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

Cesare Imbriani and Piergiuseppe Morone and Giuseppina Testa

Università degli Studi di Roma "La Sapienza", Università degli Studi di Foggia, Università degli Studi di Foggia

19. December 2008

Exporting quality: is it the right strategy for the Italian manufacturing sector?[♦]

Cesare Imbriani

University of Roma "La Sapienza"
Dipartimento di Scienze Giuridiche
Sezione di Economia e Finanza
cesare.imbriani@uniroma1.it

Piergiuseppe Morone

University of Foggia,
Dipartimento di Scienze
Economiche e Matematiche
p.morone@gmail.com

Giuseppina Testa[♣]

University of Foggia,
Dipartimento di Scienze
Economiche e Matematiche
g.testa@unifg.it

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 largely on SMEs, is struggling to regain competitiveness in global markets. In light of these stylised facts, we first investigate whether innovating activities and quality goods' production enhance Italian SMEs' probability to be exporter. Our findings suggest that both products' quality and innovative activities affect considerably SMEs' likelihood to export. Subsequently, 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. The former are more likely to export if they introduce product innovation, marketing innovation and/or organisational changes, the latter increase their chances of exporting when introducing process innovations and organisational changes.

JEL classification: L1, O31, C24

Keywords: SMEs, exports, innovative activities, quality, probit.

[♦] We wish to thank Ottavio Ricchi for the useful comments provided. Moreover we would like to thank the participants at the CNR Economia Internazionale Workshop, held in Villa Mondragone - Frascati (Roma, 17-18 September 2007).

[♣] Corresponding author. Please send any correspondence to the following email address: g.testa@unifg.it.

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, 2008) 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 (Basile et al., 2006; Borin and Quintieri, 2006; Bugamelli, 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. 1 Internationalisation strategies: a brief literature review

As mentioned above, a growing challenge for large and small firms is to survive in an environment that has become increasingly competitive over the last decades. Several authors (Bernard and Jensen, 1999; Melitz, 2003; Bernard et al., 2003; Imbruno, 2008) pointed out, both from a theoretical and an empirical perspectives, how such growing pressure results in a general increase of firms productivity. In a widely cited paper, Melitz (2003) proposed a dynamic industry model with heterogeneous firms which shows how the reduction of barriers to trade induces more productive firms (within an industry) to export while simultaneously forcing the least productive firms (within the same industry) to exit the market. The long-run effect is, thus, a reallocation of resources towards the more productive firms and an aggregate increase of productivity. In light of such theoretical considerations, firms must increase their productivity if they want to preserve a position in international markets. Various strategies have been suggested to increase firms' productivity and their international competitiveness; for instance, firms could aim at product differentiation, quality-upgrading and, of course, product and process innovations. Bearing in mind the Italian specialisation model (largely based on small and medium enterprises operating in traditional sectors - see, among others, the classical contributions of Modiano; 1984; Soru; 1985; Sirilli; 1985 and more recent studies by Basile et al., 2006; Bugamelli, 2006; Lamieri and Lanza, 2006), the factors that should be taken into consideration as potential drivers of a shift towards foreign markets are: (a) firm's size; (b) the presence of sunk costs; (c) firm's age (d) innovation strategies, and (e) the quality of the exported products. This latter factor is particularly relevant in the Italian case, highly characterised by the *Made in Italy* model and 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 a firm's decision to export.

The empirical literature on the link between firm's export and size is quite broad in scope (Bonaccorsi, 1992; Calof, 1994; Bugamelli at 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]

[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.

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.

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; Castellani, 2002; Roper and Love, 2002; Basile et al., 2003) and the magnitude of exports (Basile, 2001; Castellani, 2002; 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 (i.e. its specific characteristics) and to the local productive structure. Along the line of the work of Melitz (2003) and under the assumption of heterogeneous firms, several studies have recently focused on product differentiation and quality-upgrading mechanism as viable tools to improve productivity and increase exports (see, for instance, De Loecker, 2008; Baldwin and Harrigan, 2007; Johnson 2008; Kugler and Verhoogen, 2008).

In a recent work, Verhoogen (2008) argues that firms with high productivity produce higher-quality goods and are willing to pay higher wages to maintain a higher-quality workforce. In his model, quality upgrading is generated by the increased export. However, reverse causation may operate as quality upgrading may be undertaken in order to boost exports.[2] Note that the issue of causality here discussed is part of the general debate which confronts a 'learning by exporting' hypothesis with a 'self-selection' one (on this debate see: Bernard and Jensen, 2004; Melitz and Ottaviano, 2005; Baldwin, 2005; and for an empirical test applied to the Italian case see Corcos et al. (2007); Bratti and Felice, 2008; Imbruno, 2008).

