Winter December, 2011

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Claudio Vicarelli
Piero Esposito

LLEE Working Paper Series

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Piero Esposito *Claudio Vicarelli*
Working Paper No. 95
December 2011

Luiss Lab of European Economics
Department of Economics and Finance
LUISS Guido Carli
Viale Romania 32, 00197, Rome -- Italy
http://dptea.luiss.edu/research-centers/luiss-lab-european-economics

Explaining the Performance of Italian Exports during the Crisis: (Medium) Quality Matters

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Piero Esposito*
Sant'Anna School of Advanced Studies (SSSA)

Claudio Vicarelli
Italian National Institute of Statistics (ISTAT)

Abstract

A recent study argues that the contraction in total trade that occurred during the crisis was mainly driven by the fall in high quality goods, which should have higher income elasticity owing to a non-linear Engel curve. Our aims are, on the one hand, to test the quality Engel curve assumption for EU15 imports from Italy and, on the other hand, to ascertain whether a break in income elasticities – either temporary or permanent – occurred during the global financial crisis as a result of the changing preference for quality of consumers in the old EU member states. We test these hypotheses by estimating income and price elasticities of EU imports of consumption goods from Italy for both volumes and market shares.

The contribution of this paper is twofold. First, we introduce a medium quality category, allowing us to make a more detailed reading of the stylised facts about the performance of Italian trade during the crisis. Second, we perform three different versions of the mean group estimator. Our results are consistent with the assumption of a change in the preference for quality. This change may be due either to a shift in consumption from high to medium quality Italian products or to the higher quality, actual or perceived, of Italian medium quality goods compared with the varieties imported from the rest of the world.

JEL: F01, F10, F14, C23
Keywords: Product Quality, Export Elasticity, Panel Data

*Corresponding author; email p.esposito@sssup.it; tel. +393280244616.
Opinion expressed in this article are those of the authors and cannot be attributed to ISTAT.

1. Introduction

Trade linkages, which have been strengthened over the last twenty years by the growth of free trade, acted as the main channel of transmission of the world financial crisis during 2008-9. According to IMF estimates, trade in goods collapsed by 12% in volume terms in 2009, having decelerated in 2008 (2.8%, from 7.5% in 2007).

The contraction in global trade volumes during the crisis was associated with a decline in prices of similar magnitude (-11.4% in US dollars in 2009 according to IMF estimates). This is a not unexpected result as firms try to compress their margins in order to preserve market shares and consumers shift their demand towards cheaper products. Assuming that higher prices for the same product are associated with higher quality, the demand shift towards varieties with a lower price implies a switch to low quality products.

In other words, the recession may have affected differently the demand for goods of different quality, and aggregate price index trends could hide demand shifts among qualities. The relationship between income and quality of goods demanded, which reflects the more traditional link between rising income and increasing consumption of all goods (Engel curve), was formalised in a model by Bils and Klenow (2001) and is known as the "quality Engel curve". Based on this assumption, it follows that high quality goods should be more sensitive to changes in per capita income than goods of lower quality.

The results of a recent study[1] strongly support the suggestion that imports of high quality varieties are more sensitive to variations in GDP than imports of low quality varieties. This evidence has been found for the EU15 countries as a whole (imports by EU15 from each market of origin); however, disentangling the destination markets could produce different results.

In this paper we analyse the role of quality in explaining Italy's trade performance during the global financial crisis. In particular, our aims are, on the one hand, to test the quality Engel curve assumption and, on the other hand, to ascertain whether a break in income elasticities – either temporary or permanent – occurred during the global financial crisis as result of the changing preference for quality of consumers in the old EU member states.

The first aim has relevance for Italy for two reasons. First, Italian manufacturing is structurally specialised in high quality goods (and hence in goods with higher value added and higher prices), including in the "traditional" sectors (such as footwear, leather and textiles). Second, previous empirical findings support the assertion that in the last decade the Italian manufacturing industry has moved further towards higher quality goods in response to competition from the emerging economies.[2] In other words, if the assumption that higher quality goods suffered most during the crisis holds, Italian exports could have been harmed more than those of its competitors because of its manufacturing specialisation and the recent shift towards higher quality goods.

