct}$ Procedure 3.2* (2)	$\ln UV_{fpct}$ Procedure 3.2 (3)	$\ln UV Imp_{fpct}$ FE (4)
$FC_{f,t-1}$	0.094*** (0.033)	0.102*** (0.040)	0.537** (0.200)	0.022 (0.020)
$\ln Empl_{f,t-1}$	0.060*** (0.009)	0.062*** (0.013)	0.060*** (0.015)	0.039*** (0.006)
$\ln Age_{f,t}$	-0.005 (0.009)	-0.005 (0.014)	0.016 (0.018)	0.010 (0.006)
$\ln ASSETS_{f,t-1}$	-0.048*** (0.009)	-0.055*** (0.013)	-0.070*** (0.015)	0.009 (0.006)
$\ln GOM_{f,t-1}$	-0.004 (0.003)	-0.004 (0.004)	0.011 (0.008)	-0.006** (0.003)
$\hat{\epsilon}_{2fpct,t}$		-0.010*** (0.003)	-0.010*** (0.003)	
$avg \ln UV_f$				0.182*** (0.006)
Year FE	Yes	Yes	Yes	Yes
Country-Product FE	Yes	Yes	Yes	Yes
R-squared	0.684			0.740
N.Observations	4374164		See note	806363
N.Firms	53103			29891
N.Product-country groups	271193			56222

Note: Table reports regression using data on 2001-2003. The dependent variable is reported at the top of each column. All the regressions include a constant term. Robust standard errors clustered at firm level are reported in parenthesis below the coefficients. Estimates in columns 2-3 are computed via 200 replications of a 10% random panel subsample from the original dataset. Asterisks denote significance levels (***: $p < 1\%$; **: $p < 5\%$; *: $p < 10\%$). Procedure 3.2* controls only for selection by performing Procedure 3.2 without instruments for $FC_{f,t-1}$.

In Table 5 we report simple FE estimates, and control for selection and endogeneity bias via the Procedure 3.2 described in Section 3. However, due to the unmanageable computer memory requirements implied by the size of the transaction level dataset, estimates are obtained through a re-sampling procedure, in which we perform random extraction (with replacement) of 200 panel subsamples, each including 10% of the firms from the original dataset. FE estimates reveal that, conditional on other factors, constrained firms charge higher prices (an increase of 9.4%) than unconstrained firms. The results are confirmed when we control for selection and endogeneity bias. However, the estimates in column 3 reveal a downward bias in the FE results: the corrected coefficient on the FC dummy implies that constrained firms set export prices about 54% higher as compared to unconstrained firms.

A joint reading of these findings with the results from previous sections opens up different interpretations for the pricing behavior of constrained firms. The combination of lower export values with higher prices is consistent with a pure efficiency sorting interpretation, where FC firms set higher prices because they operate at lower efficiency (i.e. at higher marginal cost). Also, the findings may be in line with a strategic pricing explanations, with constrained firms that keep prices high in the attempt to offset the negative impact on revenues due to reduced export activity, at least partially exploiting demand rigidities. The results are instead difficult to reconcile with models of quality sorting, which would predict that constrained firms reduce both quantities and prices as compared to unconstrained firms.

Since export prices only represent an indirect signal of quality, we complement the analysis to check if firms who set higher export prices also purchase more costly inputs. The price of inputs is not usually available in standard industrial data. Here, however, we can exploit the transaction level prices of imports in intermediate goods to approximate the overall input prices. We run the following regression

$$\ln UVImp_{pc,t} = \gamma FC_{f,t-1} + \delta Avg \ln UV_{f,t} + \beta \mathbf{Z}_{f,t-1} + FE_{pc} + \epsilon_{fpct} \quad , \quad (11)$$

where we consider the unit value of import in product p from origin country c , $UVImp$, only for those transactions in products that fall into the intermediate input category identified by CEPII-BACI classification system (Gaulier and Zignago, 2010). Since one cannot know which particular imported input is used to produce a specific exported product, the correlation with export prices is explored by the average unit value of exports across products and destinations, $Avg \ln UV$. Following Manova and Zhang (2012), average unit value of export is computed as the average of the unit values of all the export (product-destination) transactions of a firm (in logs), de-means by their product specific averages (i.e. across firms and destinations) and weighted by the share of each transaction in the overall export revenues of a firm. With product-country fixed effects, we control for characteristics of each imported good that are common within each origin country. The identification comes therefore from variation across firms that purchase the same inputs from the same country.

