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2013-13/September 2013

Document de travail

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Firms' Leverage and Export Quality: Evidence from France*

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This version: August 2013

Abstract

Is corporate financial structure a determinant of non-price competitiveness in export markets? In this paper we provide a positive answer to this question by finding that among illiquid exporters leverage is negatively correlated with the quality of their exported goods. This result is obtained on a sample including over 120,000 export flows of 6,229 French firms exporting within six HS6 products categories. The main methodological contribution of our study is the use of a flow-level measure of export quality obtained from the estimation of a structural model of demand (Berry, 1994); this estimator enhance the validity of our approach by avoiding the drawbacks of proxying for quality using export prices, as it is common practice in the trade literature. We argue that the negative impact of leverage on quality is consistent with theoretical contributions in the financial literature predicting a negative impact of debt financing on firms' incentive to undertake quality upgrading investments.

1 Introduction

In contrast to the Modigliani-Miller theorem (Modigliani and Miller, 1958) a number of empirical papers questions the irrelevance of the corporate financial structure for firms' real activities, by showing that leverage affects investment patterns and productivity growth (e.g. Aivazian et al., 2005; Nucci et al., 2005; Nunes et al., 2007; Coricelli et al., 2012). These findings from the financial literature are paralleled by the evidence emerging from studies on firms' heterogeneous export performance. Models of export behavior in which credit constraints prevent illiquid firms from sizing profitable export opportunities (Manova, 2008; Chaney, 2013), have motivated several analyses on the role of firms' financial attributes in determining export entry and success on foreign markets (Greenaway et al., 2007; Bellone et al., 2010; Askenazy et al., 2011; Minetti and Zhu, 2011). Although the direction of causality between firms' export status and their financial attributes is a matter of debate, the conclusions of these papers

*The authors would like to thank Stefano Schiavo, Jaanika Merikull, Lucia Tajoli, and all the participants to the EACES and the ITSG workshops for their helpful comments and suggestions.

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suggest that firms' liquidity and financial structure differ significantly between exporters and non-exporters.

The supporters of the hypothesis that financial factors are determinants of firms heterogenous export performance have generally interpreted high debt-to-asset ratios as an indication of firms' financial constraints. Since debt overhang is expected to impede firms' ability to access external funds, the negative impact of higher leverage on export entry is believed to reflect the incapacity of highly leveraged firms to finance externally the fixed entry costs of export. However, recent advancements in the trade literature suggest that in addition to the capacity of paying for fixed entry costs, firms' ability to produce higher quality products is an important determinant of their selection into exporting and a major driver of their success in foreign markets. Iacovone and Javorcik (2008) and Kugler and Verhoogen (2012) find convincing evidence that Mexican firms invest in quality upgrading in preparation to exporting, and a series of papers using data on firm-level export flows find that exporters of more expensive varieties reach more distant destinations and realize higher revenues (Bastos and Silva, 2010; Crozet et al., 2011; Manova and Zhang, 2012). Hence, the relevance of financial factors for firms' export performance may be due to the fact that firms' financial structure affects their ability (or choice) to produce higher quality products.

This paper explores the finance-quality channel by investigating whether firms' leverage is a determinant of quality heterogeneity across exported varieties. Our hypothesis stems from the predictions of models in the financial literature showing how firms' recourse to debt financing may eventually affect their costs and incentives to invest in quality enhancing activities (Long and Malitz, 1985; Maksimovic and Titman, 1991). We base our empirical analysis on firm-level export and and balance sheet data provided respectively by the French Customs and by the French National Statistical Office (INSEE). These data are used to obtain an estimator of quality for over 120,000 individual export flows, six HS6 consumer products, and 6,229 French exporters. The novel result of this study is that leverage affects negatively firms' ability to compete on foreign market through quality. However, this result holds only for 'illiquid' exporters, whose working capital is insufficient to cover all their operating costs. This evidence signals that leverage has a differential impact on firms' real activities depending on whether debt financing is an optimizing choice for the firm (Jensen and Meckling, 1976), or a forced solution to compensate for insufficient internal resources (Myers, 1984).

A major methodological contribution of our paper is that we adopt a discrete choice model of consumer demand (Berry, 1994; Khandelwal, 2010) to estimate quality at the level of individual firms' export flows. In the trade literature, price differences across similar products have been used to identify differences in quality[1]. However, this strategy is not a viable alter-

[1]In turn, exported products' prices are proxied by the unit-values of individual export flows, and unit-values

native to study the impact of firms' leverage on quality. If high leverage is both detrimental to firms' productivity and quality, its net effect on prices would be ambiguous: firms with higher leverage may set relatively higher export prices because they are relatively less efficient. This effect would be confounded as a sign of superior quality if we proxy quality with prices. Our estimator of quality avoids this concern as it measures products' demand left unexplained by their relative prices. Arguably our results are based on a small sample drawn from of the population of French exporters. This limitation of the study stems from methodological issues related to the estimation of export quality. However, we show that the results obtained on the small sample are consistent with some regularities between exporters' financial characteristics and export prices that emerge from the entire dataset of export flows.

Quality estimates are regressed on firms' leverage and other firm-level covariates using three different estimators that exploit different sources of variation in leverage and export quality. First, we present estimates obtained from pooled OLS models that include a full set of product-destination fixed effects. In these models, identification relies on variations across firms exporting the same CN8 product to the same destination. Given the time-persistence of leverage and quality (i.e. aspects such as branding are not expected to vary greatly over time) this estimator would appear as the most appropriate. However, firm-level omitted variables affecting financial structure and product quality are a major concern when exploiting cross-sectional variations. To deal with this issue we check the robustness of the results by adopting FE models and IV-FE models that control for firm-level time invariant factors and simultaneity between leverage and quality. The significant negative relationship between leverage and quality is robust to the use of different estimation techniques.

To the best of our knowledge the only other paper that investigates explicitly financial factors in relation to export quality is Fan et al. (2012). These authors present a model in which credit rationing has an ambiguous effect on export prices, and they find that exporters based in Chinese provinces with higher loans to GDP ratio export more expensive varieties, while firms operating in 2-digit ISIC industries with higher financial dependence export cheaper products. Methodologically, we distinguish our contribution from the work of these authors by using a firm-level measure of leverage instead of industry- and regional-level regressors that are more likely to capture structural differences across provinces and industries than firm heterogeneity. In addition, although Fan et al. (2012) obtain a quality estimator similar to the one that we use, our approach to the structural estimation of the discrete choice model of demand differs from their one as we deal with endogeneity through IV, and as we allow the demand parameters to vary across different HS6 product categories.

The rest of the paper is structured as it follows. Section 2 introduces the conceptual

are obtained by dividing the values of exported products by their quantities.

framework underpinning our hypotheses. Section 3 describes the data, and it presents cursory evidence on exporters' attributes and exported varieties' prices. Section 4 introduces the methodology we adopt to obtain an estimator of quality. Section 5 presents the empirical model of export quality and leverage and the main results. Section 6 concludes.

2 Conceptual framework

The Modigliani-Miller theorem states that firms' financial structure is irrelevant for the value of the firm (Modigliani and Miller, 1958). This proposition has been questioned by a large theoretical literature that demonstrates how information asymmetries and imperfect capital markets may affect firms' access to different sources of external financing, their cost of capital and ultimately their value. It follows, that the observed financial structure of the firm may not be the one that optimizes its current and future profitability.

Myers and Majluf (1984) look into information asymmetries between insiders (i.e. manager and current shareholders) and outsiders (i.e. potential buyers of firms' shares) to explain the observed pecking order pattern of firms' financing; firms finance their expenses by first using internal resources, when internal finance is insufficient they use debt, and as a last resort they issue new equities. They show that if the real value of shares is private information of the manager, it is in the interest of insiders to issue new shares only if the market valuation of the firm is above its real value. By anticipating this behavior, the demand of outside investors falls short of firms' financing needs unless they expect shares to be issued in the absence of less expensive sources of financing. This problem may oblige managers to finance investment through debt, even if this source of financing does not lead to an optimal investment policy.

