

Exporting quality: is it the right strategy in the Italian manufacturing sector?

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PRELIMINARY DRAFT

ABSTRACT: Recently, most European manufacturing firms have been engaged in a number of innovative activities to survive the growing competition coming from newly-industrialising countries. Italian manufacturing industry, which relies on small and family-controlled firms, is struggling to regain competitiveness in global markets. Departing from these stylised facts and building on a conceptual model, this paper aims at understanding the determinants of the propensity of Italian small- and medium-sized firms to export. Specifically, we investigate whether innovating activities and quality goods’ production have any effect on firm’s probability to be exporter. We find that both products’ quality and innovative activities (divided into: product, process, organisational and market-related) affect considerably small- and medium-sized firms’ likelihood to export. Moreover, our finding suggests that high-quality firms’ advantage in exporting is limited to some traditional sectors (food and beverage, clothing, footwear and leather, metal products and mechanical products). It follows that quality strategy is effective for the production and exports of specific goods, but cannot be considered as a general strategy to revitalise manufacturing exports as a whole. Using the Chow test, we find evidence for a structural break produced by quality, which results in substantial differences between high- and low-quality firms. In particular, our findings suggest that, on the one hand, high-quality firms are more likely to export if they introduce product and marketing innovation and are larger. On the other hand, low-quality firms (which typically follow a price competition strategy) increase their chances of exporting when introducing process innovations and organisational changes; in this case micro and small size is not a disadvantage.

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1. Introduction

European manufacturing firms are facing a growing competitive pressure coming from the newly industrialising countries (NICs) which produce and export in the global markets cheap and competitive commodities. This is particularly true for those sectors and countries whose specialisation lies in the production of low-capital and low-skill intensive goods. Italy is a case in point: a long standing history of specialisation in sectors of traditional goods and the typical small size of national firms poses the country in direct competition with fast-growing economies like China and India. Several studies (see, for instance, Pinch et al, 2003; Forsman and Solitander, 2003; and for the Italian case: Morone and Testa, 2007) suggests that a possible strategy for surviving in this highly competitive global market is to learn and master new technologies. Through investments in innovation and knowledge Italian firms would avoid competition with those countries which rely on low labour costs.

Moreover, as recognised by early studies on the Italian specialisation model (Modiano, 1982 and 1984; Amendola, 1991), Italian firms have traditionally competed focusing on high-value products which results from their sectoral specialisation. Following this line of reasoning, several recent studies (Borin and Quintieri, 2006; Lamieri and Lanza, 2006; Borin and Lamieri, 2007) have shown that Italian exports gained momentum in the last years mainly thanks to what could be labelled a “quality” effect: while the volume of exported commodities stayed unchanged the overall value of exports has grown; this has been interpreted as a rise in the quality of exported commodities matched to an increase in the unit value of goods sold abroad.

In this paper we shall attempt to evaluate whether the introduction of new innovative strategies and quality strategies (i.e. producing higher value goods) influence Italian firm’s decision to export. The paper is structured as follows: in the next section we briefly review the relevant literature on the role of innovation and quality for firms aiming at becoming exporters. In section 3, we present the empirical methodology and the data used. Section 4 presents our econometric results and section 5 concludes.

2. Internationalisation strategies: a brief literature review

A considerable number of studies have examined various factors which might affect firm’s predisposition towards internationalisation. Bearing in mind the Italian

specialisation model (see, among others, Modiano; 1984; Soru; 1985; Sirilli; 1985), the factors that may be taken into consideration as potential drivers of a shift towards foreign markets are: (a) firm's size; (b) firm's age; (c) innovation strategies, and (d) the presence of sunk costs to access export markets. However, as already mentioned, another relevant factor is (e) the quality of the exported products; this factor is particularly relevant in the Italian case highly characterised by the *Made in Italy* model, based on the exporting of products of traditional sectors, perceived as typically high quality products. In what follows we shall consider the impact of these five factors over firm's decision of exporting.

The empirical literature on the link between firm's export and size is quite broad in scope (Bonaccorsi, 1992; Calof, 1994; Bugamelli et al., 2000; Sterlacchini, 2002). The theoretical underpinning of this evidence is that a large firm is typically willing to take higher risks, has a better ability to innovate and identify financing sources and is more able to overcome sunk costs linked to internationalisation-related activities.¹

As pointed out by Özler et al., sunk costs “can be the costs of international marketing, establishing a distribution system, the cost of gathering information about the demand conditions in export markets, hiring employees with language skills, training employees for new markets, etc. Once these costs are incurred, they cannot be recovered. In other words, costs incurred during the entry to export markets are sunk costs” (2007: 2).

Firm's age also could be related to its decision of exporting. Considering the firm's age as a proxy both of the accumulated experience and of the perception of the risk attached to international activities, younger firms are expected to be less inclined towards foreign markets compared with older ones.

Nonetheless, results of empirical analyses were rather ambiguous on this point: while some studies (Abbas and Swiercz, 1991) found a positive relationship between these two factors, others (Kirpalani and MacIntosh, 1980) found opposite results. In this regard, De Toni and Nassimbeni (2000) hypothesises that the positive affect of age as a proxy of the accumulated experience is actually distorted by a negative effect. This is because older firms find it much more difficult to adapt to constantly changing environmental conditions in global markets.