Focusing on the role of local productive systems, 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 the 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 and of an inferior quality.

Traditionally, economists have offered two sets of explanations to the 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 high quality goods. Another group of scholars argues that the qualitative distribution of trade patterns between Northern and Southern countries[3] 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

[2] Note that this argument resembles, *mutatis mutandi*, seminal contributions by Romer (1987, 1990), Grossman and Helpman (1991) and Aghion and Howitt (1992).

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.[4] 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.[5] 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.[6] 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.[7]

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 years[8] (2004-2005) and 0 otherwise.

---

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

[4] 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.

[5] 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.

[6] 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 quality; (4) medium low quality; (5) low quality.

[7] 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.

[8] Note that the current year in our survey is 2003.

It is worth noting that our dependent variable may be subject to a problem of measurement error due to the fact that it may reflect some 'wishful thinking' of the firm, which, eventually, might not be able to face the cost of exporting (due, for instance, to an incorrect evaluation or to unpredictable shocks). On the other hand, a firm might incur in the opposite problem understating its exporting potential.

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 medium, low and medium-low quality.[9] 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.[10]

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

[9] For the sake of simplicity, we shall refer from now on to this dichotomy simply as low and high quality. Note that using a fourfold or a threefold definition of quality (i.e. decomposing the variable respectively in: low quality, medium-low quality, medium-high quality and high quality; low quality, medium quality and high quality) does not affect our results (see appendix, table A1).

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

performing over time production routines. This might eventually lead to the development of high-quality and knowledge-intensive products.[11]

However, to explore the relationship between innovation and quality, heterogeneity across industries should be taken into account. This is because the process of producing high-quality products may require formal innovation activities in industries with vertical differentiation, whereas in other industries quality is more linked to variable costs (raw materials in the furniture industry are an example).[12]

Finally, we include in our model $export_{i,t}$ 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.

3.2 Descriptive statistics

Inspecting the whole sample data disaggregated by size, sector and innovation activities, we confirm the most common stylized facts about the Italian specialisation model, such as micro-sized dimension and traditional sectors (see table 1). Looking at firms' distribution across size, we can observe that micro-sized firms are around 60 percent, followed by small firms (around 26 percent) and medium firms (around 14 percent).

Looking at firms' distribution across sectors, we can observe a high concentration of our sample of SMEs in four traditional sectors (food & beverage, clothing, wood and furniture).

When looking at innovative activities, we can see that the percentage of firms engaged in product and process innovation is around 32 percent, whereas the percentage of firms engaged in organisational and marketing changes are 19 and 12 percent, respectively.

It seems worthwhile looking at firms' distribution across the different categories of quality and size. From table 2 it appears that the percentage of firms producing high-quality products increases with size rising from 7 percent to 11 percent. The opposite is true for medium and medium-low quality goods.

[11] In fact, as far as the relation between quality and innovation is concerned, one could object saying that quality is captured and explained by the set of innovation's variables. However, the correlation between our quality variable and the set of innovative activities' variables is very poor (it goes from 0.16 to 0.18). Moreover, the model specification with quality variable is also supported by the LR-test (see appendix, table A2).

Table 1. Basic descriptive statistics

Size (t)	Freq	Percent
Micro	1,574	60.47%
Small	670	25.74%
Medium	359	13.79%
	2,603	100.00%
Sector (t)		
Food & beverage	323	12.41%
Clothing	340	13.06%
Footwear, leather	100	3.84%
Wood and furniture	330	12.68%
Chemical & plastic products	142	5.46%
Non Metallic mineral products	133	5.11%
Metal products	476	18.29%
Mechanical products	241	9.26%
Electrical equipment, motor vehicle	244	9.37%
Other sectors	274	10.53%
	2,603	100.00%
Innovation variables (t-1)[1]		
Product innovation	784	30.12%
Process innovation	842	32.25%
Organisational change	509	19.55%
Marketing innovation	325	12.49%

[1] Totals do not add to 100% due to multiple responses.

Table 2. Firms' distribution across size and quality

Quality	%	Micro	Small	Medium
High-quality	8.87%	7.75%	10.30%	11.14%
Medium-high	27.43%	24.33%	32.24%	32.03%
Medium	54.01%	56.73%	49.70%	50.14%
Medium-low	6.72%	7.62%	5.97%	4.18%
Low	2.96%	3.56%	1.79%	2.51%
	100.00%	100.00%	100.00%	100.00%

Table 3 shows 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.

[12] To the best of our knowledge, there are no theoretical and empirical studies which consider jointly quality and innovation as determinants of firms exporting decisions.

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.

Table 3. Exporting trends - 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

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 sectors[13] (chemicals and electronics) expecting to export is lower than that of current exporters.