Indeed, in the absence of conflicting interests between managers and current shareholders, Long and Malitz (1985) show how debt financing may cause underinvestment when investors face uncertainty regarding the future 'state of the world'. Investment increases firm's revenues in all 'states of the world'. In 'good states of the word' the firm realizes sufficient revenues to repay its debt and shareholders are residual claimants. On the contrary, in 'bad states of the word' shareholders cede all the revenues of the firm as a partial repayment of its debt to bondholders. Intuitively, if the manager acts in the interest of shareholders underinvestment is determined by the different extent to which investment increases the expected returns for shareholders and bondholders in the 'bad states of the world': bondholders benefit from investment as they might expect to recover a greater part of their loan, while shareholders do not benefit at all. This asymmetry creates an incentive problem and causes more leveraged firms to invest less than optimally. In addition, the distortion is accentuated if lenders anticipate borrowers' underinvestment and charge higher costs for credit because they expect to

recover a smaller part of the loan in 'bad states of the world'.

The paper of Long and Malitz provides an additional insight that leads to our hypothesis of a negative effect of leverage on quality. Indeed, their model predicts that more firm-specific intangible investment such as advertisement and R&D are more prone to agency problems because lenders find it more difficult to monitor managers' use of resources. Hence, greater specificity implies higher 'agency costs' of debt. Therefore, they argue that firms that resort more intensively to debt financing have a relative disadvantage in undertaking intangible investment. They find empirical support for this prediction analyzing US firms' patterns of investment and financing. Hence, this paper suggests that underinvestment due to debt financing affects more seriously activities directly related with quality upgrading or with consumers' perception of product quality.

An alternative explanation for the negative relationship between leverage and quality is provided by Maksimovic and Titman (1991). They present a model in which firms' investment in product quality is undertaken to build up a 'reputation capital' that allows to charge higher prices in the future. High leverage increases the probability of future bankruptcy, and it shortens firms' optimization horizon. In turn, leverage causes lower present investment in quality. In addition, highly leveraged firms that face an immediate threat of bankruptcy may reduce quality (if this reduces costs) to sustain cash flow and pay back lenders. In the words of the authors, this strategy of the firm is equivalent to "obtaining an involuntary loan from consumers, since the reduction in future revenues resulting from the loss or reputation corresponds to the repayment" (Maksimovic and Titman, 1991, pag. 117). By analyzing inventory shortfalls as a measure of quality in the supermarket industry, Matsa (2011) brings empirical support for this hypothesis, as he finds that highly leveraged firms degrade their product quality (i.e. more frequent shortfalls) to preserve cash flow for debt servicing.

The literature that have been surveyed up to this point stresses the costs and distortions introduced by debt financing, and the reasons why illiquid firms may be forced into adopting a highly leveraged financial structure that constraints their investment behavior. However, the 'trade-off theory' of corporate financial structure provides reasons why debt financing could also enhance firms' value. Debt financing may eventually increase investment if the tax shield function of debt (i.e. the possibility of discounting interest rate payments from taxable profits) increases the net present value of investment opportunities. Jensen and Meckling (1976) also show how in the presence of conflicts between managers and owners, debt is a 'disciplinary device' through which owners control managers, because interest rate payments reduce firms' free cash-flow at the disposal of managers for unprofitable discretionary spending. This insights suggests that for some firms high leverage is an optimal choice, and we should not expect their competitiveness to be affected negatively by their levels of debt. Drawing

from these theories, we expect that the relationship between leverage and quality would be mediated by two opposite channels leading to the hypotheses that we test with French data:

Hyp 1: exporters with high levels of debt over total assets are relatively disadvantaged or less incentivized in undertaking quality enhancing activities, and we expect them to export worse quality varieties.

Hyp 2: For some firms the beneficial effects of debt offset the distortions induced by this source of financing. For these firms a highly leveraged financial structure does not necessarily affect product quality.

3 Data and general statistics

3.1 The FICUS and the Customs datasets

Our empirical analysis is conducted on data obtained from two sources: the *Fichier complet de Système Unifié de Statistique d'Entreprises* (FICUS) provided by the French National Statistical Office (INSEE), and the French Customs Dataset. FICUS reports balance sheet items and demographic information, covering the population of French firms. We have access to annual files relative to the period 1997-2007. After appending these files, the resulting firm-year panel dataset includes over two million observations for the manufacturing sector. Leverage of firm f at time t (Lev_{ft}) is constructed using FICUS variables as the book value of debt over total assets. FICUS includes also information on firms' age, ownership, employment, assets, liquidity and their need for external financing. We use these information to construct firm-level controls. Outliers are eliminated by replacing to missing observations below the 1st or above the 99th percentiles of each variable's distribution.

The Custom database reports export values (euros), quantities (kilograms), destinations and product classes (CN8) of the export flows of French firms. This dataset excludes the flows of small exporters because firms that export less than €1,000 outside the EU, or less then €100,000 within the EU, are not required to fill in a complete declarations of their transactions. The different thresholds for reporting would be a problem if we were to investigate firms' characteristics in relation to their export destinations. However, this is not a concern for our identification strategy as we investigate differences across exporters serving the same market, or variations in quality over time for the same exported variety defined at the firm-product-destination level. Because some product categories change CN8 product code over time, we use tables provided by Eurostat to concord the classification to the 2007 version.

Customs data are used to construct unit-values of exported varieties as flow values divided by quantities $UV_{fpd} = \frac{val_{fpd}}{qty_{fpd}}$, where f, p, d are indices for firm, CN8 product and export

destination. Unit-values are common proxy for prices in the literature despite numerous flaws that have been exposed since the paper of Kravis and Lipsey (1971), and more recently highlighted by Silver (2007). Caveats for using unit-values to compare the prices of different varieties are particularly serious when products are weakly homogenous, nevertheless the 8-digit level of product disaggregation lessens this flaw. In addition, unit-values are very noisy proxies for export prices because measurement errors in quantities determine extreme variations. To mitigate this issue we drop observations outside the 0.5% extreme percentiles of the unit-value distribution within each CN8 product category, and export flows with extreme unit-value variations from one year to the following (above and below the 1% percentiles). Unit-values and market shares of exported varieties are sufficient information to estimate quality according to the methodology that is explained in the following sections.

A nice feature of the FICUS and the Customs datasets is that they both identify firms through the same fiscal identification codes (SIREN). Therefore, we can associate individual trade flows in Customs to the firm-level variables that we observe in FICUS, in order to investigate the quality of exported varieties in relation to exporters' attributes.

3.2 Some cursory evidence from the Customs dataset

Despite our analysis on export quality and leverage is conducted on a small sample of HS6 products, in this section we exploit the entire Customs dataset to obtain some stylized but suggesting evidence on the relationship between exporters' characteristics and quality. We propose a simple empirical exercise that highlights some differences between firms exporting varieties with different prices within the same HS6 product class.

First, each export flow is associated with a price quartile according to the position of its demeaned unit-value in the unit-value distribution of the corresponding HS6 product category[2]. Firm-level variables listed in table 1 are then regressed on the set of dummies identifying the different price quartiles. Results are reported in Table 2. Column 1 in the table reports estimates for the constants. These estimates should be interpreted as the mean values of the dependent variables (each firm-level indicator) when they are computed over the group of firms exporting the cheapest varieties (first quartile of the price distribution). The remaining columns show how the mean values of the dependent variables differ from the ones computed on the first group, for firms exporting within the second (column 2), the third (column 3), and the fourth (column 4) quartile of the price distribution

Firms exporting more expensive varieties are found to be older and larger in terms of

[2]Demeaned unit-values are obtained by subtracting to the unit-value of each variety the mean unit-value computed over all varieties exported to the same destination in the same year within the same HS6 product class.