¹ Note that, as shown by several authors (Kumar and Siddharthan, 1994; Wagner, 1995), size can also affect exports in a non-linear fashion; this is related to the fact that when a firm's size reaches a certain threshold, we would expect to find that its growth is less profitable as co-ordination costs increase.

Finally, there is growing evidence, at firm level, of the benefits of innovation to firm's ability to internationalise. It has been argued that product innovation positively affects both the probability to export (Wakelin, 1998; Sterlacchini, 1999; Nassimbeni, 2001; Basile, 2001; Roper and Love, 2002) and the magnitude of exports (Basile, 2001; Roper and Love, 2002). One straightforward reason is that firms with new products are able to demand higher prices than their competitors. Similarly, process, organisational and marketing innovations affects firm's decision to participate in the global market. Process and organisational innovations reduce costs of production, while marketing innovation improves products performance.

The quality of the products destined to foreign markets is undoubtedly linked both to the innovative capacity of the firm and to the local productive structure. Various theoretical studies reveal how a growing number of countries tend to specialise not only in the quantity and variety of goods produced and exported, but also (and actually in a more pronounced manner) in qualitative differentiation of goods (see, among others, Hallak, 2006; Hummels and Klenow, 2005; Schott, 2004). In particular, the result of the qualitative differentiation of the products sold and bought on international markets has been a production polarisation, where, on the one hand, there are those countries characterised by a high quality production and, on the other hand, there is a new group of countries specialised in the production of goods which are cheaper but of inferior quality.

The economic theory offers two sets of explanations to this process of qualitative differentiation of products. Falvey (1981) and Falvey and Kierzkowski (1987) argue that countries with better initial endowment of physical capital are also those which are more likely to specialise in exporting of high quality goods. Another group of scholars argue that the qualitative distribution of trade patterns between Northern and Southern countries² is related to the technological gap rather than to the difference in capital endowments (Flam and Helpman, 1987; Aghion and Howitt, 1990; Fontagné, 1999).

Both these two sets of theoretical explanations are validated by robust empirical evidence. On the one hand, Hummels and Klenow (2005), using data of 126 exporting countries and 59 importing countries for 5000 different categories of products, show that higher prices exports are directly associated with better capital endowment. Faruq (2006), on the other hand, shows (using data on US imports from 58 countries) how exports of

qualitatively differentiated products are associated with both bigger stock of physical capital as well as with greater investments in R&D.

It is worth mentioning that most of the empirical literature uses a price index of traded goods as a proxy for product quality.³ This indicator, although commonly used, presents some critical shortcomings; for instance, it is based on the hypothesis that price variations are exclusively linked to qualitative variations of the product in question.⁴

As we shall see in the next paragraph, our quality measure differs from price indexes as it contains information on the market where the product is sold.⁵ This variable reflects firm's self-perception of goods quality.

3. Data and econometric approach

3.1 Database and variables' definition

The data we use comes from the Survey on small- and medium-sized enterprises conducted by Unioncamere-Tagliacarne in November 2003. The survey was carried out using a questionnaire administrated to a stratified random sample of about 2,600 Italian manufacturing firms. Its aim was to investigate the innovative activities and the internationalisation strategies adopted by small- and medium-sized enterprises; it includes a number of questions about the characteristics of the firms (e.g. size, sector, age, etc.), their economic state, their innovating capabilities and their internationalisation attitude.⁶

Using this dataset we define a binary dependent variable, $export_{i,t+1}$, which is coded 1 if the firm expects to export in the coming two years⁷ (2004-2005) and 0 otherwise.

² By Northern and Southern countries we distinguish between more and less skilled and capital intensive countries (see: Wood, 2004).

³ Often, the average unit price of exported goods is used as a quality proxy. This price is calculated as the ratio between the export value and the export volume. However, it should be borne in mind that this index does not represent a pure price index.

⁴ For example, if a man's T-Shirt produced in Japan costs about four times a similar T-Shirt made in Thailand, it is immediately deduced that the T-Shirt made in Japan is better than the one made in Thailand in terms of its quality. Nonetheless, it is known that price differences can be the result not only of a difference in quality, but also of different price structures (Faruq, 2006). Recently, other more complex indicators were put forward to overcome these problems (see, for instance, Martinez-Zarzoso and Suarez Burguet, 2001); however, the average unit price remains the index most commonly used when applying this type of empirical analysis.

⁵ Specifically, in our dataset, quality variable corresponds to the answer to the following question: 'which market segment do your products target? Possible answers are: (1) high quality; (2) medium high quality; (3) medium low quality; (4) low quality.'

⁶ For a detailed description of the survey see: Morone and Testa, 2007 and Unioncamere-Tagliacarne, 2005. An accurate analysis of the internationalisation section of the survey is provided in Reganati, 2005.

⁷ Note that the current year in our survey is 2003.

Departing from the theoretical framework discussed in section 2, we define a set of explanatory variables.

In our dataset, firm's size is a variable coded in three categories; it defines micro-sized firms (less than or equal to 9 employees), small-sized firms (between 10 and 49 employees) and medium-sized firms (between 50 and 249 employees). To handle this variable, we define two dummies (i.e. micro and small) and take the third (i.e. medium) as the base category. We define ten sectoral dummies and choose the clothing sector as the reference omitted category. This enables us to capture the future export performance of the other sectors with respect to the base category (clothing). We also consider firms' age defining six dummy variables and picking the first one (i.e. firms established before 1961) as the base category.