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

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.

Table 4.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 4.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 4.c Export strategy for medium-firms

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

Further information on changes in firm's export behaviour can be gathered from tables 4 and 5. Relating export decision to the previous export status and differentiating between micro-, small- and medium-sized firms (see respectively tables 4a, 4b and 4c), 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 5.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 5.b High-quality firms export strategy

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

From tables 5a and 5b, 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.

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:

$$P(A_i = 1|x_i) = G(x'\beta_i) = \Phi(x_i'\beta)$$

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. We mitigate this bias by using the proxy $quality_{i,t}$. as discussed in section 3.1.[14]

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.[15]

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)*[16], 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 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.

---

[14] 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 pointy of view, if quality would turn to be an imperfect proxy, the estimators would be biased.

[15] On this test, see Chow (1960).

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

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:

$$P(export_{it+1} = 1) = \Phi(\beta_0 + \beta_1 size_{i,t} + \beta_2 sector_{i,t} + \beta_3 export_{i,t} + \beta_4 inn_{i,t-1}) \quad (1)$$

$$P(export_{it+1} = 1) = \Phi(\beta_0 + \beta_1 size_{i,t} + \beta_2 sector_{i,t} + \beta_3 export_{i,t} + \beta_4 inn_{i,t-1} + \gamma quality_{i,t}) \quad (2)$$

where $inn_{i,t-1}$ 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 6, 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 finding 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.[17]

[17] 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.

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,[18] 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 6 about here-

Table 6: Probit Analysis: Impact effects

We attain more insights by calculating the marginal effects of our independent variables upon the dependent variable. In table 7 we report the marginal effects obtained for both model's specifications (1 and 2) discussed above.

-Insert Table 7 about here-

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

Table 7. 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.[19]

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, 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) diminishes when quality is introduced into the model. Specifically, small- and

[19] 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, whereas Bugamelli and Infante (2003), by using a large database of Italian manufacturing firms covering the period 1982-1999, found that past experience in foreign markets increases the probability of exporting by about 70 percentage points – result which is rather close to our finding.

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. However, it should be noted that the marginal effect of product quality is lower than the effect of any of the innovation dummies and that the marginal effect of marketing and organisational innovation is greater than that of product and process innovation. This result can be explained, considering that productivity differentials[20] among firms are to a large extent linked to product differentiation and superior firms' organisation, as noted in several recent works (see, for example, Black and Lynch, 2004; Bloom and Van Reenen, 2007; De Loecker 2008). In this perspective, our results might provide some indirect evidence to the fact that the productivity advantage of exporters could be strongly correlated with organisational and marketing innovation, as well as product quality.

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 8 about here-

Table 8. Binary choice models: probit and LPM comparison

The linear probability and probit results are displayed for comparison in table 8. 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

[20] Note that in light of the recent theoretical and empirical international trade literature - showing that exporters are more productive than non-exporters (see, for instance, Mayer and Ottaviano, 2007 or ISGEP,

across the two models as they are based on different assumptions on the error terms. Hence, we can confidently apply the linear probability model to our data.[21]

-Insert Table 9 about here-

Table 9. The Chow test

In order to conduct the Chow test,[22] we report in table 9 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 10 about here-

Table 10. Interaction variables' approach results

As it clearly emerges from Table 10, 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

---

2007) - our estimated coefficient may be biased as we do not take into account firm productivity.

[21] We also tested the presence of the structural break sticking to the probit model specification by using the LR test and obtained comparable results (see appendix, tables A3 and A4).

[22] Note here that the equality of the variance of the first half versus the second half of the sample is verified.

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 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 which various innovation strategies might have over exporting propensity. Actually, this interpretation is well supported by our results. In fact, we can observe that high-quality firms increase their probability of exporting when introducing any kind of innovation beside process innovation. Specifically, product innovation and organisational changes increase high-quality firms' probability to export by more than 4 percentage points, whereas market innovation increases export probability by more than 10 percentage points. The impact of innovation differs for low-quality firms which increase their probability of exporting mainly by means of process innovation (6.1 percentage points) as well as by introducing organisational changes (4.4 percentage points), hence pursuing a type of innovation mainly oriented to price competition.

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 in producing 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 to produce and market high-quality new products; then, the micro and the small size becomes, in fact, a constraint to international competitiveness.