Table 1: Variables definition

Name	Definition	FICUS name
Age	Firm age since the administrative creation date	based on datcr
Employee	Total Employment	effsalm in thousand
Assets	Sum of Tangible assets and untangible assets	tactint
Cash Flow	Gross Operating income over total assets	ebe/TA[a]
Profit	Profit before taxes over total assets	pbcai/TA
Wage	Average wage per employee	saltrai / effsalm
Labor Productivity	Value added over employees	vaht / effsalm
Inv. Rate Tangible	Physical Investment over total assets	invcorp/TA
Inv. Rate Intangible	Untangible Investment over total assets	(invavap - invcorp) /TA
Collateral	Tangible Assets over total assets	immocor / TA
Intangible	Intangible assets over total assets	immoin /TA
Leverage	Debt over total assets	empdett / TA
Liquidity	Cash minus need in cash over total assets	(FDR - BFDR)/TA

[a] Variable is divided by the total assets of the previous year.

employment and total assets. They have also higher profitability and cash flows. They distribute higher wages and display a larger labor productivity, and these differences are stronger for firms exporting within the upper quartile. Their rates of tangible investment are slightly and significantly lower, while they invest more in intangibles[3]. Consistently with our hypothesis regarding a negative impact of leverage on quality we find that firms exporting more expensive varieties have also lower levels of debt, higher cash flow but lower liquidity. This evidence might signal that these firms generate more internal resources but have also greater financing needs.

These descriptive statistics dismiss the hypothesis that higher prices are associated with weaker exporters in terms of size, efficiency and financial attributes and they suggest that quality matters more the cost-competitiveness for French exporters' performance. In addition, the preliminary evidence on unit-values and firms' leverage calls for a more formal test on the relationship between exporters' financial structure and export quality.

[3]Investment in intangibles includes advertising, R&D, software and market research.

Table 2: Average value of firm-level variables conditional by quartiles of exported varieties' unit-values

	Constant	Q2	Q3	Q4	Obs.
	(1)	(2)	(3)	(4)	
Age	25.98***	2.600***	3.005***	3.364***	2,341,228
Employee	319.4***	81.34***	103.9***	173.1***	2,511,199
Assets	83184.5***	31714.6***	40966.7***	71770.9***	2,513,179
Cash Flow	0.108***	0,000343	0.00101***	0.00147***	2,263,998
Profit	0.0941***	0.00124***	0.00216***	0.00389***	2,267,352
Wage	27.78***	0.348***	0.991***	2.248***	2,485,756
Labor prod.	58.37***	1.657***	3.223***	6.212***	2,485,823
Invest. rate intangible	0.00607***	-0.000577***	-0.000224***	0.0000912**	2,275,653
Invest. rate tangible	0.0379***	-0.00210***	-0.00287***	-0.00296***	2,283,284
Leverage	0.166***	-0.00232***	-0.00266***	-0.00379***	2,290,526
Collateral	0.411***	-0.0136***	-0.0199***	-0.0286***	2,592,876
Intangible Assets	0.0571***	-0.000611***	0.000914***	0.00334***	2,290,468
Liquidity	0.0714***	-0.00310***	-0.00381***	-0.00433***	2,187,555

HS6 product class fixed effects are included in each regression

4 The discrete choice model of demand

4.1 Theory

This section describes the discrete choice model of demand introduced by Berry (1994), and how we obtain a proxy of export quality by estimating this model with French Customs data. The central idea of this model consists in inverting the demand function so that to infer from aggregate market information the mean utility level that each variety of a differentiated product accrues to consumers. The model imposes some structure on demand by assuming that each individual i consumes only the variety j that delivers the greatest utility:

$$u_{ij} > u_{ik} \quad \forall \quad k \in K \tag{1}$$

where K is a product class encompassing all varieties sharing some degree of substitutability. The set K is composed by one or more 'nests', that are groups of varieties (indexed by g) characterized by greater substitutability among each others[4]. To allow for the nested structure

[4]For example, K may include all varieties of men shirts on the market. Although consumers can always substitute one variety for another in K, they are more likely to substitute shirts of the same material (belonging to the same nest g within K).

of K, consumers' utility is modeled according to the following specification (Mcfadden, 1974):

$$\begin{aligned} u_{ij} &= \delta_j + \zeta_{ig} + (1-\sigma)\epsilon_{ij} \quad , \quad 0 \leq \sigma < 1 \\ \delta_j &= X_j'\beta + \alpha p_j + \zeta_j \quad , \quad \alpha \leq 0 \end{aligned} \tag{2}$$

where δ_j is the expected utility from the consumption of j. This depends on vectors of product attributes X_j and parameters β, on price p_j and on product quality ζ_j. The terms ζ_{ig} and ϵ_{ij} are consumers' deviations from the mean utility δ_j that are determined respectively by heterogeneous preferences across consumers for different nests of varieties, and across varieties belonging to the same nest. The within-group substitutability parameter σ determines the extent to which different consumers agree on the utility they derive from choosing j. Eventually, the negative parameter α captures the disutility of price that is common across consumers.

By assuming that idiosyncratic deviations in preferences ϵ_{ij} follow a Type I extreme-value distribution, utility function 2 originates the following nested logit model:

$$s_j = \frac{e^{\delta_j/(1-\sigma)}}{[\sum_{k\in g} e^{\delta_k/(1-\sigma)}]^{\sigma} \times \sum_{g\in K}[\sum_{k\in g} e^{\delta_k/(1-\sigma)}]^{(1-\sigma)}} \tag{3}$$

where s_j is the market share of variety j. This can be seen as the aggregate realization of individual consumers' choices, when the probability that consumer i chooses variety j over any other alternative in K is increasing in the relative utility delivered by j compared to the competing varieties. Berry shows that the log difference between s_j and the market share s_o of an outside variety can be conveniently written in a linear form[5]:

$$ln(s_j) - ln(s_o) = X_j'\beta + \alpha p_j + \sigma ln(s_{j/g}) + \zeta_j \tag{4}$$

where $ln(s_j) - ln(s_o)$ is the normalized share of variety j measured over the total market of product class K. On the contrary, the 'nest share' $s_{j/g}$ is the share of variety j measured over the market for nest g to which that variety belongs. From the last equation we can obtain an estimator of product quality Q_j as:

$$\begin{aligned} Q_j &= [ln(s_j) - ln(s_o)] - [\alpha p_j + \sigma ln(s_{j/g})] \\ Q_j &\equiv X_j'\beta + \zeta_j \end{aligned} \tag{5}$$

Equation 5 shows that an estimator of quality can be obtained as the normalized market share of a variety that is not explained by its price and its nest-share. This residual component is the part of demand for variety j that is accounted for by product characteristics (X_j),

[5]Ideally, the outside variety is a variety whose price and quality is uncorrelated with the price and quality of the varieties whose market shares are normalized (Nevo, 2000).

consumers' taste (β) and a 'brand' component ζ_j. Admittedly, Q_j should be given a broad definition of quality encompassing different products' aspects such as: closeness to consumers' taste, quality of the materials, design and consumers' appreciation for the brand. Nevertheless this proxy fits our research question as we aim to determine whether firms' leverage inhibits activities such as market research, advertisement, product development that would allow them to enhance their non-price competitiveness on foreign markets.

4.2 Identification strategy

We bring the model to the data by defining each export flow (fpd) observed in the Customs dataset as an exported variety, and K as the set of all varieties that belong to the same 6-digit product class. Nests within K are groups of products belonging to the same 8-digit product class. At time t the market share of each individual variety within a destination market is defined as $s_{fpdt} = \frac{q_{fpdt}}{MKT_{dt}}$, where the numerator is the exported quantity (in Kg) of variety fpd, and MKT_{dt} is the aggregate quantity demanded by consumers in country d for all varieties belonging to the same 6-digit class. The nest share is defined instead as $ns_{fpdt} = \frac{q_{fpdt}}{MKT_{pdt}}$, where the denominator is the volume in market d of all varieties within the same 8-digit class.