Quality_{it} is defined as a dummy variable which takes the value 1 if the firm produces goods of high and medium-high quality and 0 if the firm produces goods of low and medium-low quality.⁸ Innovation strategies are captured by four dummy variables indicating whether the firm has introduced process, product, organisational or marketing innovations over the period 2001-2002.⁹

The rationale for including in our model quality and innovation variables is that we believe that innovation – although increasingly seen as a powerful way of getting a competitive advantage – is not the only viable strategy to gain access to foreign markets. Under certain circumstances, producers might accumulate a knowledge-base which is useful for production without engaging in formal innovation activity but simply performing over time production routines. This might eventually lead to the development of high-quality and knowledge-intensive products.

Finally, we include in our model *export_{it}*, which is a dummy variable taking the value of 1 if the firm exports in the current year (2003). This variable helps to evaluate the persistence in the decision to export as well as the presence of sunk costs in accessing export markets.

⁸ For the sake of simplicity, we shall refer from now on to this dichotomy simply as low and high quality.

⁹ Product innovation refers to changes in products and/or services which a firm offers; process innovation refers to changes in the way in which they are created and delivered; organisational change refers to changes

3.2 Descriptive statistics

The two columns of table 1 show respectively the percentage of firms exporting at the year 2003 and the percentage of the firms expecting to export over the period 2004-2005. These percentages are disaggregated by size, sector and age.

Almost 46 percent of medium-sized firms expect to export over the coming two years, while, for small- and micro-sized firms, this figure falls to 34 and 18 percent, respectively.

Compared with the percentage of firms which currently export, the share of small-sized firms expecting to export falls from 38 to 34 and the share of medium-sized firms expecting to exports falls from 55 to 46; on the contrary, the share of micro-sized firms expecting to export rises from 16 to 18.

At sectoral level, we see that the percentage of currently exporting firms operating in the food and beverage industry is about 18 percent, and a relatively large percentage of firms operating in the same industry expect to export in the coming two years (about 25 percent). A similar trend is observable in the wood and furniture and the metal sectors. Table 1 shows that, compared to the percentage of firms which are currently exporting, the percentage of firms expecting to export in wood and furniture rises from 17 to 19 and in metal industry rises from 26 to 27.

Hence, there is a substantial persistence in the export behaviour for firms operating in several traditional sectors (food and beverage, wood and furniture and metal). Conversely, the percentage of firms operating in typical core sectors¹⁰ (chemicals and electronics) expecting to export is lower than that of current exporters.

With respect to firms' age structure we can notice that while younger firms (i.e. those established after 1990) expect to increase their exports over the coming two years, older firms expect an opposite trend.

in the context in which the products and services are introduced and marketing innovation refers to changes in the marketing strategy.

¹⁰ We refer to the industrial taxonomy first introduced by Robson et al. (1988).

Table 1. Basic descriptive statistics

	Exporting (t)		Expecting to export (t+1)	
	0	1	0	1
Size (t)				
Micro	83.48%	16.52%	81.83%	18.17%
Small	61.34%	38.66%	66.27%	33.73%
Medium	44.85%	55.15%	54.32%	45.68%
Sector (t)				
Food & beverage	81.42%	18.58%	75.23%	24.77%
Clothing	73.82%	26.18%	75%	25%
Footwear, leather	62%	38%	68%	32%
Wood and furniture	83.33%	16.67%	80.91%	19.09%
Chemical & plastic products	63.38%	36.62%	65.49%	34.51%
Non Metallic mineral products	72.18%	27.82%	81.95%	18.05%
Metal products	73.32%	26.68%	72.90%	27.10%
Mechanical products	52.28%	47.72%	61.83%	38.17%
Electrical equipment, motor vehicle	68.44%	31.56%	74.18%	25.82%
Other sectors	75.55%	24.45%	78.47%	21.53%
Age (t)				
Before 1961	50.48%	49.52%	58.10%	41.90%
Between 1961-1970	62.72%	37.28%	65.59%	34.41%
Between 1971-1980	68.89%	31.11%	73.29%	26.71%
Between 1981-1990	79.12%	20.88%	79.77%	20.23%
Between 1991-2000	77.02%	22.98%	75.78%	24.22%
After 2000	82.4%	17.6%	78.4%	21.6%
N.	1886	717	1927	676

Further information on changes in firm's export behaviour can be gathered from tables 2 and 3. Relating export decision to the previous export status and differentiating between micro-, small- and medium-sized firms (see respectively tables 2a, 2b and 2c), we observe that more than 8 percent of non-exporting micro-sized firms expect to become exporters in the coming two years, whereas more than 91 percent are going to remain in the status of non-exporters. For small- and medium-sized firms, the percentage of non-exporters turning into exporters increases by more than 13 percent. This data suggests that larger firms are more dynamic.

Table 2.a Export strategy for micro-firms

		Export strategy (t+1)	
		0	1
Export (t)	0	91.02%	8.98%
	1	35.38%	64.61%

Table 2.b Export strategy for small-firms

		Export strategy (t+1)	
		0	1
Export (t)	0	86.62%	13.38%
	1	33.98%	66.02%

Table 2.c Export strategy for medium-firms

		Export strategy (t+1)	
		0	1
Export (t)	0	86.96%	13.04%
	1	27.78%	72.22%

From tables 3a and 3b, we notice that 8 percent of firms providing low quality products switch from non-exporting to exporting status, whereas for firms producing high quality products, this percentage is twice as large. Again, this finding suggests that firms producing quality goods are more dynamic over time and, hence, more likely to access export markets.