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 product and marketing innovations as well as organisational changes) 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 6. Probit Analysis: parameters

Probit Analysis				
Dependent variable: export t+1 (2004-2005)	(1)		(2)	
	Coeff.	P >| z |	Coeff.	P >| z |
Age (t)				
Before 1961	*base*		*base*	
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	*base*		*base*	
Sector (t)				
Food & beverage	-0.042	0.000	-0.032	0.000
Clothing	*base*		*base*	
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 7. 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	*base*		*base*	
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	*base*		*base*	
Sector (t)				
Food & beverage	-0.010	0.000	-0.008	0.000
Clothing	*base*		*base*	
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 8. Binary choice models: probit and LPM comparison

Dependent variable: export t+1 (2004-2005)	Probit (entire)		Chow Test					
			LPM (entire)		LPM (high quality)		LPM (low quality)	
	Coeff.	P>|z|	Coeff.	P>|t|	Coeff.	P>|t|	Coeff.	P>|t|
Age (t)								
Before 1961	*base*		*base*		*base*		*base*	
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	*base*		*base*		*base*		*base*	
Sector (t)								
Food & beverage	-0.032	0.000	0.001	0.440	0.109	0.000	-0.043	0.000
Clothing	*base*		*base*		*base*		*base*	
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 R^2	0.2851							
Adjusted R^2			0.3276		0.3459		0.2992	

Table 9. 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 10. The interaction variables approach results

Dependentvariable:exportt+1 (2004-2005) LPM (OLS)

	Coeff.	P>|t|
Age (t)		
Before 1961	*base*	
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	*base*	
Sector (t)		
Food & beverage	0.109	0.000
Clothing	*base*	
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	*base*	
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	*base*	
Non_quality x sector (t)		
NQ_Food & beverage	-0.152	0.000
NQ_Clothing	*base*	
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	

REFERENCE

Abbas, A. and Swiercz, P.M. (1991). Firm Size and Export Behaviour: Lessons from the Midwest. Journal of Small Business Management, 71-78.

Philippe A., Howitt, P. (1990). A Model of Growth Through Creative Destruction. NBER Working Papers 3223, National Bureau of Economic Research, Inc.

Amendola, A. (1991). Competitività e Specializzazione delle Esportazioni Italiane: Dinamica della Domanda Mondiale e Struttura dei Mercati di Esportazione in Commercio estero, Competitività e Specializzazione dell'Italia - Consiglio nazionale delle ricerche - Progetto finanziato Struttura ed evoluzione dell'economia italiana, Franco Angeli.

Auquier, A., (1980). Sizes of firms, Exporting Behaviour, and the Structure of French industry. The Journal of Industrial Economics 29, 203–218.

Basile R., Giunta A., Nugent J. (2005). Foreign Expansion by Italian Manufacturing Firms in the Nineties: an Ordered Probit Analysis. Review of Industrial Organization, 23(1), 1-24.

Baldwin, J. R. (1995). Innovation: the Key to Success in Small Firms. Working Paper No. 76, Micro-Economic Studies and Analysis Division, Statistics Canada and Canadian Institute for Advanced Research, Economic Project Growth.

Baldwin, R. (2005). Heterogeneous Firms and Trade: Testable and Untestable Properties of the Melitz model. NBER Working paper No. 11471 (June).

Bernard, A. B. and J. B. Jensen (1999). Exceptional Exporter Performance: Cause, Effect, or Both?. Journal of International Economics, 47, 1-25.

Bernard A. B., Eaton J., Jensen B. and Kortum S. (2003). Plants and Productivity in International Trade. American Economic Review, 93(4), 1268-1290.

Bernard, A. B., Jensen, J.B. (2004). Why some Firms Export. Review of Economics and Statistics, 86: 561-569.

Bertola, G., Garibaldi, P. (2003). The Structure and History of Italian Unemployment. CESifo Working Paper Series No. 907.

Basevi, G. (1970). Domestic Demand and Ability to Export. Journal of Political Economy, 78, 330–337.

Basile, R. (2001). Export Behaviour of Italian Manufacturing Firms over the Nineties: the Role of Innovation. Research Policy, 30,1185-1201.

Black S.E., Lynch L.M. (2004). What's Driving the New Economy: The Benefits of Workplace Innovation. The Economic Journal, 114, F97-F116

Bloom N., Van Reenen J. (2007), "Measuring and Explaining Management Practices Across Firms and Countries", Quarterly Journal of Economics, 122(4), 1351-1408.

Bonino, E. (2007). Intervento Tavola Rotonda "L'Export Italiano alla Sfida della Qualità", Roma, 11-01-2007, Ministero del Commercio Internazionale, available on-line at:

http://www.mincomes.it/interventi_ministro/interventi_2007/interventi_gennaio07/interventi110107.htm (accessed on 11 June 2007).

Bonaccorsi, A. (1992). On the Relationship between Firm Size and Export Intensity. Journal of International Business Studies, 23, 22-38.

Bratti, M., Felice G. (2008). Export and Product Innovation at Firm Level. Paper presented at CNR Workshop (May).