As to our second aim, although it is impossible at the moment to know whether the crisis will result in a permanent or a temporary change in elasticities, any break in this relationship during the crisis could provide important information on future trends in Italian trade, particularly since the end of the recession still seems far away.

The contribution of this paper is twofold. We introduce a medium quality category allowing us to make a more detailed reading of the stylised facts about the performance of Italian trade

[1] See Berthou and Emlinger (2010).

[2] Several studies have attempted to explain the sharp increase in export unit values observed in Italy since 2000. One hypothesis is that price increases reflect a production shift towards higher quality goods. Sectoral studies show that there has been an upgrading of quality within different sectors of traditional manufacturing: food processing (Marianera, 2007), footwear (Borin and Quintieri, 2007), clothing textiles (Armenise et al., 2007) and furniture (Calacurcio, 2007). Manzocchi (2007) shows that Italian SMEs have improved the quality of production, managing to increase their market power and the ability to create value added.

during the crisis. We use this classification in both descriptive analysis and estimates. A second novelty of this paper concerns the use of estimators. We perform three different versions of the mean group estimator developed by Pesaran and Smith (1995) to deal with cross-sectional dependent panels. The first version is the common correlated effect mean group (CCEMG) estimator proposed by Pesaran (2006); in addition, we develop two variations of this estimator which augment the mean group estimator respectively with yearly dummies (dumMG) and with cross-sectional averages of all variables over each year (CCERMG). The performance of the three estimators is evaluated on the basis of their ability to remove cross-sectional dependency

The paper is organised as follows. After a brief review of the empirical literature on Italian export performance in the last decade (Section 2) and a description of the aggregation methodology and the construction of price indices (Section 3.1), we describe the evolution of EU imports from Italy in terms of quality (Section 3.2). We then estimate income and price elasticities for consumption goods classified according to their relative quality (high, medium and low) (Section 4). Some brief conclusions follow (Section 5).

2. Empirical literature

As far as we know, to date no papers have been published on the behaviour of Italian trade during the crisis according to the quality level of goods. Some empirical papers on Italian exports that take product quality into account have focused on the similarity between Italy's manufacturing specialisation and that of its competitors (De Nardis and Traù, 2005) or on the intensity of the competitive pressure on Italian exporters of traditional goods (De Nardis and Pensa, 2004).

Looking at the behaviour of Italian firms during the crisis, Bugamelli et al. (2009) use a firm-level dataset to describe how the recession affected the Italian economy and to quantify the impact on Italian firms at both aggregate and sectoral level. The authors seek to determine whether the outbreak of the crisis brought the restructuring process to a halt. In particular, two crucial points are verified: first, whether, other things being equal, firms that had restructured reacted relatively better than the others; second, to what extent the sharp drop in demand and financial markets tensions weighed on companies that, having restructured, had higher debt exposure. The results show that firms involved in restructuring in the first half of the last decade were able, *ceteris paribus*, to bear the impact of the crisis better, reporting less disappointing results in terms of turnover, employment and investment.

Felettigh and Federico (2011) measure the price elasticity of import demand in each of the destination markets of Italian exports. They find that the export elasticity of Italian goods is, on average, lower than that of French, German and Spanish goods. The sectoral and geographical composition therefore seems to expose Italian exports to markets with less elastic demand than the other main competitors. However, the authors stress that their results do not suggest that Italian exports face less elastic demand as a result of their own intrinsic characteristics, i.e. their quality or other product attributes (branding, post-sales assistance and other determinants of non-price competitiveness). Their estimates only capture a "composition effect", which comes from the sectoral and geographical specialisation.

More in general, several papers have recently tried to understand the reasons behind the trade collapse that characterised the last episode of financial turbulence. This collapse has been greater than the fall in GDP. As regards the collapse in volume terms, evidence points to the role of a composition effect between sectors (some sectors, whose contribution to world trade is larger than their contribution to GDP, have been more affected than others), the role of inventories (tending to amplify the adjustment through international trade in goods), or the role of trade finance instruments (which became unavailableat the height of the crisis) (see for instance Alessandria et al., 2010).