Table 3.a Low-quality firms export strategy

		Export strategy (t+1)	
		0	1
Export (t)	0	91.94%	8.06%
	1	37.57%	62.42%

Table 3.b High-quality firms export strategy

		Export strategy (t+1)	
		0	1
Export (t)	0	84.41%	15.59%
	1	28.68%	71.32%

3.3 Empirical methodology

In order to investigate the determinants of future export decisions of small- and medium-sized Italian manufacturing firms, we estimate a probit model of the following form:

$$P(A_i = 1|x_i) = G(x_i' b_i) = \Phi(x_i' b)$$

where A_i represents firm's decision of becoming exporter at time $t+1$, x_i represents our observable vector of explanatory variables and e_i represents an unobservable error term.

Note here that the probit model assumes the normal distribution for the unobservable term and that the marginal effect of each independent variable on the probability of A_i depends on the full vector of regressors through the function G .

As discussed earlier, a firm's knowledge base is accumulated both by engaging directly in innovative activities (hence performing a search process which eventually leads to some sort of innovation) and by performing over time production routines which may lead to the development of high-quality and knowledge-intensive products. Hence, by including in our model solely formal innovation activities we might incur in an omitted variable problem.¹¹ We mitigate this bias by using the proxy $quality_{i,t}$ as discussed in section 3.1.¹²

We then move to examine whether export performance varies between firms which rely on their distinctive competence to provide high-quality products and those which offer low-quality products. Specifically, we aim at studying whether our sample may be divided into two sub-samples corresponding to the two types of firms and if this is the case, we may need to decide whether to apply our regression model to both categories or whether we need to keep them separately. We intend to do so performing a Chow test.¹³

However, before conducting the Chow test, we check for the linearity of our model. In order to do so, we compare the pseudo R^2 of the probit model with the adjusted R^2 of a linear probability model and establish an approximate relationship between the two models. Here, it is worth recalling that the econometric literature (see Wooldridge, 2005) suggests how to compare the probit estimates with those of linear probability model. Specifically, using a rough rule of thumb (i.e. using the scale factor $g(0)$ ¹⁴, which is equal to 1 for the linear probability model and to 0.4 for the probit model), we can divide the probit estimates by 2.5 to make them comparable to those of the linear probability model.

If the two models provide consistent results, we can consider the underlying model as linear and, hence, proceed to perform the Chow test. As mentioned before, in applying this test, we split our sample into two sub-samples and run separate regressions. The Chow test

¹¹ Omitted variables appear when we would like to control for one or more additional variables but, usually because of data unavailability, we cannot include them in a regression model (Wooldridge, 2005). Problems arise when the omitted variables are correlated with one or more of the regressors, since their effect shows up in the error term (see appendix).

¹² We shall maintain that our quality variable, however being qualitative and dichotomous in nature, is an adequate proxy as it does not suffer from the problems associated to price index of traded goods discussed earlier. Note also that from an econometric point of view, if quality would turn to be an imperfect proxy, the estimators would be biased.

¹³ On this test, see Chow (1960).

¹⁴ Note that g is a symmetric density about zero, with unique mode at zero (see Wooldridge, 2005).

compares the regressions over each sub-sample to the regression over the full sample. Under the null hypothesis, there should be no significant difference between both types of firms. We use the F statistic to test this hypothesis.

If the null hypothesis is rejected, then the final specification is the intersection of the two specifications from each sub-sample. We then use the interaction variables' approach by adding to the whole sample regression a new set of variables obtained by letting the reference category (i.e. $quality_{i,t}$) interact with all the independent variables. This approach is informative about how the export strategy differs between the two types of firms.

4. Results and interpretation

In this section we will present the results of the empirical analysis described above. More precisely, we shall report in the first sub-section results obtained running the probit model. We shall then present the results obtained performing the Chow test and the interaction variables approach. This will enable us to further investigate our core research question, that is the relevance of quality in determining future export decisions.

4.1 Results obtained for probit model

As mentioned in section 3, we run two separate model specifications: one that includes all independent variables except $quality_{i,t}$ and one that includes also $quality_{i,t}$. In both regressions, our dependent variable is exports propensity at time $t+1$ (i.e. 2004-2005).

In short, the two estimated specifications take the following form:

$$P(\text{export}_{it+1} = 1) = \Phi(b_0 + b_1 \text{size}_{i,t} + b_2 \text{sector}_{i,t} + b_3 \text{export}_{i,t} + b_4 \text{inn}_{i,t-1}) \quad (1)$$

$$P(\text{export}_{it+1} = 1) = \Phi(b_0 + b_1 \text{size}_{i,t} + b_2 \text{sector}_{i,t} + b_3 \text{export}_{i,t} + b_4 \text{inn}_{i,t-1} + g \text{quality}_{i,t}) \quad (2)$$

where $\text{inn}_{i,t-1}$ is a vector which takes the form of product, process, organisational and marketing innovation, undertaken over the period 2001-2002.

As we can see in table 4, most of our independent variables are statistically significant and correctly signed in both models' specification. In particular, we observe that firms' age positively affects future export decisions, suggesting that older firms have a higher propensity to export over the period 2004-2005. The size of the firm is also positively correlated with export_{t+1} , suggesting that small size is a constraint to future exports. As

discussed in section 2, both of these findings are in line with most of the existing empirical literature which points out that older and larger plants are more likely to have more intensive export activity.¹⁵

As far as sectors are concerned, we notice that footwear and leather, clothing, metal products and food and beverage are the sectors with the higher propensity to export over the period 2004-2005. This finding confirms our expectations and suggests that Italian firms still have a substantial comparative advantage in the Made in Italy sectors. However, this result does not apply to wood and furniture, also typically included in the Made in Italy production.