Bugamelli M. (2007). Export Prices, Product Quality and Firms' Characteristic: An Analysis on a Sample of Italian firms. Temi di discussione (Economic working papers) 634, Bank of Italy, Economic Research Department.

Bugamelli M., Infante L. (2003). Sunk Costs of Exports. Temi di discussione (Economic working papers) 469, Bank of Italy, Economic Research Department.

Bugamelli, M., Cipolline, P., Infante L. (2000). L'Internazionalizzazione Produttiva delle Imprese Italiane negli anni Novanta. Rivista italiana degli economisti, 5(3), 349-386.

Castellani D. (2002). Export Behavior and Productivity Growth: Evidence from Italian Manufacturing Firms. Weltwirtshaftliches Archiv, 138(4).

Caves, R. E. (1986). Exporting Behavior and Market Structure: Evidence from the United States', in H. W. de Jong and W. G. Shepherd (Eds.), Mainstreams in Industries Organization, Dordrecht: Kluwer.

Calof, J.L. (1994). The Relationship between Firm Size and Export Behavior Revisited. Journal of International Business Studies, 25 (2), 367–387.

Corcos G., Del Gatto M., Mion G. and Ottaviano G. (2007). Productivity and Firm Selection: Intra- vs International Trade. Working Paper CRENoS 200706, Centre for North South Economic Research, University of Cagliari and Sassari, Sardinia, revised.

De Benedictis L. (2005). Three Decades of Italian Comparative Advantages. The World Economy, 28(11), 1679-1709.

De Loecker J. (2008). Product Differentiation, Multi-Product Firms and Estimating the Impact of Trade Liberalization on Productivity, mimeo.

De Toni A., Nassimbeni G., (2000). Just-In-Time purchasing: an Empirical Study of Operational Practices, Supplier Development and Performance", OMEGA - International Journal of Management Science, 28 (6), 631-651.

Caves, R., (1986). Exporting Behavior and Market Structure: Evidence from the United States". In: Jong, H., Sheperd, W.G. (Eds.), Mainstreams in Industrial Organization. Martinus Nijhof, Dordrecht, 189–210.

Chow, G.C., (1960). Tests of Equality between Sets of Coefficients in two Linear Regressions. Econometrica ,28(3),591-605.

Clerides, S., Lach S., Tybout J. (1998). Is Learning by Exporting Important? Micro Dynamic Evidence from Colombia, Mexico and Morocco. Quarterly Journal of Economics, 903-947.

Falvey, R. E. (1981). Commercial Policy and Intra-Industry Trade. Journal of International Economics,11, 495-511.

Falvey, R. E., Kierzkowski H. (1987). Product Quality, Intra-Industry Trade and (Im)perferct Competition, in H. Kierzkowski (a cura di), Protection and Competition in International Trade. Oxford: Basil Blackwell.

Faruq H. (2006). New Evidence on Product Quality and Trade. Caepr Working Papers 2006-019, Center for Applied Economics and Policy Research, Economics Department, Indiana University Bloomington.

Flam, H., Helpman H. (1987). Vertical Product Differentiation and North South Trade. American Economic Review, 77, 810-822.

Fontagné, L., Freudenberg M., Péridy N. (1998). Intra-Industry Trade and the Single Market: Quality Matters, CEPR Discussion Paper 1959.

Forsman, M., Solidanter N. (2003). Knowledge Transfer in Clusters and Networks. Journal of International Business Studies - Literature Review, 3, 1-23.

Glesjer, H., Jacquemin, A., Petit, J. (1980). Exports in an Imperfect Competition Framework: an Analysis of 1446 Exporters. Quarterly Journal of Economics 94, 507–524.

Hallak, J. (2006). Product Quality and the Direction of Trade. Journal of International Economics, 68(1), 238-265, January.

Hummels, D., Klenow, P. J. (2005). The Variety and Quality of a Nation's Exports. American Economic Review, American Economic Association, 95(3), 704-723, June.

Imbruno, M. (2008). International Trade, Economic Performance and Market Integration: a Firm-Level Analysis of Italian Manufacturing Sector. MA thesis, Department of Economics, University of Sussex.

Italian Economic Watch (2007). Macroeconomic Adjustment in the Euro Area II: Italy, available on-line at: http://italyeconomicinfo.blogspot.com/ (accessed on 11 June 2007).

ISGEP (2007). Export and Productivity: Comparable Evidence from 14 Countries. Working Papers 0714, University of Urbino Carlo Bo.

ISTAT (2004). Alcuni Aspetti della Dinamica dell'Interscambio Commerciale dell'Italia, available on-line at: www.istat.it/istat/audizioni/141004/Dossier3.doc (accessed on 11 June 2007).