The empirical challenge in constructing market shares is determined by the unavailability of data reporting total demand at the country-product level. To overcome this problem we proxy for unobserved demand in each country with the aggregate quantity imported within each 6-digit class. We use the BACI dataset[6] to compute the outside varieties' share S_{odt}. This is the share on non-French import over the total import of country d in a given 6-digit product class. This share is used to approximate market size: $MKT_{dt} = \frac{\sum_{dt} q_{fpdt}}{1-S_{odt}}$, where the numerator is the total export from France to country d within a 6-digit product class obtained by aggregating individual export flows[7]. Similarly we approximate market sizes at the 8-digit level as $MKT_{pdt} = \frac{\sum_{pdt} q_{fpdt}}{1-S_{odt}}$, where the numerator is the aggregate quantity exported by France to country d within the same 8-digit product class.

We estimate the model by individual 6-digit product classes to allow the coefficients α and σ to differ across Ks. The specification we adopt is similar to the one proposed by Khandelwal (2010):

[6]This dataset reconciles trade declarations from importers and exporters as they appear in the COMTRADE database (Gaulier and Zignago, 2010).

[7]For example, if France exports to Italy 2,000 Kg of men shirts and its market share over Italy's import of men's shirt is 0.2, then the share of non-French import in that product class is the outside variety's share $S_o = 1 - 0.2 = 0.8$. The total market for shirts in Italy is computed as $MKT = \frac{2{,}000kg}{1-0.8} = 10{,}000Kg$.

$$
\begin{aligned}
ln(s_{fpdt}) - ln(s_{odt}) &= \alpha UV_{fpdt} + \sigma ln(ns_{fpdt}) + \delta_t + \delta_c + \hat{Q}_{fpdt} \qquad (6)\\
\hat{Q}_{fpdt} &\equiv \delta_{fpd} + \delta_{fpdt}
\end{aligned}
$$

where UV_{fpdt} is the unit-value of export flow fpd , and the error $\hat{Q}_{fpdt}$ mirrors empirically the quality estimator Q_j in equation 5. This error can be decomposed into a firm-product-destination fixed effect δ_{fpd} that absorbs the time-invariant features of the variety that affect its market share in d (i.e. quality of materials, closeness with consumers' taste, brand name), and by a time-varying component δ_{fpdt} that captures shocks in demand reflecting the positive impact of firms' activities to promote their product on foreign markets (i.e. advertisement, improvements in design and materials). Negative variations in δ_{fpdt} reflect instead the incapacity of firm f to keep the pace with quality upgrades that are implemented by French exporters of competing varieties within the same market d. The remaining terms δ_t and δ_d control respectively for macroeconomic shocks common to all French exporters and for destination specific time-invariant factors.

If higher quality products are priced at higher mark-ups, or if their production involves higher marginal costs, then $\hat{Q}_{fpdt}$ is likely to be positive correlated with unit-values UV_{fpdt} and with the log of the nest-share $ln(ns_{fpdt})$. Therefore, OLS estimates of α are generally upward biased (Nevo, 2000). To deal with endogeneity in unit-values and nest-shares we estimate 6 adopting a panel fixed-effect instrumental variable estimator (IV-FE). With the panel unit set at the level of the individual variety (fpd), within-group transformation eliminates the correlation between the regressors and the fixed-effect component of quality δ_{fpd}, and in turn prevents omitted variable bias of the estimated parameters. Identification of α and σ now relies only on time-variations in market shares and prices within the same variety.

To deal with the endogeneity of prices and nest-shares arising from their correlation with the time-varying component of quality, we use three instruments. The first instrument for UV_{fpdt} is the average unit-value computed across all French varieties exported to d at time t within the same 6-digit product class of p. We expect this instrument to be mainly driven by demand factors in the destination market unrelated with firm-specific variations in ϵ_{fpdt}. The second instrument for prices is the physical productivity of the firm, obtained as output quantity per employee[8]. Since the physical productivity of labor does not depend on prices we expect this instrument to be exogenous with respect to quality variations but to be correlated with unit-values through marginal costs. Lastly, we instrument for market shares of

[8]Because we observe only the total quantity exported by the firm q_{exp} we obtain quantities produced q_{tot} as: $q_{tot} = \frac{v_{tot}}{v_{exp}} \times q_{exp}$. We lag the instrument to avoid measurement error in quantities to drive the correlation between unit-values and the instrument.

individual firms using the number of different 8-digit products exported by the same firm to d (Khandelwal, 2010).

The methodological requirements and the assumptions of the discrete choice of demand prevent us from estimating the discrete choice model for all 6-digit product categories observed in the Customs dataset. First, the assumptions of this model are less tenable if applied to the demand for intermediates and capital goods. Importers of these products are less likely to choose in each period among alternative varieties because factors such as longer-lasting contracts with suppliers and technological path dependency may constraint their ability to switch variety. For this reason we choose to restrict our analysis to consumer products. Second, in order to obtain more precise estimates of the demand parameters we select HS6 products for which we have a sufficiently large number of observations in Customs[9]. Lastly, we keep HS6 products for which the over-identification tests and the coefficients obtained from estimating the model by FE-IV suggest correct identification of the demand parameters.

Table 3: Demand parameters (FE estimates)

	(1) Chocolate and confectionery	(2) Wine (still)	(3) Wine (sparkling)	(4) Perfume and toilet waters	(5) Wooden furniture	(6) Lamps
α	-0.017***	-0.001	-0.006***	-0.001***	-0.002***	-0.001***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)
σ	0.788***	1.072***	0.946***	0.987***	0.931***	0.884***
	(0.00)	(0.00)	(0.00)	(0.00)	(0.00)	(0.01)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
R^2	0.70	0.89	0.89	0.93	0.90	0.80
Obs.	17,390	18,737	29,502	54,598	37,474	14,339

On the basis of these criteria we select six product categories that are economically relevant over the total French exports of consumer goods. These products fit our investigation on quality, as their demand is likely to be determined by exporters' capacity to carry out 'quality enhancing' activities such as: researching consumers' taste in foreign markets, improving packaging and product design, adopting better materials, switching to quality enhancing production techniques, investing in advertisement to promote their brand.

Estimates of the demand parameters from FE and IV-FE are respectively reported in Table 3 and Table 4. As expected, across all products the coefficient α from IV-FE is consistently

[9]In addition, some product categories cannot be analyzed because for some years they miss information on quantities.

Table 4: Demand parameters (IV-FE estimates)

	(1) Chocolate and confectionery	(2) Wine (still)	(3) Wine (sparkling)	(4) Perfume and toilet waters	(5) Wooden furniture	(6) Lamps
α	-0.088***	-0.008**	-0.039***	-0.016***	-0.024***	-0.004**
	(0.01)	(0.00)	(0.01)	(0.01)	(0.01)	(0.00)
σ	0.852***	0.913***	0.977***	0.548***	0.967***	0.747***
	(0.08)	(0.22)	(0.06)	(0.10)	(0.04)	(0.07)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Own-price elasticities						
Median	-4.88	-1.16	-0.62	-1.02	-6.81	-0.36
High	-8.36	-1.51	-1.16	-1.65	-12.60	-0.76
Low	-3.03	-0.55	-4.27	-0.60	-3.53	-0.19
Hansen j-test (p-value)	0.24	0.24	0.46	0.40	0.67	0.23
R^2	0.68	0.88	0.90	0.73	0.89	0.82
Obs.	8,971	10,809	13,079	28,187	14,833	4,984

Notes. The reported estimates are obtained by IV-FE estimation of the discrete choice model, implemented by using the user-written command xtreg2 in Stata (Schaffer, 2005). For all product categories we instrument for unit-values and nested-shares using the same set of instruments as described in the body of the text. Cluster robust standard errors are reported (cluster unit: product-destination).

smaller than the one from FE, suggesting that the IV estimator corrects the upward bias due to the positive correlation of unit-value with unobserved quality. The substitution parameters σ obtained from IV are all in the plausible range $[0-1)$. Overidentification tests confirm the exogeneity of our instrument set. Table 4 reports also the price elasticities of market shares that are computed using the estimated demand parameters, prices and the market shares of individual varieties[10].