As for the different reasons for the collapse of trade prices, Francois and Woerz (2009) show that part of the drop in import prices can be explained by the fall in world commodity prices, which affected raw materials and manufactured goods. The decrease in manufactured goods prices could also be due to a contraction in mark-ups; firms may have decided to reduce their profit margins to save their market share, with repercussions on individual prices and the composition of imported varieties.

For our purposes, the most interesting paper is the one by Berthou and Emlinger (2010). They investigate whether the selection of vertically differentiated varieties, within product categories, can explain the decrease in import price indices in 2009. The authors use detailed product level data on EU15 imports provided by Eurostat and the distribution of unit values for each destination market and product category in order to classify import flows as low or high quality. They find some evidence that 24% of the collapse in the trade price index of the EU15 during the 2008-9 crisis can be attributed to a larger decrease in demand for high quality varieties that are sold at a higher price on the European market. The authors' results for the import demand elasticity of a large set of importers, exporters and product categories strongly support the contention that imports of high quality varieties are more sensitive to GDP variations than imports of low quality varieties.

This is a very interesting (and crucial) point. Advanced economies usually specialise in the production of high quality goods. This characteristic has allowed them to shield their exports (and their market shares) from the competition of emerging economies in international markets. If, in times of crisis, goods (especially in traditional manufacturing sectors) of a lower quality produced by emerging economies become a good substitute for higher quality (and more expensive) goods, it follows that countries that specialise in producing and exporting such goods could suffer more than other countries (but equally they should experience a faster increase in export volumes in times of economic recovery).

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3. Italian export behaviour during the crisis: methodological issues and descriptive evidence

3.1 Price and quality measurement in international trade

For our analysis we classify EU imports of consumer goods from Italy into three quality levels (high, medium and low). To do so, we use monthly trade data taken from the Eurostat COMEXT database, with a CN8 product disaggregation, and we build quarterly observations by aggregating the monthly data.

The measurement of product quality is a complicated issue as there are no direct and objective measures of the quality of a particular good. The main proxy for product quality is given by its price, based on the assumption that price differences between goods belonging to the same product category reflect quality differences. Import and export prices are approximated by unit values, as only values and quantities (in a basic unit of measurement such as kilos or litres) are reported. In the intra-industry trade literature a relative measure of product quality is given by the ratio between the unit values (the unit value ratio, or UVR) of bilateral import and export flows (see, for example, Fontagné et al., 2006 and 2008). Products with a UVR above (below) 1 plus (minus) a given threshold[3] are considered to be of high (low) quality and their flows are explained by the theory of vertical differentiation (Flam and Helpmann, 1987; Hummels et al., 2001). Products with a UVR of around 1 are considered to be horizontally differentiated. In a multilateral framework, product quality can be measured by the UVR of imports in a given destination market. Assuming that imports of the same product from different countries represent different varieties of that product, high (low) quality varieties are those with a unit value above (below) the average unit

[3] The threshold is included in order to account for transport costs. Without it, horizontally differentiated goods would be classified as vertically differentiated. The usual thresholds are 15% and 25%.

values for all imports. We follow the latter approach and classify a given product as low (high) quality if its unit value is at least 15% lower (higher) than the average import unit value of all partners. All the remaining goods (whose prices differ less than 15% from the average import unit value) are defined as medium quality goods. The inclusion of the latter category is necessary as goods of similar quality are more sensitive to price variations, while quality differentiated goods should react more to income variations, so that not separating this category from the others could result in an underestimation of income elasticities and an overestimation of price elasticities.

In order to carry out the empirical analysis in Section 4 we need to build price and volume indices for the three quality levels of consumption goods. For each partner country we aggregate individual unit values using the Törnqvist index in its logarithmic form:

$$\ln P_{(t-1,t)} = \sum_i (\ln p_{i,t} - \ln p_{i,t-1})\left(\frac{s_{i,t-1}+s_{i,t}}{2}\right) \qquad (1)$$