Johanson, J., Vahlne, J.E. (1990). The Mechanism of Internationalization. International Marketing Review, 7(4), 11-24.

Kirpalani, V. H., Macintosh, N. B. (1980). International marketing effectiveness of technology-oriented small firms. Journal of International Business Studies, Winter: 81-90.

Kumar, N., Siddharthan, N. S. (1994). Technology, Firm Size and Export Behaviour in Developing Countries: The Case of Indian Entreprises. Journal of Development Studies, 31, 289-309.

Lamieri M., Lanza A. (2006). La Ripresa passa attraverso la Qualità: una Analisi del Potere di mercato delle imprese italiane. Imprese e territorio, rivista di analisi economica, 1(1), 22–29.

Lanza, A., Quintieri B. (2007). Eppur si muove: come cambia l'export italiano", collana Analisi della Fondazione Manlio Masi, edizione Rubbettino.

Mayer T., Ottaviano G.I.P. (2007). The Happy Few: The Internationalisation of European Firms", Bruegel Blueprint Series, November 2007.

Martinez-Zarzoso, I., Suarez-Burguet, C. (2000). The Determinants of Trade Performance: Influence of R&D on Export Flows. Applied Economics, Taylor and Francis Journals, vol. 32(15), 1939-46, December

Melitz, M. (2003). The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity," Econometrica, LXXI, 1695–1725.

Melitz, M., Ottaviano G. (2005). Market size, Trade, and Productivity. Revision of NBER Working Paper No. 11393.

Modiano, P. (1982). Competitività e Collocazione Internazionale delle Esportazioni Italiane: il Problema dei Prodotti Tradizionali. Economia e Politica Industriale, 33.

Modiano P. (1984). La Collocazione Internazionale dell'Industria Italiana: un tentativo di Interpretazione di alcune Tendenze Recenti. Economia Italiana, 3.

Morone, P. (2005). I Fattori di Competitività delle PMI; in AAVV, Le piccole e Medie Imprese nell'Economia Italiana, Unioncamere-Tagliacarne, Rapporto 2004 sulle PMI nell'economia italiana, FrancoAngeli Editore, 2005.

Morone, P., Testa, G. (2008). Firms Growth, Size and Innovation. Economics of Innovation and new Technology, 17(4).

Nassimbeni G., (2001). Technology, Innovation Capacity, and the Export Attitude of Amall Manufacturing Firms: a Logit / Tobit Model. Research Policy, 30, 245-262.

Onida, F. (1999). Quali Prospettive per il Modello di Specializzazione Internazionale dell'Italia', Economia Italiana, 3, 573–626.

Özler, Ş., E. Taymaz and K. Yilmaz, (2007). History Matters for the Export Decision. ERC Working Papers in Economics, N. 07

Petrucci A., & Quintieri B. (2001) Will Italy Survive Globalization? A specific factor model with vertical product differentiation, in S. W. Arndt e H. Kierzkowski (a cura di) Fragmentation: New Production Patterns in the World Economy, Oxford University Press

Pinch, S., Henry N., Jenkins M., Tallman S. (2003). From 'Industrial District' to 'Knowledge Clusters': A Model of Knowledge Dissemination and Competitive Advantage in Industrial Agglomerations. Journal of Economic Geography, 3, 373-388.

Rapp, W. (1976). Firm size and Japan's Export Structure In: Patrick, H. (Ed.), Japanese Industrialization and its Social Consequences. The University of California Press, Berkeley, 201–248.

Roberts, M. J., Tybout J. R. (1997). The Decision to Export in Colombia: An Empirical Model of Entry with Sunk Cost. American Economic Review, 545-564.

Robson, M., Townsend, J. and K. Pavitt (1988). Sectoral Patterns of Production and Use of Innovations in the U.K.: 1945-1983. Research Policy, 17(1), 1-14.

Roper, S. and Love, J.H. (2002). Innovation and Export Performance: Evidence from the UK and German Manufacturing Plants. Research Policy, 31, 1087-1102.

Schott P. K., (2004). Across-Product Versus Within-Product Specialization in International Trade," The Quarterly Journal of Economics, MIT Press, 119(2), 646-677.

Sirilli G., (1985). Gli indicatori della scienza e della tecnologia, in Onida F. (a cura di).

Soru A., (1985). Tendenze negli anni '70 per settori disaggregati' in Onida F. (a cura di).

Sterlacchini A., (1999). Do Innovative Activities Matter to Small firms in Non-R&D Intensive Industries? An application to Export Performance. Research Policy, 28, 819-832.