5 Leverage end export quality

5.1 The model of leverage and export quality

In this section we discuss how we identify the effect of exporters' leverage on quality by dealing with omitted variable bias and endogeneity. Our simple specification of the model of leverage and export quality is:

$$\hat{Q}_{fpdt} = c_{pdt} + \beta Lev_{ft} + Z'_{ft}\gamma + \eta_f + \eta_{ft} + \epsilon_{fpdt} \tag{7}$$

[10]Further details on how own-price elasticities are computed are left in the Appendix.

where c_{pdt} accounts for shocks in demand that affect all firms exporting the same product to the same destination. This term is important for identification because the estimator of quality is basically the residual market share of an exported variety once we control for its price, therefore it is affected by destination-product specific demand shocks. The term η_f and η_{ft} capture unobservable fixed and time-varying factors at the firm level. Z'_{ft} is a vector of observable firm-level controls. This vector includes: the log number of workers, labor productivity (value added per employee), the log of firm's age and two dummy that assumes value one if the exporter belongs to a business group or if it is foreign-owned. These covariates are included to increase the efficiency of the estimates and to control for observable factors that might affect both firms' financing decisions and the quality of their exported varieties. For example, older firms may have easier access to credit and be perceived as producers of better quality products because of their longer track records and their well established brand name. Firms that are part of a business group may have lower leverage due to greater access to groups' internal financing (Boutin et al., 2012), and at the same time they may benefit from quality enhancing activities carried out by other affiliates.

Pooled OLS with cluster robust standard errors is the first estimator we apply to model 7. By including a full set of product-destination-year dummies, we force identification to rely on variations in quality and leverage across firms exporting the same product to the same destination. These variations are the most appropriate source of identification according to our research question. Indeed, we want to investigate whether differences in financial structure across firms determine differences in exported quality. In addition, Lev_{ft} and $\hat{Q}_{fpdt}$ are time-persistent variables hence we expect estimators that exploit time variations to underestimate the impact of leverage on quality. However, OLS would generate consistent estimates of β only if leverage is uncorrelated with η_f and η_{ft}. Because this assumption is very restrictive we will also regress the model using within-group FE and IV-FE estimators.

Within-group FE transforms the variables in 7 to eliminate η_f from the right-hand side of the model[11]. By doing so, we prevent the correlation between leverage and some firm-level time-invariant factors subsumed in the error to bias the coefficient on Lev_{ft}. However FE models are still insufficient to address the endogeneity of Lev_{ft} arising from its correlation with firm-level shocks affecting both its financial structure and the quality of its export. In addition, endogeneity might arise from reverse causality if firms modify their financial structure as the result of an increase in revenues from foreign markets. We address this issue by using IV-FE models to instrument current variations in leverage with past variations in exporters' financial structure.

[11] All variables are demeaned at the level of each panel group, where groups are defined at the level of individual varieties (fpd).

Table 5: Summary statistics of the estimation sample

HS6	Obs.	Firms	Employees	Leverage	Liquidity	lprod	Intangibles	UV	Flows	Dest.
180690	7893	456	203.24	0.20	0.05	3.83	0.12	13.35	5.33	3.67
220410	14042	553	87.33	0.28	-0.01	4.27	0.06	10.15	11.68	8.10
220421	16921	674	169.79	0.23	0.02	4.02	0.07	7.83	5.70	3.43
330300	48376	1114	234.74	0.18	0.02	4.04	0.18	33.41	13.54	10.89
940360	31562	3256	156.07	0.17	0.05	3.66	0.12	20.04	3.53	2.98
940510	7174	706	242.69	0.14	0.06	3.78	0.16	78.08	3.01	2.67

Notes. HS6 product categories are: Chocolate and confectionery (180690), Still wine (220410), Sparkling wine (220421), Perfume and toilet waters (330300), Wooden furniture (940360), Lamps (940510). *Obs.* is the total number of export flows observed, *Firms* is the number of unique exporters in the sample, *Employee* is the mean number of employees by exporter, *Leverage* is the average book vale to total asset ratio, *Liquidity* is the difference between firms' working capital and financing need to cover operating expenses normalized over total assets , *lprod* is the log of labor productivity defined as value added per employee, *Intangibles* is the ratio of intangible assets over total assets, *UV* is the mean unit-value of exported varieties, *Flows* is the average number of export flows by firm (product-destination), *Dest* is the average number of unique destinations served by exporter.

5.2 Results

To maximize the number of observations we estimate the discrete choice model of demand with export flows generated by both manufacturers and wholesalers. However, we investigate the impact of leverage on quality only for the exports of manufacturing firms. This choice is explained by the fact that the theoretical literature that motivates our investigation is not easily applicable to wholesalers; it is not clear which kind of quality enhancing investment could be affected by the financial structure of these firms. Table 5 reports summary statistics on exporters' attributes and export flows by each product category.

Leverage differs significantly across firms exporting different products. Exporters of perfumes (HS6: 330300), lamps (HS6: 940510) and wooden furniture (HS6: 940360) are characterized by lower levels of debt-to-asset ratio, larger size and higher proportion of intangibles over total assets. These product classes have also higher average unit-value indicating that they include the most expensive varieties in our sample. On the contrary, exporters of wines (HS6: 220410 and 220421) are characterized by higher leverage, smaller size and lower ratio of intangibles over total assets. This cursory evidence appears consistent with the theoretical predictions of Long and Malitz (1985) whereby firms with a greater proportion of 'opaque' assets are relatively disadvantaged in financing investment through debt. The table reports also exporters' average liquidity obtained as the difference between working capital and financing needs for operating expenses (normalized over total assets). This variable indicates firms' operative dependence on external financing. Exporters of wine and perfumes appear more reliant on external financing to cover operative expenses. However differences in liquidity across product categories are smaller than differences in leverage, suggesting that heterogeneity in financial structure across exporters of different products might be mostly determined by different patterns of investment financing rather than by different operative dependence on credit.

In figure 1 we show kernel densities of $\hat{Q}$ estimated by individual 6-digit product categories. For each product class we plot empirical densities estimated on the split sample of exporters with low leverage ($Lev_{ft} < 0.31$) and exporters with high leverage ($Lev_{ft} > 0.36$)[12]. Differences in the distribution of $\hat{Q}$ between 'high leverage' and 'low leverage' exporters are apparent for three out of the six product categories in our sample[13]. The distribution of $\hat{Q}$ for low-leverage firms appears shifted toward higher values when we consider the export of Perfume, Sparkling Wine and Lamps. For other products empirical differences in the distribution of $\hat{Q}$ are less apparent. This evidence calls for more formal tests on the relationship between exporters leverage and exported varieties' quality.

The results from the estimation of model 7 are reported in table 6. We first regress the model using the whole sample obtained by pooling together observations for each HS6 product category. Then, estimation is repeated separately on the samples of export flows generated by firms with $Liquidity > 0$ and with $Liquidity < 0$. A similar split sample strategy is also implemented in Nucci et al. (2005), with the aim of capturing the differential effect of leverage on TFP for firms that are able to finance productivity enhancing opportunities with own funds and those that require external financing. These authors find indeed that the effect of leverage on total factor productivity is more negative for firms with low liquidity, confirming that higher levels of debt constraint firms ability to undertake performance enhancing activities.