Innovative strategies are all significant and positively signed. Specifically, organisational changes and marketing innovations display the highest coefficients. However, the magnitude of innovation variables' coefficients consistently drops in the second specification of the model, suggesting that not including quality produces overestimated results for innovation variables. This indicates the occurrence of an omitted variable problem, as foreseen in section 3.

In the second model specification, which appears to be the correct one,¹⁶ we obtain results which are comparable to those of the first specification; however, goods' quality seems to be a rather relevant driver of future exports decisions.

Finally, it is worth noting that future exports' decisions are strongly affected by present exporting behaviours, that is to imply that those firms exporting today are more likely to export tomorrow. This finding is consistent with the existing literature which points out the presence of sunk costs of entry into international markets. For instance, in their specifications of export participation decision, Roberts and Tybout (1997) and Clerides, Lach and Tybout (1998) assume that there are sunk entry and exit costs in the export markets.

-Insert Table 4 about here-

Table 4: Probit Analysis: Impact effects

¹⁵ Along with the literature referred to in section 2, please see earlier studies on the benefits of economies of scale for trade propensity: in Germany (Wagner, 1995), Belgium (Glesjer *et al.*, 1980), Japan (Rapp, 1976), France (Auquier, 1980) and the US (Caves, 1986); on the relevance of firms' age to exports trends see Johanson and Vahlne, 1990 and Bernard and Jensen, 1999.

¹⁶ This result is corroborated by the value of the pseudo R^2 which increases in the second model specification.

We attain more insights by calculating the marginal effects of our independent variables upon the dependent variable. In table 5 we report the marginal effects obtained for both model's specifications (1 and 2) discussed above.

-Insert Table 5 about here-

Table 5. Probit Analysis: Marginal effects

We can now quantify the effect of each variable upon future exports decision. Specifically, we can notice that firms established between 1970 and 1990 are roughly 3 percentage points less likely to enter into export markets over the period 2004-2005 than firms established before 1961. This trend is partially reverted for firms established between 1991 and 2000 but applies also to very young firms (i.e. those established after 2000).

Firms' size has a monotonic effect upon future exports. Our finding shows that micro and small firms are respectively 2.7 and 0.4 percentage points less likely to export than medium-sized firms – i.e. increasing the size of the firm the probability of being an exporter increases monotonically.

Sectoral marginal effects confirm our earlier findings showing, on average, a higher probability to be engaged in future exports for firms operating in the Made in Italy sectors. Worth noticing is the exception of firms classified under the wood and furniture sector, which, other things being equal, are 6 percentage points less likely to export than firms operating in the clothing sector.

The analysis of marginal effects reveals the presence of substantially high sunk costs as, *ceteris paribus*, firm's export experience reported in the current year increases its likelihood of exporting tomorrow by 50 percentage points. As discussed above, this result is in line with existing empirical literature.¹⁷

Finally, innovating activities undertaken at time *t-1* (i.e. over the period 2001-2002) are indeed a key component in exporting decisions of Italian small and medium enterprises: product and process innovation affects the probability of entering into export markets in the period 2004-2005 by 4.2 and 5.3 percentage points, respectively. Even more relevant appear to be organisational changes and marketing innovations; other things being equal,

¹⁷ For instance, Roberts and Tybout (1997) report that the previous year's export experience increases a plant's likelihood of exporting today by 60 percentage points – result which is rather close to our finding.

SMEs that have introduced in 2003 either one of these two innovations are, on average, 8 percentage points more likely to export over the coming two years.

However, as already observed, the impact of innovation (defined in any of the four forms) drops when quality is introduced into the model. Specifically, small- and medium-sized enterprises that at time t produce quality goods are, *ceteris paribus*, almost 4 percentage points more likely to export at time $t+1$; whereas the impact of process, product, organisational and marketing innovations drops to 4, 4.9, 7.8 and 7.6 percentage points, respectively.

All in all, these findings confirm our hypothesis that quality is a relevant component in determining future exports' patterns. In what follows we will further investigate this hypothesis by conducting a Chow test which will allow us to examine the presence of a structural break in export markets penetration between those firms that produce quality goods on the upper segment of vertically differentiated markets and those SMEs that position themselves on a lower quality range.

4.2 Chow test and interaction variables approach

As discussed in section 3.3, we start this analysis by comparing the results obtained with our probit model with those obtained with a linear probability model (LPM).

-Insert Table 6 about here-

Table 6. Binary choice models: probit and LPM comparison

The linear probability and probit results are displayed for comparison in table 6. The estimates from the two models tell a consistent story: the signs of the coefficient are the same across models and the same variables are statistically significant. However, as discussed in section 3, the magnitudes of the coefficients are not directly comparable across the two models as they are based on different assumptions on the error terms.

By comparing the pseudo R-squared¹⁸ of the probit model with the adjusted R-squared of LPM, we can notice that the latter is higher than the former. Hence, we can confidently apply the linear probability model to our data.

¹⁸ The pseudo R-squared is defined as $1 - [\log L / \log L_{\text{with constant only}}]$.