Sterlacchini, A. (2002). The Determinants of Export Performance: a Firm-Level Study in Italian Manufacturing. Welwirtschaftliches, 137 (3).

Verhoogen E. (2008). Trade, Quality Upgrading and Wage Inequality in the Mexican Manufacturing Sector. Quarterly Journal of Economics, CXXIII (2), 2008

Vermeulen, P. (2004). Factor Content, Size, and Export Propensity at the Firm Level. Economics Letters, 82(2), 249-252.

Wagner, J., (1995). Exports, firm size, and firm dynamics. Small Business Economics, 7, 29–39**.**

Wakelin, K., (1998). Innovation and Export Behaviour at the Firm Level. Research Policy, 26, 829-841.

Wooldridge, J.M. (2002). Econometric Analysis of Cross Section and Panel Data. Cambridge, The MIT Press.

Appendix

Table A1. Probit analysis: marginal effects for different specification of quality

Marginal effects and p-values

Dependent variable: export t+1 (2004-2005)	(1)		(2)		(3)	
	Coeff.	P>|z|	Coeff.	P>|z|	Coeff.	P>|z|
Age (t)						
Before 1961	*base*		*base*		*base*	
Between 1961-1970	0.002	0.428	0.001	0.619	0.003	0.317
Between 1971-1980	-0.033	0.000	-0.034	0.000	-0.031	0.000
Between 1981-1990	-0.032	0.000	-0.033	0.000	-0.032	0.000
Between 1991-2000	-0.002	0.300	-0.005	0.040	-0.002	0.402
After 2000	-0.039	0.000	-0.039	0.000	-0.039	0.000
Size (t)						
Micro	-0.027	0.000	-0.026	0.000	-0.027	0.000
Small	-0.005	0.155	-0.005	0.197	-0.005	0.146
Medium	*base*		*base*		*base*	
Sector (t)						
Food & beverage	-0.007	0.001	-0.007	0.001	-0.008	0.000
Clothing	*base*		*base*		*base*	
Footwear, leather	0.010	0.001	0.012	0.000	0.011	0.001
Wood and furniture	-0.061	0.000	-0.060	0.000	-0.060	0.000
Chemical & plastic products	-0.016	0.000	-0.012	0.000	-0.015	0.000
Non Metallic mineral products	-0.050	0.000	-0.051	0.000	-0.050	0.000
Metal products	0.013	0.000	0.015	0.000	0.014	0.000
Mechanical products	-0.013	0.000	-0.013	0.000	-0.013	0.000
Electrical equipment, motor vehicle	-0.027	0.000	-0.026	0.000	-0.025	0.000
Other sectors	-0.062	0.000	-0.062	0.000	-0.063	0.000
Export (t)	0.499	0.000	0.499	0.000	0.497	0.000
Innovation variables (t-1)						
Product innovation	0.041	0.000	0.040	0.000	0.040	0.000
Process innovation	0.050	0.000	0.051	0.000	0.049	0.000
Organisational change	0.079	0.000	0.080	0.000	0.078	0.000
Marketing innovation	0.078	0.000	0.076	0.000	0.076	0.000
Quality (t)*	0.019	0.000	0.024	0.000	0.038	0.000
N.	2603		2603		2603	
Pseudo R2	0.2843		0.284		0.285	

* In the first column quality is defined as a variable taking value 0 if the firm produces goods of low quality, 1 if the firm produces goods of medium-low quality, 2 if the firm produces goods of medium-high quality and 3 if the firm produces goods of high quality. In the second column quality is defined as variable taking value 0 if the firm produces goods of low quality, 1 if the firm produces goods of medium quality and 2 if the firm produces goods of high quality. In the third column quality is defined as variable taking value 1 if the firm produces goods of high, medium-high and value 0 if the firm produces goods of low and medium-low quality.

Table A2. Probit analysis: LR-test on the relevance of quality

Marginal effects and p-values

Dependent variable: export t+1 (2004-2005)	(1)		(2)	
	Coeff.	P>|z|	Coeff.	P>|z|
Age (t)				
Before 1961	*base*		*base*	
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	*base*		*base*	
Sector (t)				
Food & beverage	-0.010	0.000	-0.008	0.000
Clothing	*base*		*base*	
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	
Likelihood-ratio test				
LR chi2(1)	1036.61			
Prob > chi2	0.0000			