with

$$s_{i,t} = \frac{p_{i,t}q_{i,t}}{\sum_i p_{i,t}q_{i,t}} \qquad (2)$$

where ln p is the log unit value in time t and t-1 for product i and s are the weights, given by their share in total import value. Basically, for each t, this index aggregates price variations between t-1 and t through a geometric mean. After applying the exponential transformation in order to eliminate logs, the final price index is obtained as a concatenate product of the variations occurring in each time period, using 2007 as base year. The use of import shares as weights reduces the problem of instability due to measurement errors in quantities. Volumes are obtained by dividing the value series by their respective price index. For the calculation of price indices and volumes we exclude outliers according to the following rule: first, we exclude observations showing a UVR above 20 or below 0.05 because extremely large differences in Italian and average import unit values suggest that the Italian good is actually a different product and not a different variety of the same product; second, we exclude products showing, in each period, a UVR growth rate outside the range of three standard deviations; finally, for each product we exclude observations outside the range of three standard errors in comparison with the average unit value (UVR) change over the whole period.

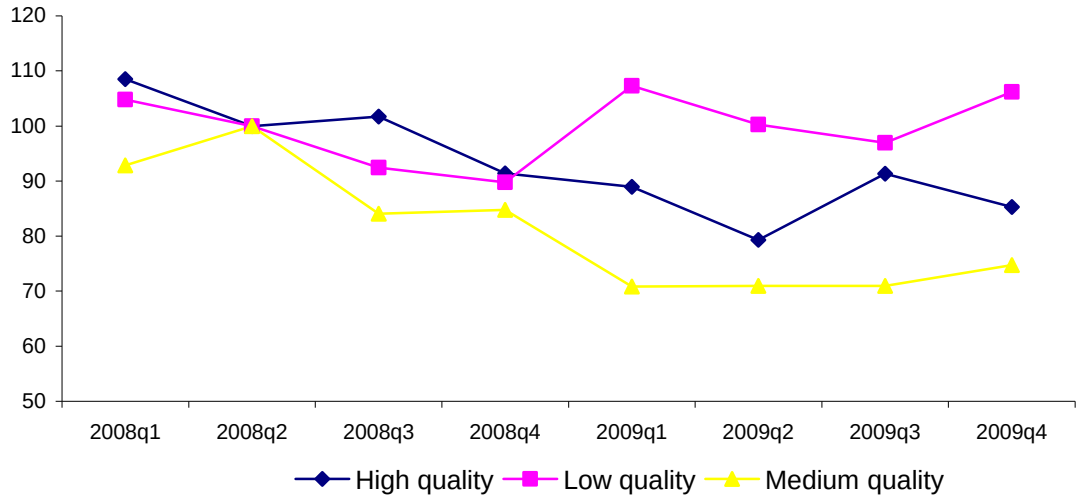
3.2 Descriptive evidence

In this paragraph our aim is to verify whether, during the financial crisis, Italian trade reacted as in the findings of Berthou and Emlinger (2010), i.e. if EU imports of high quality varieties were more sensitive to GDP variations than imports of low quality varieties. We analyse EU15 import flows of consumption goods from Italy during the period January 2008-December 2009, covering the most acute phase of the international financial crisis.

Figure 1 shows the performance of the EU import volume index from Italy of low, medium and high quality consumption goods since the beginning of 2008, when the real effects of the sub-prime crisis began to appear in world trade volumes. Low quality goods seem to have fallen less than volumes of high and medium quality goods.

Table 1 contains a comparison of volumes, market shares and prices between the second quarters of 2008 and 2009 (starting just before the most severe phase of the crisis, coinciding with Lehman Brothers' bankruptcy in September 2008); prices are expressed in relative terms (unit values). The results confirm the graphical evidence: between the second quarters of 2008 and 2009 high quality goods recorded a huge drop (-20.6%) while the volume of low quality goods remained unchanged. A similar relation holds for market shares, with that of high quality exports shrinking by 2.8% and that of low quality goods increasing by 6.2%. The increase in market share for low quality products could reflect the shift towards low quality varieties, while relative prices do not seem to be informative as they fell during the crisis by a similar amount for both high and low quality goods.

Figure 1 - Consumer goods: EU15 imports from Italy by quality
(volumes; Q2 2008=100)



Source: Author's calculations based on EUROSTAT COMEXT.

Changes in market share during the crisis are in line with historical variations as between 1995 and 2007 the share of high quality products fell by 62% against only 34% for low quality goods while volume changes moved differently.