-Insert Table 7 about here-

Table 7. The Chow test

In order to conduct the Chow test,¹⁹ we report in table 7 the residual sums of squares for the separate regressions (RSS_1 and RSS_2) and the residual sum of squares of the pooled sample regression.

We compare the value of the total residual sum of squares (obtained by summing RSS_1 and RSS_2) with the residual sum of squares from the pooled sample regression. The F-statistic is 1.891 and the critical value of $F(22, 2559)$ at 5% of significance is 1.57. Hence, we conclude that the pooled regression model is an inadequate specification and that we should run separate regressions for the two types of firms.

Once the existence of a structural break is established we can move on to use the interaction variables. This is done by running a standard OLS regression on a model which includes all the original independent variables plus a set of new variables obtained letting interacting the original explanatory variables with a dummy variable which takes the value of 1 if the firm produces low quality goods and zero otherwise. In this way we obtain, for each variable, two distinguished coefficients which can be interpreted respectively as referring to high-quality firms and low-quality firms. By comparing these coefficients we can appreciate the different impacts of our explanatory variables on future export decisions for the two typologies of firms.

-Insert Table 8 about here-

Table 8. Interaction variables' approach results

As it clearly emerges from Table 8, there are substantial differences between high- and low-quality firms. First, we can observe that firms' size affects differently future exports accordingly to the quality level of goods. In fact, while micro- and small-sized firms do not appear to be at a disadvantage when producing low-quality goods (in terms of future exports), a larger size is quite relevant for those firms characterised by high-quality production. The reason for this discrepancy could reside in the fact that high-quality firms

¹⁹ Note here that the equality of the variance of the first half versus the second half of the sample is verified.

are concentrated in traditional sectors (whereas, this is not the case for low-quality producers) and therefore face directly the competition of low-income countries' products.

Since Italian high quality firms cannot match low-cost NICs prices, they try to gain access to foreign markets by developing new products of higher quality. Hence, high-quality firms that sell their products on international markets would be advantaged by larger size, since large firms with greater resources are more likely to commercialise new products successfully.

This, in turn, should result in different impacts of various innovation strategies over exporting propensity. Actually, this interpretation is well supported by our results. In fact, we can observe that high-quality firms have higher probability of exporting when introducing product or market innovation. The opposite is true for low-quality firms, which increase their probability of exporting mainly by means of process innovation and organisational changes.

Note that this finding counters the argument according to which small firms are more inclined to produce high-quality goods; as typically asserted their comparative advantage to produce a high-quality output for special markets "is attributed to the flexibility associated with a lean organization that allows them to provide quick and efficient service. Small firms are depicted as being close to their customers and able to adapt their products to changing customer demands" (Baldwin, 1995). However, in our understanding, since Italian high-quality firms operate mainly in traditional sectors, they must beat low-cost NICs price competition if aiming at exporting. This, in turn, requires an innovative effort which finds in the micro and the small size a constraint.

5. Conclusions

In this paper we address the issue of exports' drivers for Italian small and medium enterprises operating in manufacturing sector. Following the existing literature, we identify a set of variables that could affect firm's future decision to export: size, age, sunk costs (proxied by present exports), sectors, innovating activities and quality production. Running a probit model and using future export's decisions as the dependent variable, we found that older firms have a higher propensity to export, that firm's size is positively correlated with future export's decisions and that sunk costs heavily affect our dependent variable. With respect to sectoral differences we found that the firms with the highest propensity to future

exports are those operating in traditional sectors (i.e. footwear and leather, clothing, metal products and food and beverage), a fact which suggests that Italian firms still have a substantial comparative advantage in the Made in Italy sectors. Innovation also plays a major role in determining firm's probability of being exporter: firms introducing either process, product, organisational or marketing innovations are, on average, between four to eight percentage points more likely to export than firms that do not innovate. Finally, producing quality products increases, *ceteris paribus*, future export's decisions by almost four percentages points.

Once having established these relations, we proceeded testing the hypothesis that quality generates a structural break in our model, suggesting that firms producing for high-quality markets behave differently from those producing for low-quality ones. We verified this hypothesis by means of Chow test and then performed the interaction variables approach in order to appreciate different behaviours.

This second part of our analysis led us to the following two major conclusions: first, the advantage of high-quality firms in exporting is limited to traditional sectors; second, since high-quality firms operate mainly in traditional sectors, they must innovate (mainly process and marketing innovations) in order to beat low-cost NICs price competition on international markets. This, in turn, implies that the micro- and the small-size is a constraint to high-quality firms operating in traditional sectors.

Both these findings have relevant policy implications: on the one hand, quality strategy cannot be considered as a general strategy to revitalise manufacturing exports as a whole, and on the other hand, if quality strategy has to be followed, policy makers should aim to increase the average firm size and facilitate the quality-oriented innovation activities.