Table A3. Probit model: the Chow Test

Dependent variable: export t+1 (2004-2005)	Chow Test					
	Probit (entire)		Probit (high quality)		Probit (low quality)	
	Coeff.	P >| t |	Coeff.	P >| t |	Coeff.	P >| t |
Age (t)						
Before 1961	*base*		*base*		*base*	
Between 1961-1970	0.011	0.314	0.055	0.001	-0.042	0.007
Between 1971-1980	-0.133	0.000	0.023	0.129	-0.248	0.000
Between 1981-1990	-0.134	0.000	-0.002	0.880	-0.222	0.000
Between 1991-2000	-0.008	0.403	-0.057	0.000	0.021	0.130
After 2000	-0.172	0.000	-0.066	0.001	-0.246	0.000
Size (t)						
Micro	-0.106	0.000	-0.343	0.000	0.088	0.000
Small	-0.023	0.149	-0.149	0.000	0.071	0.001
Medium	*base*		*base*		*base*	
Sector (t)						
Food & beverage	-0.032	0.000	0.401	0.000	-0.309	0.000
Clothing	*base*		*base*		*base*	
Footwear, leather	0.043	0.000	0.191	0.000	0.019	0.235
Wood and furniture	-0.274	0.000	-0.202	0.000	-0.322	0.000
Chemical & plastic products	-0.062	0.000	-0.380	0.000	0.092	0.000
Non Metallic mineral products	-0.230	0.000	-0.766	0.000	0.030	0.040
Metal products	0.057	0.000	0.116	0.000	0.018	0.079
Mechanical products	-0.055	0.000	0.148	0.000	-0.228	0.000
Electrical equipment, motor vehicle	-0.106	0.000	-0.299	0.000	0.023	0.048
Other sectors	-0.290	0.000	-0.232	0.000	-0.330	0.000
Export (t)	1.542	0.000	1.528	0.000	1.596	0.000
Innovation variables (t-1)						
Product innovation	0.159	0.000	0.150	0.000	0.144	0.000
Process innovation	0.195	0.000	-0.001	0.855	0.322	0.000
Organisational change	0.293	0.000	0.200	0.000	0.382	0.000
Marketing innovation	0.280	0.000	0.391	0.000	0.157	0.000
Quality (t)	0.153	0.000	–	–	–	–
Constant	-1.276	0.000	-0.932	0.000	-1.426	0.000
N.	2603		945		1658	
Pseudo R^2	0.285		0.290		0.274	
Likelihood-ratio test						
LR chi2(21)	7734.97					
Prob > chi2	0.0000					

Table A4. Probit model: marginal effects- the interaction variables approach results

Dependent variable: export t+1 (2004-2005)	Probit	
	Coeff.	P >| t |
Age (t)		
Before 1961	*base*	
Between 1961-1970	0.013	0.002
Between 1971-1980	0.005	0.131
Between 1981-1990	-0.001	0.880
Between 1991-2000	-0.013	0.000
After 2000	-0.015	0.000
Size (t)		
Micro	-0.091	0.000
Small	-0.034	0.000
Medium	*base*	
Sector (t)		
Food & beverage	0.110	0.000
Clothing	*base*	
Footwear, leather	0.050	0.000
Wood and furniture	-0.045	0.000
Chemical & plastic products	-0.075	0.000
Non Metallic mineral products	-0.124	0.000
Metal products	0.029	0.000
Mechanical products	0.038	0.000
Electrical equipment, motor vehicle	-0.063	0.000
Other sectors	-0.050	0.000
Export (t)	0.488	0.000
Innovation variables (t-1)		
Product innovation	0.037	0.000
Process innovation	-0.001	0.855
Organisational change	0.051	0.000
Marketing innovation	0.108	0.000
Non_Quality (t)	-0.128	0.000
Non_quality x Age (T)		
NQ_Before 1961	*base*	
NQ_Between 1961-1970	-0.022	0.000
NQ_Between 1971-1980	-0.059	0.000
NQ_Between 1981-1990	-0.049	0.000
NQ_Between 1991-2000	0.019	0.000
NQ_After 2000	-0.039	0.000
Non_quality x Size (T)		
NQ_Micro	0.100	0.000
NQ_Small	0.058	0.000
NQ_Medium	*base*	
Non_quality x sector (t)		
NQ_Food & beverage	-0.123	0.000
NQ_Clothing	*base*	
NQ_Footwear, leather	-0.038	0.000
NQ_Wood and furniture	-0.027	0.000
NQ_Chemical & plastic products	0.138	0.000
NQ_Non Metallic mineral products	0.255	0.000
NQ_Metal products	-0.022	0.000
NQ_Mechanical products	-0.075	0.000
NQ_Electrical equipment, motor vehicle	0.088	0.000
NQ_Other sectors	-0.023	0.000
Non_quality x Export (t)	0.017	0.000
Non_quality x Innovation variables (t-1)		
Product innovation	-0.001	0.556
Process innovation	0.086	0.000
Organisational change	0.047	0.000
Marketing innovation	-0.050	0.000
N.	2603	
Adj R-squared	0.2991	