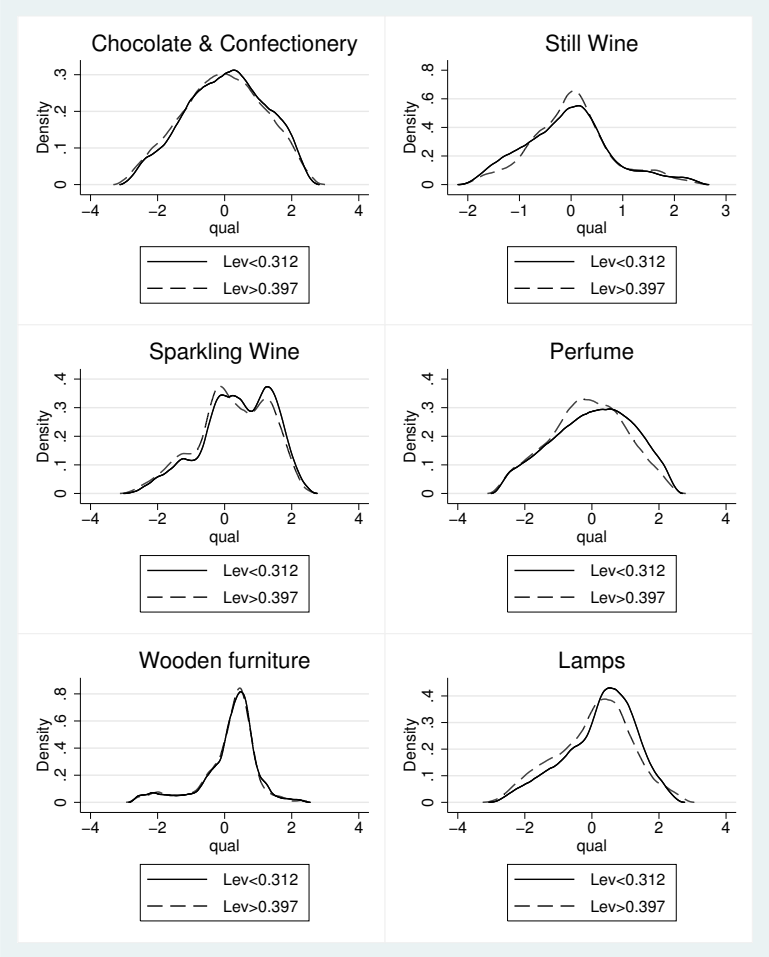
In addition, this separation criteria allows to partially discriminate those firm that choose a highly leveraged financial structure by balancing costs and benefit of debt financing (trade off theory of optimal capital structure), from those that accumulate debt in the absence of sufficient liquidity to finance operating expenses and investment internally (pecking order theory). Indeed if a firm is left with sufficient internal resources to cover the costs of current operations after investing ($Liquidity_{ft} > 0$), either it does not need external financing at all or it uses external financing to finance investment when it could always substitute if for some internal financing. Hence the use of debt financing for these firms can be explained be the beneficial effects of debt (e.g. tax shield). On the contrary when working capital is insufficient to cover operating expenses ($Liquidity < 0$), debt financing is more likely to be a forced solution rather than a value optimizing choice.

Results obtained on the whole sample confirm **Hyp1** that leverage impacts negatively on the quality of firms' export. The coefficients on Lev_{ft} range from -0.066 (FE) to -0.188 (IV-FE). The upward bias of the FE estimator might be due to the fact that for some firms

[12]We split the sample using the threshold above which leverage has been found to affect negatively TFP growth (Coricelli et al., 2012).

[13]However the Kolmogorov-Smirnov test fails to reject equality of distributions only for Chocolate and confectionery (HS6:180690).

Figure 1: Distributions of $\hat{Q}$ by group of exporters with different leverage



Notes. All densities are estimated using the Epanechnikov kernel function. Bandwith are selected automatically by Stata (kdensity command). The threshold levels of leverage that we use to split samples are motivated by Coricelli et al. (2012).

quality upgrading investment is financed by debt. Hence in these cases leverage and quality move in the same direction. However, we are interested in the effect of higher initial levels of leverage on firms ability to increase the quality of their exported products. For this reason OLS and IV-FE estimates are more relevant for our research question. OLS gives implicitly more weight to differences in levels of leverage across exporters, while IV-FE addresses reverse causality that biases upward FE estimates by instrumenting changes in leverage at time t with lagged changes (i.e. we use the first and the second lags as instruments). The IV-FE estimates obtained on the whole sample is significant only at the 10% level. Weak significance casts some doubts on the fact that the impact of leverage on quality is negative for all firms.

Table 6: Export quality and firms' financial characteristics

	Pooled Sample			Liquidity>0			Liquidity<0		
	OLS	FE	IV-FE	OLS	FE	IV-FE	OLS	FE	IV-FE
Lev_{ft}	-0.131***	-0.066**	-0.188*	-0.029	-0.044	0.309*	-0.242***	-0.129***	-0.828***
	(0.021)	(0.028)	(0.108)	(0.032)	(0.040)	(0.163)	(0.031)	(0.047)	(0.273)
$log(Intang)_{ft}$	0.011***	0.004	0.058***	0.020***	0.013**	0.077***	-0.011***	-0.014*	0.011
	(0.002)	(0.005)	(0.019)	(0.003)	(0.006)	(0.027)	(0.003)	(0.008)	(0.032)
$log(lprod)_{ft}$	0.173***	0.050***	0.045***	0.174***	0.050***	0.026*	0.155***	0.026**	0.040***
	(0.015)	(0.008)	(0.010)	(0.016)	(0.010)	(0.014)	(0.015)	(0.011)	(0.015)
$log(empl)_{ft}$	0.064***	0.111***	0.086***	0.061***	0.104***	0.057**	0.073***	0.097***	0.130***
	(0.008)	(0.012)	(0.020)	(0.009)	(0.016)	(0.027)	(0.008)	(0.022)	(0.034)
$Group_{ft}$	-0.037***	0.024***	0.019	-0.056***	0.022*	0.024	-0.013	0.037***	0.003
	(0.009)	(0.009)	(0.015)	(0.010)	(0.013)	(0.020)	(0.011)	(0.012)	(0.026)
$Foreign_{ft}$	0.057***	-0.019	-0.030	0.030	-0.043*	-0.078**	0.109***	0.042**	0.104***
	(0.017)	(0.015)	(0.022)	(0.019)	(0.023)	(0.039)	(0.024)	(0.020)	(0.040)
$log(age)_{ft}$	-0.000	-0.160*	-0.198**	0.000	-0.172**	-0.230***	-0.000	-0.156	-0.206
	(0.000)	(0.086)	(0.095)	(0.000)	(0.087)	(0.081)	(0.000)	(0.105)	(0.152)
$Constant$	-0.954***			-0.938***			-0.837***		
	(0.091)			(0.102)			(0.085)		
pd FE	y	n	n	y	n	n	y	n	n
hs6-t FE	y	y	y	y	y	y	y	y	y
fpd FE	n	y	y	n	y	y	n	y	y
Hansen (p)	-	-	0.818	-	-	0.024	-	-	0.706
R^2	0.597	0.005	0.003	0.577	0.004	0.002	0.647	0.003	-0.012
Groups		15,654	6,956		10,146	4581.000		7,354	3,255
Obs.	85,335	72,227	32,292	52,001	41,274	19,154	33,334	25,821	10,945

Notes. Cluster-robust standard errors in parentheses (cluster unit: product-destination). IV-FE models are estimated by GMM using the first and the second lags of the endogenous variables (Lev_{ft}, $log(Intang)_{ft}$, $log(lprod)_{ft}$) as instruments. IV-FE models are estimated using the xtivreg2 (Schaffer, 2005). R^2 for FE and IV-FE models are reported but they are not correct as they do not exclude the part of the model that is explained by individuals' FEs, therefore they should be not interpret as reliable measure of goodness of fit of the model. $pdFE$ are CN8 product-destination fixed effects, $hs6-tFE$ are HS6 product-year fixed effects, $fpdFE$ are firm-CN8 product-destination FE. Except for the latter group of FE controlled for by within-group transformation of the variables, the other two FE are introduced in the model by a full set of dummies.