Table 4. Probit Analysis: parameters

Probit Analysis				
Dependent variable: export t+1 (2004-2005)	(1)		(2)	
	Coeff.	P > z	Coeff.	P > z
Age (t)				
Before 1961	<i>base</i>		<i>base</i>	
Between 1961-1970	0.002	0.878	0.011	0.314
Between 1971-1980	-0.147	0.000	-0.133	0.000
Between 1981-1990	-0.147	0.000	-0.134	0.000
Between 1991-2000	-0.017	0.078	-0.008	0.403
After 2000	-0.149	0.000	-0.172	0.000
Size (t)				
Micro	-0.106	0.000	-0.106	0.000
Small	-0.019	0.233	-0.023	0.149
Medium	<i>base</i>		<i>base</i>	
Sector (t)				
Food & beverage	-0.042	0.000	-0.032	0.000
Clothing	<i>base</i>		<i>base</i>	
Footwear, leather	0.029	0.017	0.043	0.000
Wood and furniture	-0.273	0.000	-0.274	0.000
Chemical & plastic products	-0.092	0.000	-0.062	0.000
Non Metallic mineral products	-0.242	0.000	-0.230	0.000
Metal products	0.038	0.000	0.057	0.000
Mechanical products	-0.059	0.000	-0.055	0.000
Electrical equipment, motor vehicle	-0.118	0.000	-0.106	0.000
Other sectors	-0.296	0.000	-0.290	0.000
Export (t)	1.564	0.000	1.542	0.000
Innovation variables (t-1)				
Product innovation	0.168	0.000	0.159	0.000
Process innovation	0.210	0.000	0.195	0.000
Organisational change	0.306	0.000	0.293	0.000
Marketing innovation	0.292	0.000	0.280	0.000
Quality (t)	–	–	0.153	0.000
Constant	-1.216	0.000	-1.276	0.000
N.	2603		2603	
Pseudo R2	0.283		0.285	

Table 5. Probit Analysis: marginal effects

Marginal effects and p-values				
Dependent variable: export t+1 (2004-2005)				
	(1)		(2)	
	Coeff.	P > z	Coeff.	P > z
Age (t)				
Before 1961	<i>base</i>		<i>base</i>	
Between 1961-1970	0.0004	0.878	0.003	0.317
Between 1971-1980	-0.034	0.000	-0.031	0.000
Between 1981-1990	-0.035	0.000	-0.032	0.000
Between 1991-2000	-0.004	0.076	-0.002	0.402
After 2000	-0.034	0.000	-0.039	0.000
Size (t)				
Micro	-0.027	0.000	-0.027	0.000
Small	-0.004	0.230	-0.005	0.146
Medium	<i>base</i>		<i>base</i>	
Sector (t)				
Food & beverage	-0.010	0.000	-0.008	0.000
Clothing	<i>base</i>		<i>base</i>	
Footwear, leather	0.007	0.019	0.011	0.001
Wood and furniture	-0.061	0.000	-0.060	0.000
Chemical & plastic products	-0.021	0.000	-0.015	0.000
Non Metallic mineral products	-0.053	0.000	-0.050	0.000
Metal products	0.009	0.000	0.014	0.000
Mechanical products	-0.014	0.000	-0.013	0.000
Electrical equipment, motor vehicle	-0.028	0.000	-0.025	0.000
Other sectors	-0.064	0.000	-0.063	0.000
Export (t)	0.506	0.000	0.497	0.000
Innovation variables (t-1)				
Product innovation	0.042	0.000	0.040	0.000
Process innovation	0.053	0.000	0.049	0.000
Organisational change	0.082	0.000	0.078	0.000
Marketing innovation	0.080	0.000	0.076	0.000
Quality (t)	—	—	0.038	0.000
N.	2603		2603	
Pseudo R2	0.283		0.285	

Table 6. Binary choice models: probit and LPM comparison

Dependent variable: export t+1 (2004-2005)	Chow Test							
	Probit (entire)		LPM (entire)		LPM (high quality)		LPM (low quality)	
	Coeff.	P > z	Coeff.	P > t	Coeff.	P > t	Coeff.	P > t
Age (t)								
Before 1961	<i>base</i>		<i>base</i>		<i>base</i>		<i>base</i>	
Between 1961-1970	0.011	0.314	0.003	0.223	0.021	0.000	-0.010	0.001
Between 1971-1980	-0.133	0.000	-0.031	0.000	0.005	0.199	-0.050	0.000
Between 1981-1990	-0.134	0.000	-0.028	0.000	-0.002	0.627	-0.041	0.000
Between 1991-2000	-0.008	0.403	-0.007	0.000	-0.020	0.000	-0.001	0.741
After 2000	-0.172	0.000	-0.037	0.000	-0.008	0.086	-0.042	0.000
Size (t)								
Micro	-0.106	0.000	-0.038	0.000	-0.109	0.000	0.012	0.003
Small	-0.023	0.149	-0.018	0.000	-0.054	0.000	0.007	0.087
Medium	<i>base</i>		<i>base</i>		<i>base</i>		<i>base</i>	
Sector (t)								
Food & beverage	-0.032	0.000	0.001	0.440	0.109	0.000	-0.043	0.000
Clothing	<i>base</i>		<i>base</i>		<i>base</i>		<i>base</i>	
Footwear, leather	0.043	0.000	0.007	0.006	0.051	0.000	-0.002	0.482
Wood and furniture	-0.274	0.000	-0.047	0.000	-0.043	0.000	-0.046	0.000
Chemical & plastic products	-0.062	0.000	-0.016	0.000	-0.113	0.000	0.024	0.000
Non Metallic mineral products	-0.230	0.000	-0.047	0.000	-0.165	0.000	0.003	0.343
Metal products	0.057	0.000	0.012	0.000	0.027	0.000	0.006	0.001
Mechanical products	-0.055	0.000	-0.007	0.001	0.038	0.000	-0.034	0.000
Electrical equipment, motor vehicle	-0.106	0.000	-0.022	0.000	-0.069	0.000	0.011	0.000
Other sectors	-0.290	0.000	-0.054	0.000	-0.056	0.000	-0.051	0.000
Export (t)	1.542	0.000	0.503	0.000	0.503	0.000	0.499	0.000
Quality (t)	0.153	0.000	0.030	0.000	–	–	–	–
Innovation variables (t-1)								
Product innovation	0.159	0.000	0.032	0.000	0.043	0.000	0.025	0.000
Process innovation	0.195	0.000	0.042	0.000	0.001	0.486	0.063	0.000
Organisational change	0.293	0.000	0.072	0.000	0.047	0.000	0.091	0.000
Marketing innovation	0.280	0.000	0.081	0.000	0.107	0.000	0.052	0.000
Constant	-1.276	0.000	0.125	0.000	0.211	0.000	0.085	0.000
N.	2603		2603		945		1658	
Pseudo R²	0.2851							
Adjusted R²			0.3276		0.3459		0.2992	