The behaviour of medium quality goods (accounting for around 35% of total exports) is not directly comparable with the results of previous studies. Volumes of this category recorded the largest reduction (-29%) while their market share increased by an exceptional 40%, or 4.5% in absolute terms, even though their relative price increased by 2.3%.

Table 1 – Volumes, prices and market shares: changes between Q2 2008 and Q2 2009

	High	Low	Medium
	Volumes		
Q2 2008	5739.2	898.3	3687.0
Q2 2009	4553.0	900.8	2615.2
% change	-20.67	0.28	-29.07
% 1995-2007	-31.93	-43.97	-1.42
	Market share		
Q2 2008	6.81	5.40	9.32
Q2 2009	6.62	5.74	13.85
% change	-2.78	6.21	48.68
% 1995-2007	-62.51	-33.39	-37.20
	Relative price		
% change	-7.73	-8.40	2.44

Source: Author's calculations based on COMEXT data.

All in all, it seems that the Engel curve relationship holds: during the crisis, low quality goods decreased much less in volume than high and medium quality goods. It should be noted, however, that low quality products represent only around 10% of total exports of consumption goods. The relation between high and low quality goods implied by the quality Engel curve holds

for market shares too, but it does not explain the sharp increase in the market share for medium quality products. In the next section we attempt to explain these results.

4. Estimating income and price elasticities: econometric strategy and results

4.1 Econometric strategy

Descriptive evidence of the existence of a quality Engle curve for EU imports from Italy cannot be exhaustive. We formally test this assumption by performing a panel estimation of income and price elasticities for EU15 imports from Italy of high, medium and low quality goods and their market shares.

The quality Engel curve suggests that high quality goods are more reactive to income changes than low quality ones. Introducing a medium quality category, we can expect it to lie between the other two. However, the descriptive analysis has shown that during the global financial crisis Italian medium quality goods recorded the largest drop in volume terms, while the market share behaved in the opposite way. The large drop in volume suggests that medium quality goods have a higher income elasticity, but this assumption does not explain the behaviour of their market share. Two explanations for the increase in the (medium quality) market share are possible: first, the contraction in income caused by the global financial crisis may have induced consumers to shift consumption from high to medium quality Italian products; second, medium quality consumption products could be perceived as high quality varieties compared with those of competitors, either owing to a "made in Italy" brand effect or because of an actual higher quality not apparent from their relative unit value. Both explanations are consistent with an increase in the elasticity of the market share of Italian medium quality products to GDP per capita. A change in income elasticity during the crisis may also explain the larger drop in volume. Evidence in favour of this assumption can be found by verifying the presence of a structural break in the income elasticities of volumes and market shares.

Testing for structural breaks requires a minimum number of observations after the break for the coefficients to be properly identified. Our sample ends in 2009q4[4] and includes only six observations from the beginning of the crisis; hence a formal test is not possible. In order to provide partial evidence for structural breaks, we estimate income and price elasticities excluding the global financial crisis and comparing the coefficients with the estimates on the whole sample. Additional graphical evidence on the occurrence of a break can be provided by running the estimates recursively and plotting the evolution of the coefficient of GDP per capita. In this way we are able to see the behaviour of the income elasticity during the six quarters of the crisis, which may be at least partially hidden by the simple comparison of pre- and post-crisis parameters.

Given the relatively long time span (from 1995q1 to 2009q4) we need to test for stationarity of the series in order to choose the proper estimation method. Furthermore, this choice, as well as that of the proper unit root test, is influenced by the potential presence of common factors among the panels, leading to cross-sectional dependence (CSD) which can bias the estimates. This is of particular concern given that we are dealing with a single exporting country and with EU15 countries as importers. Regarding the former, the global evolution of the Italian economy can introduce CSD, while the same is true for the latter as the EU-wide dynamics, as well as the Maastricht constraints and ECB monetary policy, generate common factors in the evolution of EU member states' trade. In order to test for CSD we adopt the procedure developed by Pesaran (2004), which uses the correlation coefficients between time series for each panel member. The stationarity of the series is investigated with the t-test for unit roots in heterogeneous panels with cross-section dependence proposed by Pesaran (2007) and with the Breitung test (Breitung and Das, 2005). The

[4] We could not further extend the sample as the final revision of 2010 data will be available only at the beginning of 2011.