The results (see column 4 in Table 5) show that quality may play a role in the data, as indeed we find a positive association between export and input prices. However, controlling for the correlation with export prices and other firm characteristics, the price of imported inputs does not have any significant association with financing constraints. This corroborates that pricing decisions of constrained firms do not reflect quality issues.

7 Conclusions

The present paper provides a comprehensive analysis of the role that financial constraints play in shaping firms' export performance. We use detailed firm-product-country data on the international activities of a sample of firms covering the vast majority of Italian exports. Exploiting the information on access to credit measured via credit ratings provided by an independent institution, we extend the existing literature in a number of directions.

First, we find that financially constrained firms export less in value, conditional on entry, and that they serve fewer countries and ship a narrower range of products. Contraction in the intensive margin suggests that access to external credit is relevant in the financing of both fixed and variables costs of exporting. At the same time, reduced activity of constrained firms along product/country extensive margins hints at the existence of relevant country-specific and product-specific fixed costs, which indeed limit the scope of geographical and product diversification. These findings confirm previous evidence. However, by fully controlling for selection and possible endogeneity of financial constraints, we show that the effects of FCs are large, and in generally larger than what estimated when corrections are not taken into account.

Second, by taking a dynamic perspective, we address the largely unexplored question whether financing constraints play a role in the dynamic adjustments in product/destination scope of multi-product/multi-destination firms over time. We find that financing constraints increase the probability to drop products or destinations, and decrease the probability to add new products or new destinations. More generally, therefore, financing constraints tend to hamper an effective reallocation of resources from (product or destination) markets that over time become less profitable to markets that becomes more profitable. As above, specific treatment of selection into export and possible endogeneity of the financing constraint proxy reveal that these effects are sizable.

Finally, this is the first paper documenting the interplay between firm-level credit conditions and export prices. We show that, once again controlling for selection and endogeneity, constrained firms set higher prices as compared to unconstrained firms who perform transactions in the same product to the same destination market. The finding is consistent with models of efficiency sorting, where constrained firms are predicted to sell at higher prices due to low efficiency, and also in line with the idea that prices are indeed a strategic variable that constrained firms adjust in the hope to keep

operations and to sustain revenues. Our evidence seems instead to contrast with theories of quality sorting into export. Since quality is costly, one would expect that constrained firms reduce prices as compared to unconstrained firms, but we observe just the opposite.

References

- ALMEIDA, H., M. CAMPELLO, AND M. S. WEISBACH (2004): “The Cash Flow Sensitivity of Cash,” *Journal of Finance*, 59, 1777–1804.
- ASKENAZY, P., A. CALDERA, G. GAULIER, AND D. IRAC (2011): “Financial Constraints and Foreign Market Entries or Exits: Firm-Level Evidence from France,” Working papers 328, Banque de France.
- BASTOS, P. AND J. SILVA (2010): “The quality of a firm’s exports: Where you export to matters,” *Journal of International Economics*, 82, 99–111.
- BELLONE, F., P. MUSSO, L. NESTA, AND S. SCHIAVO (2010): “Financial Constraints and Firm Export Behaviour,” *The World Economy*, 33, 347–373.
- BERMAN, N. AND J. HRICOURT (2010): “Financial factors and the margins of trade: Evidence from cross-country firm-level data,” *Journal of Development Economics*, 93, 206–217.
- BERNARD, A. B. AND J. B. JENSEN (2004): “Why Some Firms Export,” *The Review of Economics and Statistics*, 86, 561–569.
- BERNARD, A. B., J. B. JENSEN, S. J. REDDING, AND P. K. SCHOTT (2011): “The Empirics of Firm Heterogeneity and International Trade,” NBER Working Papers 17627, National Bureau of Economic Research, Inc.
- BERNARD, A. B., S. J. REDDING, AND P. K. SCHOTT (2010): “Multiple-Product Firms and Product Switching,” *American Economic Review*, 100, 70–97.
- BOTTAZZI, G., M. GRAZZI, A. SECCHI, AND F. TAMAGNI (2011): “Financial and Economic Determinants of Firm Default,” *Journal of Evolutionary Economics*, 21, 373–406.
- BOTTAZZI, G., A. SECCHI, AND F. TAMAGNI (2008): “Productivity, Profitability and Financial performance,” *Industrial and Corporate Change*, 17, 711–751.
- (2010): “Financial constraints and firm dynamics,” Dse working paper, 2010/99, Department of Economics, University of Pisa, Italy.
- CHANEY, T. (2005): “Liquidity constrained exporters,” mimeo, University of Chicago.
- CLEARY, S. (1999): “The relationship between firm investment and financial status,” *The Journal of Finance*, 54, 673–692.
- DASGUPTA, S. AND S. TITMAN (1998): “Pricing Strategy and Financial Policy,” *Review of Financial Studies*, 11, 705–37.
- FEENSTRA, R. C., Z. LI, AND M. YU (2011): “Exports and Credit Constraints Under Incomplete Information: Theory and Evidence from China,” NBER Working Papers 16940, National Bureau of Economic Research, Inc.
- GAGNON, J. E. (1989): “Adjustment costs and international trade dynamics,” *Journal of International Economics*, 26, 327–344.
- GAULIER, G. AND S. ZIGNAGO (2010): “BACI: International Trade Database at the Product-Level. The 1994-2007 Version,” Working Papers 2010-23, CEPII research center.