Estimates from the split samples of liquid and illiquid firms provide a much clearer picture. Leverage is found affecting negatively and significantly the export quality of illiquid firms only. This evidence supports the validity of our second hypothesis (**Hyp2**). When we look at firms with insufficient internal resources to finance operations, the coefficients on Lev_{ft} are consistently more negative than those obtained on the whole sample and they are all significant at the 1% level across different estimators. On the contrary, leverage does not appear to reduce quality for firms with sufficient internal liquidity. Hence, we conclude that debt financing constraint firms' ability (or incentive) to compete through quality on foreign markets only when exporters' financial structure does not depend on their choice but on insufficient internal liquidity.

The estimated coefficients on some of our control variables deserve also some discussion. Larger and more productive exporters (with higher $log(empl)_{ft}$ and $log(lprod)_{ft}$) are found associated with the export of higher quality varieties across all specifications. This result is in line with the evidence documenting positive correlation between output price and firms' size (Kugler and Verhoogen, 2012). Therefore, our analysis based on a theoretically grounded estimator of quality, confirms the hypothesis advanced in previous papers that there is com-

plementarity between firms' scale, productivity and quality. In addition, consistently with the idea that investment in intangible assets contribute to the real or perceived quality of exporters' good, we find that $log(Intang)_{ft}$ is positively correlated with export quality, although this relationship does not hold for illiquid firms. A tentative interpretation of this result could be that intangible assets of liquidity constrained firms are less related with the quality of their products.

In FE and IV-FE models, the coefficients on the dummy variables $Group_{ft}$ and $Foreign_{ft}$ are identified by firms that become part of a business group or by those that are acquired by a foreign owner during the period of our analysis. Coefficient on $Group_{ft}$ are inconsistent across different estimators and samples, and we prefer not to advance any interpretation on the effect of entrance in a business group for output quality. On the contrary, foreign acquisition seems having a positive impact on export quality only for firms with negative liquidity while the effect is ambiguous when estimated on the whole sample and on the group of liquid exporters. Lastly, contrary with our expectations on the effect of firms' longevity on brand strength, we find the log of firm age ($log(age)_{ft}$) to be negatively correlated with quality when the coefficient is obtained on the whole sample.

Table 7: Export price and firms' financial characteristics

	Pooled Sample			Liquidity>0			Liquidity<0		
	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se	b/se
Lev_{ft}	0.018	-0.070***	-0.247***	0.188***	-0.063*	-0.152	-0.167***	-0.053	-0.499**
	(0.031)	(0.022)	(0.087)	(0.037)	(0.038)	(0.119)	(0.041)	(0.034)	(0.243)
$log(Intang)_{ft}$	0.055***	0.019***	0.049***	0.062***	0.027***	0.089***	0.043***	0.008	-0.026
	(0.002)	(0.003)	(0.011)	(0.003)	(0.004)	(0.014)	(0.003)	(0.006)	(0.024)
$log(lprod)_{ft}$	-0.010	0.011**	0.005	-0.003	0.030***	0.014	-0.024***	-0.026***	-0.016*
	(0.008)	(0.005)	(0.007)	(0.010)	(0.007)	(0.010)	(0.009)	(0.008)	(0.009)
$log(empl)_{ft}$	-0.025**	0.004	-0.032**	-0.025**	0.052***	0.001	-0.023**	-0.065***	-0.087***
	(0.011)	(0.008)	(0.013)	(0.012)	(0.011)	(0.020)	(0.009)	(0.014)	(0.025)
$Group_{ft}$	-0.051***	0.001	-0.007	-0.087***	0.007	0.010	-0.002	-0.010	0.002
	(0.018)	(0.008)	(0.012)	(0.021)	(0.010)	(0.016)	(0.021)	(0.013)	(0.023)
$Foreign_{ft}$	0.024	-0.004	-0.022	-0.069***	-0.014	-0.066**	0.194***	-0.018	0.024
	(0.023)	(0.012)	(0.018)	(0.026)	(0.016)	(0.028)	(0.027)	(0.018)	(0.034)
$log(age)_{ft}$	0.004***	-0.026	-0.068	0.006***	-0.060	-0.053	0.002***	0.032	-0.050
	(0.000)	(0.040)	(0.052)	(0.000)	(0.048)	(0.081)	(0.000)	(0.049)	(0.053)
$Constant$	2.362***			2.321***			2.425***		
	(0.076)			(0.085)			(0.078)		
pd FE	y	n	n	y	n	n	y	n	n
HS6-Year FE	y	y	y	y	y	y	y	y	y
fpd FE	n	y	y	n	y	y	n	y	y
Hansen (p)			0.640			0.189			0.872
R^2	0.468	0.001	0.001	0.464	0.004	0.005	0.498	0.002	-0.008
Groups		16,482	7,254		10,733	4,805		7,777	3,406
Obs.	90,717	77,021	34,111	55,427	44,187	20,286	35,290	27,495	11,547

Notes. Cluster-robust standard errors in parentheses (cluster unit: product-destination). IV-FE models are estimated by GMM using the first and the second lags of the endogenous variables (Lev_{ft}, $log(Intang)_{ft}$, $log(lprod)_{ft}$) as instruments. IV-FE models are estimated using the xtivreg2 (Schaffer, 2005). R^2 for FE and IV-FE models are reported but they are not correct as they do not exclude the part of the model that is explained by individuals' FEs, therefore they should be not interpret as reliable measure of goodness of fit of the model. $pdFE$ are CN8 product-destination fixed effects, $hs6 - tFE$ are HS6 product-year fixed effects, $fpdFE$ are firm-CN8 product-destination FE. Except for the latter group of FE controlled for by within-group transformation of the variables, the other two FE are introduced in the model by a full set of dummies.

As a robustness check we repeat the estimation of 7 by replacing $\hat{Q}_{ft}$ with unit-values on the left-hand side of the model. As we previously mentioned, the effect of leverage on unit-values is ambiguous if more leveraged exporters are less capable to implement productivity enhancing measures as suggested by the financial literature. However, the results obtained on $\hat{Q}_{ft}$ still hold by using unit-values as the dependent variable. We find that exporters with higher debt-to-assets ratio export less expensive varieties. In support of the differential effect of leverage on quality for liquid and illiquid firms we also find that the negative coefficient of leverage on price is significantly different from zero only on the sample of illiquid exporters.

6 Conclusions

In this paper we provide empirical support to the hypothesis that firms' financial structure is a relevant element to explain differences in product quality across exporters. Given the importance of product quality for export performance, our results shed also light on the relationship between financial factors, firms selection into exporting and performance in foreign markets. Our results are obtained by analyzing a panel of 6,229 exporters associated with over 120,000 export flows for six HS6 digit product categories of consumer goods.

Product quality for illiquid exporters is found degrading in their level of debt over total assets. The same is not true for liquid exporters. We interpret the negative impact of leverage on quality as an empirical confirmation of models predicting that debt financing and financial distress reduce firms' incentive and ability to invest in quality enhancing activities such as advertisement and R&D (Long and Malitz, 1985; Maksimovic and Titman, 1991). Instead, we interpret the conditionality of this effect on firms' liquidity, by referring to alternative theories of firms' financial structure. We believe that the pecking-order theory of firms' financing is more appropriate to explain high levels of debt among illiquid exporters: as the incapacity of these firms to cover operating expenses is an indication that they resort to debt financing in absence of sufficient internal resources Myers and Majluf (1984). For these firms high levels of debt are less likely to be set on the basis of a value optimizing choice, and leverage is more likely to constraint their quality upgrading activities. On the contrary, liquid firms use debt in substitution to available internal resources. Therefore, high levels of observed leverage among these firms is better explained by a value optimizing choice, and it is less likely to constraints quality upgrading if this would brings value to the firm (Jensen and Meckling, 1976).

We believe that our results have some important policy implications as they suggest that policies affecting firms' levels of debt financing (e.g. changes in corporate taxation rates) may also affect indirectly firms' incentives to upgrade their product quality. Again, our results may reveal some advantage of market based financial systems in promoting exporters'

quality-competitiveness on foreign markets.