latter can take account of the presence of CSD by demeaning the original series. For both tests we use alternatively the specification with and without trend and we test all lags from 1 to 4 as the quarterly frequency of the data suggests. The results are reported in Table 2. With respect to CSD the Pesaran test indicates strong commonalities across time series for all variables. All unit root tests are in favour of the non-stationarity of the import volumes of high and medium quality consumption goods. As for low quality imports, the series is stationary, but only for the Pesaran test and only with one lag. Accordingly, we conclude for the non-stationarity of this series. The story changes when we turn to price indices: Italian unit values are non-stationary according to the Breitung test, while there is evidence of stationarity, especially for the price of medium and low quality goods, with the Pesaran test; total import unit values are non-stationary for medium and high quality goods, while the Pesaran test indicates stationarity for low quality products; as to market shares, the evidence from both tests is mixed. Finally, in line with the literature, GDP per capita is strongly non-stationary in all cases.

As to the estimation technique, the presence of both stationary and non-stationary regressors poses a problem as most of the standard tools require either stationarity or non-stationarity of all regressors. In the latter case, a long-run relation can be estimated only if all variables are I(1) and there exists a cointegration relation between variables. In addition, we have to deal with the endogeneity of prices as they are simultaneously determined with quantities, introducing a simultaneous causality between the dependent and the endogenous regressor. Moreover, measurement errors in the unit values may further affect the consistency of the estimators.

In order to take these problems into account we use the mean group estimator (MG) developed by Pesaran and Smith (1995). The MG is consistent and efficient in the presence of heterogeneous coefficients as well as endogenous or stationary regressors. In order to eliminate CSD we present several augmented versions of this estimator. In the first version (dumMG) we add yearly dummies, instead of using the conventional method of adding a full set of time dummies, because the MG estimator is based on group specific regressions and time dummies would imply no degrees of freedom. The second version is the common correlated effects (CCEMG) proposed by Pesaran (2006), where the MG estimator is augmented with cross-sectional averages of all the variables (Binder and Offermanns, 2007). Finally, in the last version (CCERMG) we introduce cross-sectional averages of all variables over each year. The underlying logic of the latter estimator is that quarterly averages may contain useful information on the variables and, at the same time, differences in the seasonal pattern of the common factors among partner countries can result in this procedure being less able to eliminate CSD. The estimated equations are the following:

$$\log(M_{j,t}) = \alpha_0 + \alpha_1 \log(GDPpc_{j,t}) + \alpha_2 \log(Pk^W_{j,t}) + \alpha_3 \log(Ph_{j,t}) + \\ + \alpha_4 \log(Pm_{j,t}) + \alpha_5 \log(Pl_{j,t}) + \varepsilon_{j,t} \quad (3)$$

$$\log(MKTsh_{j,t}) = \beta_0 + \beta_1 \log(GDPpc_{j,t}) + \beta_2 \log(Pk^W_{j,t}) + \beta_3 \log(Ph_{j,t}) + \\ + \beta_4 \log(Pm_{j,t}) + \beta_5 \log(Pl_{j,t}) + \upsilon_{j,t} \quad (4)$$

$$j=AT, \ldots, SE; \quad t=1995q1,\ldots,2009q4; \; k=h, m, l;$$

where M is the import volumes and $MKTsh$ is the market share, both as defined in Section 3; Pk is the price of quality k imports from Italy, while Pk^W is the price index for total imports; subscripts j refer to the importing country, while t refers to the time period. We include the price index for all three categories of Italian goods in order to better capture the potential substitution effect between categories. Results are reported in the following section.