- GOTTFRIES, N. (2002): “Market Shares, Financial Constraints and Pricing Behaviour in the Export Market,” *Economica*, 69, 583–607.
- GREENAWAY, D., A. GUARIGLIA, AND R. KNELLER (2007): “Financial factors and exporting decisions,” *Journal of International Economics*, 73, 377–395.
- GUISSO, L., P. SAPIENZA, AND L. ZINGALES (2004): “Does Local Financial Development Matter?” *The Quarterly Journal of Economics*, 119, 929–969.
- KNELLER, R. AND Z. YU (2008): “Quality Selection, Chinese Exports and Theories of Heterogeneous Firm Trade,” Research Papers 488, University of Nottingham, GEP.
- KUGLER, M. AND E. VERHOOGEN (2012): “Prices, Plant Size and Product Quality,” *Review of Economic Studies*, 79, 307–339.
- LAMONT, O., C. POLK, AND J. SAAÁ-REQUEJO (2001): “Financial constraints and stock returns,” *The Review of Financial Studies*, 14, 529–554.
- LI, Z. AND M. YU (2009): “Exports, Productivity, and Credit Constraints: A Firm-Level Empirical Investigation of China,” Global COE Hi-Stat Discussion Paper Series gd09-098, Institute of Economic Research, Hitotsubashi University.
- LUNDIN, M., N. GOTTFRIES, C. BUCHT, AND T. LINDSTRM (2009): “Price and Investment Dynamics: Theory and Plant-Level Data,” *Journal of Money, Credit and Banking*, 41, 907–934.
- MANOVA, K. (2011): “Credit Constraints, Heterogeneous Firms, and International Trade,” Unpublished, Stanford University.
- MANOVA, K., S.-J. WEI, AND Z. ZHANG (2011): “Firm Exports and Multinational Activity Under Credit Constraints,” NBER Working Papers 16905, National Bureau of Economic Research, Inc.
- MANOVA, K. AND Z. ZHANG (2012): “Export Prices across Firms and Destinations,” *Quarterly Journal of Economics*, 127, 379–436.
- MAYER, T. AND S. ZIGNAGO (2005): “Market access in global and regional trade,” Working paper, 2005/02, CEPII research center.
- MELITZ, M. J. (2003): “The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity,” *Econometrica*, 71, 1695–1725.
- MELITZ, M. J. AND G. I. P. OTTAVIANO (2008): “Market Size, Trade, and Productivity,” *Review of Economic Studies*, 75, 295–316.
- MINETTI, R. AND S. C. ZHU (2011): “Credit constraints and firm export: microeconomic evidence from Italy,” *Journal of International Economics*, 83, 109–125.
- MUULS, M. (2008): “Exporters and Credit Constraints. A Firm-Level Approach,” Working Paper Research 2008-139, National Bank of Belgium.
- PANETTA, F., F. SCHIVARDI, AND M. SHUM (2009): “Do mergers improve information? Evidence from the loan market,” *Journal of Money, Credit and Banking*, 41, 673–709.
- PHELPS, E. S. AND S. G. WINTER (1991): “Optimal Price Policy under Atomistic Competition,” in *Microeconomic Foundations of Employment and Inflation Theory*, ed. by E. S. Phelps, New York : Norton.

- PICHLER, P., A. STOMPER, AND C. ZULEHNER (2008): “Why Leverage Affects Pricing,” *Review of Financial Studies*, 21, 1733–1765.
- SEMYKINA, A. AND J. M. WOOLDRIDGE (2010): “Estimating panel data models in the presence of endogeneity and selection,” *Journal of Econometrics*, 157, 375–380.
- WOOLDRIDGE, J. M. (2010): *Econometric Analysis of Cross Section and Panel Data*, Cambridge, MA: The MIT Press.