Appendix

Table 8: Correlations between the main variables used in regressions

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) $\hat{Q}_{fpdt}$	1								
(2) $log(UV)_{fpdt}$	0.0246***	1							
(3) Lev_{ft}	-0.0362***	-0.0998***	1						
(4) $log(Intang)_{ft}$	0.0659***	0.266***	-0.0749***	1					
(5) $log(empl)_{ft}$	0.0770***	0.197***	-0.150***	0.756***	1				
(6) $log(age)_{ft}$	0.00671*	0.0376***	0.0206***	0.148***	0.238***	1			
(7) $Group$	-0.0122***	0.101***	0.00730*	0.242***	0.307***	0.144***	1		
(8) $Foreign_{ft}$	0.0373***	0.150***	-0.0533***	0.336***	0.317***	-0.0172***	-0.390***	1	
(9) $log(lprod)_{ft}$	0.0581***	0.171***	-0.102***	0.278***	0.0810***	0.0297***	0.128***	0.133***	1

* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$

Derivation of the elasticity of demand

By defining $D_g = \sum_{j \in g} e^{\delta_j / 1-6}$ equation (3) can be written as:

$$s_j = \frac{e^{\delta_j/(1-\sigma)}}{D_g^{\sigma}[\sum_g D_g^{(1-\sigma)}]} \tag{8}$$

then

$$\frac{\partial s_j}{\partial p_j} = \frac{e^{\delta_j/(1-6)} \frac{\partial \delta_j}{\partial p_j} D_g^{\sigma}[\sum_g D_g^{(1-\sigma)}] - e^{\delta_j/(1-\sigma)}[\frac{\partial (D_g^{\sigma})}{\partial p_j}[\sum_g D_g^{1-\sigma}] + D_g^{\sigma} \frac{\partial (D_g^{1-\sigma})}{\partial p_j}}{(D_g^{\sigma}[\sum_g D_g^{(1-\sigma)}])^2} \tag{9}$$

because $\frac{\partial \delta_j}{\partial p_j} = \frac{\alpha}{1-\sigma}$, we can use the definition of s_j in (8) and the definition of $P_{j/g} \equiv s_{j/g}$ in (6) to write (9) as:

$$\frac{\partial s_j}{\partial p_j} = \frac{\alpha}{1-\sigma} s_j (1 - \sigma s_{j|g} - (1-\sigma) s_j) \tag{10}$$

then multiplying (10) by $\frac{p_j}{s_j}$ we obtain the formula for the market share elasticity of demand:

$$\frac{\partial s_j}{\partial p_j} \times \frac{p_j}{s_j} = \frac{\alpha}{1-\sigma} p_j (1 - \sigma s_{j|g} - (1-\sigma) s_j) \tag{11}$$

References

Aivazian, V. A., Ge, Y., and Qiu, J. (2005). The impact of leverage on firm investment: Canadian evidence. *Journal of Corporate Finance*, 11(1-2):277–291.

Askenazy, P., Caldera, A., Gaulier, G., and Irac, D. (2011). Financial constraints and foreign market entries or exits: Firm-level evidence from france. Technical report.

Bastos, P. and Silva, J. (2010). The quality of a firm's exports: Where you export to matters. *Journal of International Economics*, 82(2):99 – 111.

Bellone, F., Musso, P., Nesta, L., and Schiavo, S. (2010). Financial constraints and firm export behaviour. *The World Economy*, 33(3):347–373.

Berry, S. T. (1994). Estimating discrete-choice models of product differentiation. *RAND Journal of Economics*, 25(2):242–262.

Boutin, X., Cestone, G., Fumagalli, C., Pica, G., and Serrano-Velarde, N. (2012). The deep-pocket effect of internal capital markets. Technical report.

Chaney, T. (2013). Liquidity constrained exporters. NBER Working Papers 19170, National Bureau of Economic Research, Inc.

Coricelli, F., Driffield, N., Pal, S., and Roland, I. (2012). When does leverage hurt productivity growth? a firm-level analysis. *Journal of International Money and Finance*, 31(6):1674–1694.

Crozet, M., Head, K., and Mayer, T. (2011). Quality sorting and trade: Firm-level evidence for french wine. *The Review of Economic Studies*.

Fan, H., Lai, E. L.-C., and Li, Y. A. (2012). Credit constraints, quality, and export prices: Theory and evidence from china. MPRA Paper 40857, University Library of Munich, Germany.

Gaulier, G. and Zignago, S. (2010). Baci: International trade database at the product-level. the 1994-2007 version. Working Papers 2010-23, CEPII research center.

Greenaway, D., Guariglia, A., and Kneller, R. (2007). Financial factors and exporting decisions. *Journal of International Economics*, 73(2):377–395.

Iacovone, L. and Javorcik, B. (2008). Shipping the good tequila out: investment, domestic unit values and entry of multi-product plants into export markets. Mimeo, University of Oxford.

Jensen, M. C. and Meckling, W. H. (1976). Theory of the firm: Managerial behavior, agency costs and ownership structure. *Journal of Financial Economics*, 3(4):305–360.

Khandelwal, A. (2010). The long and short (of) quality ladders. *Review of Economic Studies*, 77(4):1450–1476.

Kravis, I. B. and Lipsey, R. E. (1971). Price competitiveness in world trade, studies in international economic relations. *New York: National Bureau of Economic Research*, 6.

Kugler, M. and Verhoogen, E. (2012). Prices, plant size, and product quality. *Review of Economic Studies*, 79(1):307–339.

Long, M. S. and Malitz, I. B. (1985). Investment patterns and financial leverage. In *Corporate Capital Structures in the United States*, NBER Chapters, pages 325–352. National Bureau of Economic Research, Inc.

Maksimovic, V. and Titman, S. (1991). Financial policy and reputation for product quality. *Review of Financial Studies*, 4(1):175–200.

Manova, K. (2008). Credit constraints, heterogeneous firms, and international trade. NBER Working Papers 14531, National Bureau of Economic Research, Inc.

Manova, K. and Zhang, Z. (2012). Export prices across firms and destinations. *The Quarterly Journal of Economics*, 127(1):379–436.

Matsa, D. A. (2011). Running on empty? financial leverage and product quality in the supermarket industry. *American Economic Journal: Microeconomics*, 3(1):137–73.

Mcfadden, D. (1974). Conditional Logit Analysis of Qualitative Choice Behavior. In Zarembka, P., editor, *Frontiers in econometrics*, pages 105–142. Academic Press, New York.

Minetti, R. and Zhu, S. C. (2011). Credit constraints and firm export: Microeconomic evidence from italy. *Journal of International Economics*, 83(2):109–125.

Modigliani, F. and Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investment. *The American Economic Review*, 48(3):pp. 261–297.

Myers, S. C. (1984). The capital strcuture puzzle. *Journal of Finance*, 39:575–592.

Myers, S. C. and Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do not have. *Journal of Financial Economics*, 13(2):187–221.

Nevo, A. (2000). A practitioner's guide to estimation of random-coefficients logit models of demand. *Journal of Economics & Management Strategy*, 9(4):513–548.

Nucci, F., Pozzolo, A. F., and Schivardi, F. (2005). Is firm's productivity related to its financial structure? evidence from microeconomic data. *Rivista di Politica Economica*, 95(1):269–290.

Nunes, P. M., Sequeira, T. N., and Serrasqueiro, Z. (2007). Firms' leverage and labour productivity: a quantile approach in portuguese firms. *Applied Economics*, 39(14):1783–1788.

Schaffer, M. E. (2005). Xtivreg2: Stata module to perform extended iv/2sls, gmm and ac/hac, liml and k-class regression for panel data models. Statistical Software Components, Boston College Department of Economics.

Silver, M. (2007). Do unit value export, import and terms of trade policies indices represent or misrepresent price indices. *IMF Working Paper*, May(WP/07/121):34 pages.