Table 2 – Cross-sectional dependence and unit root tests

	Lags	ln(impHC)	ln(impMC)	ln(impLC)	ln(Ph)	ln(Pm)	ln(Pl)	Ln(Phw)	ln(Pmw)	ln(Plw)	ln(shareHC)	ln(shareMC)	ln(shareLC)	Ln(GDPpc)
Pesaran CSD test		3.22***	12.46***	5.64***	23.9***	24.1***	23.5***	23.4***	28.5***	20.4***	34.0***	13.6***	28.4***	64.68***
Pesaran UR	4	-1.464	-0.834	-1.713	-1.93	-2.19*	-1.86	-1.42	-1.54	-2.12*	-2.39***	-2.23**	-2.00	-1.50
	3	-1.513	-1.257	-2.049	-2.17*	-2.37**	-2.41***	-1.76	-2.06	-2.51***	-2.72***	-2.52***	-2.27**	-1.60
	2	-1.538	-1.304	-1.867	-1.98	-2.24**	-2.03**	-1.52	-1.78	-2.35**	-2.10	-2.44***	-1.98	-1.45
	1	-1.641	-1.669	-2.271**	-2.23**	-2.26**	-2.63***	-1.43	-1.98	-2.53***	-2.00	-2.31	-2.21**	-1.65
with trend	4	-1.996	-1.886	-2.312	-2.07	-2.12	-2.51	-1.82	-1.82	-2.19	-2.34	-2.13	-2.01	-1.27
	3	-2.297	-2.267	-2.697*	-2.35	-2.43	-3.10***	-2.19	-2.37	-2.63	-2.94***	-2.67*	-2.18	-1.63
	2	-2.186	-2.247	-2.486	-2.06	-2.34	-2.93***	-1.87	-2.10	-2.50	-2.47	-2.60	-2.15	-1.55
	1	-2.178	-2.615	-2.886**	-2.18	-2.32	-3.34***	-1.97	-2.25	-2.65	-2.49	-2.45	-2.40	-2.00
Breitung	4	-0.48	0.45	0.20	0.82	3.34	3.24	0.62	2.53	2.31	-1.92**	-0.59	-1.10	-0.56
	3	-0.67	-0.53	-0.99	0.54	2.70	1.88	-0.24	1.01	1.22	-2.06**	-1.31*	-1.37*	-0.12
	2	0.07	-0.4	-0.58	1.82	3.61	2.88	0.81	2.01	1.96	-1.77**	-1.54*	-1.17	0.45
	1	0.29	0.57	-0.71	2.29	4.19	3.02	0.84	2.28	2.17	4.61	-1.44*	-1.19	0.46
with trend	4	0.33	0.9	1.94	0.21	-0.08	1.31	3.18	2.03	-0.36	3.14	4.37	4.50	2.45
	3	0.11	-0.07	0.77	-0.09	-0.98	0.14	2.01	0.58	-1.42	3.45	3.43	3.98	3.27
	2	0.22	0.29	0.75	0.23	-0.73	-0.18	2.96	1.27	-0.68	3.95	3.23	4.17	4.29
	1	0.55	0.15	0.40	0.18	-0.5	-2.22	3.18	1.61	-0.73	-0.59	3.70	4.19	4.42

* significant at 10% level, ** significant at 5% level, ***significant at 1% level.

4.2 Results

Estimation results for volumes are shown in Table 3, while Table 4 reports the results for market shares. In each table the first three columns show the estimates excluding the global financial crisis (estimates up to 2008q2), while the following three include the whole sample (up to 2009q4); diagnostic tests are shown at the bottom of the tables. As for the performance of the three estimators, the dumMG has the lowest root mean square error (RMSE) and a higher Wald statistics (chi2) error, but its estimates are less efficient because of the larger number of parameters. Concerning cross-sectional dependence, there is no clear rank among estimators; on average the CCEMG performs worse in the reduced sample, while the CCERMG is the best performing, although the Pesaran test is not accepted in all cases, especially in the estimates over the whole sample. This is probably due to the crisis itself, which acted as an additional common shock on the error terms and complicated the structure of the common factors. As we are trying to identify the impact of the crisis (i.e. the additional common shock) on the coefficients, the presence of CSD in the estimates over the whole sample should not be a problem as long as pre-crisis estimates generate cross-sectionally independent errors. Given these considerations, the best estimator – on which we base our comments on the results – is the CCERMG.

4.2.1 Volumes

Looking at volumes (Table 3), it is worth noting that both prices and income elasticities show the expected sign. As for price elasticity, own unit value elasticity is highly statistically significant for each quality category; the magnitude of the estimated coefficient lies between -0.89 and -1.01. As for the elasticities to total import unit values, the coefficient is significant only for high quality goods: a 10% increase in the price of all imported goods causes a 3% decrease in imports from Italy. There are no significant changes when the crisis is included in the sample.