Table 7. The Chow test

RESIDUAL SUM OF SQUARES			
Regression	High quality firms	Low quality firms	Total
	(N. 945)	(N. 1658)	(N. 2603)
	RSS ₁	RSS ₂	RSS ₁ + RSS ₂
Separate	25323.44	33938.43	59261.87
Pooled			60225.39
F-test	1.891		

Table 8. The interaction variables approach results

Dependent variable: export t+1 (2004-2005)		LPM (OLS)	
	Coeff.	P > t	
Age (t)			
Before 1961	<i>base</i>		
Between 1961-1970	0.021	0.000	
Between 1971-1980	0.005	0.150	
Between 1981-1990	-0.002	0.586	
Between 1991-2000	-0.020	0.000	
After 2000	-0.008	0.054	
Size (t)			
Micro	-0.109	0.000	
Small	-0.054	0.000	
Medium	<i>base</i>		
Sector (t)			
Food & beverage	0.109	0.000	
Clothing	<i>base</i>		
Footwear, leather	0.051	0.000	
Wood and furniture	-0.043	0.000	
Chemical & plastic products	-0.113	0.000	
Non Metallic mineral products	-0.165	0.000	
Metal products	0.027	0.000	
Mechanical products	0.038	0.000	
Electrical equipment, motor vehicle	-0.069	0.000	
Other sectors	-0.056	0.000	
Export (t)	0.503	0.000	
Innovation variables (t-1)			
Product innovation	0.043	0.000	
Process innovation	0.001	0.434	
Organisational change	0.047	0.000	
Marketing innovation	0.107	0.000	
Quality (t)	0.126	0.000	
Non_quality x Age (T)			
NQ_Before 1961	<i>base</i>		
NQ_Between 1961-1970	-0.031	0.000	
NQ_Between 1971-1980	-0.055	0.000	
NQ_Between 1981-1990	-0.039	0.000	
NQ_Between 1991-2000	0.019	0.000	
NQ_After 2000	-0.035	0.000	
Non_quality x Size (T)			
NQ_Micro	0.121	0.000	
NQ_Small	0.061	0.000	
NQ_Medium	<i>base</i>		
Non_quality x sector (t)			
NQ_Food & beverage	-0.152	0.000	
NQ_Clothing	<i>base</i>		
NQ_Footwear, leather	-0.053	0.000	
NQ_Wood and furniture	-0.003	0.451	
NQ_Chemical & plastic products	0.137	0.000	
NQ_Non Metallic mineral products	0.168	0.000	
NQ_Metal products	-0.020	0.000	
NQ_Mechanical products	-0.072	0.000	
NQ_Electrical equipment, motor vehicle	0.081	0.000	
NQ_Other sectors	0.005	0.209	
Non_quality x Export (t)	-0.004	0.088	
Non_quality x Innovation variables (t-1)			
Product innovation	-0.017	0.000	
Process innovation	0.061	0.000	
Organisational change	0.044	0.000	
Marketing innovation	-0.055	0.000	
Constant	0.085	0.000	
N.	2603		
Adj R-squared	0.3384		

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Appendix - Issues on omitted variable bias

Assuming a linear form, our model can be written as:

$$export_{it+1} = b_0 + b_1 size_i + b_2 sector_i + b_3 export_{it} + b_4 inn_{it-1} + gq + v \quad (1)$$

If q – denoting an omitted variable- was not observable, we can handle it by putting it into the error term.

$$export_{it+1} = b_0 + b_1 size_i + b_2 sector_i + b_3 export_{it} + b_4 inn_{it-1} + u$$

where $u = gq + v$

In this circumstance, OLS give consistent estimate of any β_j if and only if q is uncorrelated with each of the observable regressors.

Under the assumption that *size*, *sector* and *export* are consistently estimated by the OLS regression that omits q , and writing the linear projection of our unobservable variable q onto the observable explanatory variable as:

$$q = d_0 + d_4 innovation + r \quad (2)$$

and plugging (2) into equation (1), we have:

$$\begin{aligned} export_{it+1} &= b_0 + b_1 size_i + b_2 sector_i + b_3 export_{it} + b_4 inn_{it-1} + gd_0 + gd_4 inn_{t-1} + gr + v \\ export_{it+1} &= b_0 + gd + b_1 size_i + b_2 sector_i + b_3 export_{it} + (b_4 + gd_4) inn_{t-1} + gr + v \end{aligned}$$

In this case, if $d_4 > 0$, then the coefficients of innovation variables are likely to be overestimated.