As for income elasticities, the results from the CCERMG estimator do indeed show that medium quality goods are more sensitive to changes in GDP per capita than high quality goods. A 10% growth in GDP per capita increases the demand for medium quality Italian products by 13.5% (11.7% for high quality goods), whereas the effect on low quality goods is insignificant. This result bears out the evidence of the descriptive analysis: volumes of medium and high quality goods decreased sharply during the crisis owing to their high sensitivity to changes in per capita income.

Indeed, it should be noted that income elasticities increase for all quality levels when the global financial crisis is included. For high and medium quality goods they jump to 1.72 and 1.84 respectively, while for low quality goods they go from 0.6 (statistically insignificant) to 1.4 (statistically significant at the 10% level). This evidence suggests the presence of a symmetric shock that determines an increasing sensitivity of import volumes for all the quality categories.

This break in elasticities is confirmed by looking at the recursive estimates in Figure A1: the reaction to changes in GDP per capita increases steeply in 2008q3 – at the beginning of the crisis – and remains stable in the following quarters.

4.2.2 Market shares

In the case of market shares (Table 4) the signs of the coefficients of the own and total unit values are as expected. Market share decreases when own prices increase, while there is a gain when there are price increases in total imports. The coefficients are not statistically different from -1 for high and medium quality goods, while for low quality goods the impact of the own unit value is lower (-0.64, column 2).

Table 3 – Estimation results of equation (3)

			High quality			
		No crisis			Crisis	
	dumMG	CCERMG	CCEMG	dumMG	CCERMG	CCEMG
log(Pht)	-0.948***	-0.924***	-0.937***	-0.930***	-0.935***	-0.931***
	[0.070]	[0.073]	[0.067]	[0.066]	[0.063]	[0.061]
log(Pmt)	0.038	0.058	0.047	-0.085	-0.038	0.018
	[0.069]	[0.083]	[0.088]	[0.064]	[0.087]	[0.089]
log(Plt)	0.102	0.090	0.016	0.107	0.044	-0.003
	[0.142]	[0.176]	[0.141]	[0.126]	[0.150]	[0.113]
log(Phtw)	0.094	0.300**	0.266*	0.071	0.279**	0.257
	[0.131]	[0.120]	[0.145]	[0.155]	[0.118]	[0.160]
log(GDPpc)	1.105***	1.173***	1.010**	1.747***	1.721***	1.496*
	[0.300]	[0.325]	[0.461]	[0.349]	[0.440]	[0.819]
N	702	702	702	780	780	780
chi2	1428.648	298.96	331.8	1866.5	2731.5	1039.4
rmse	0.049	0.062	0.064	0.055	0.072	0.069
CSD	0.96	-0.30	-2.80	8.35	4.70	-2.80
			Medium quality			
		No crisis			Crisis	
	dumMG	CCERMG	CCEMG	dumMG	CCERMG	CCEMG
log(Pht)	-0.022	0.06	0.083	0.016	0.118	0.128
	[0.040]	[0.085]	[0.091]	[0.060]	[0.089]	[0.088]
log(Pmt)	-0.968***	-0.943***	-0.934***	-1.014***	-0.981***	-0.971***
	[0.123]	[0.081]	[0.108]	[0.138]	[0.083]	[0.115]
log(Plt)	-0.143	0.051	0.162	-0.135	0.041	0.156
	[0.093]	[0.059]	[0.115]	[0.085]	[0.057]	[0.103]
log(Phtw)	0.151	0.028	0.13	-0.052	-0.006	0.097
	[0.231]	[0.241]	[0.209]	[0.221]	[0.207]	[0.172]
log(GDPpc)	1.316***	1.349**	1.412	2.039***	1.839***	1.412
	[0.297]	[0.448]	[1.205]	[0.295]	[0.338]	[1.182]
N	702	702	702	780	780	780
chi2	823.1	736.9	484.3	2665.0	706.88	879.9
rmse	0.067	0.094	0.090	0.070	0.095	0.092
CSD	3.69	-2.16	-3.88	6.03	3.70	-4.16
			Low quality			
		No crisis			Crisis	
	dumMG	CCERMG	CCEMG	dumMG	CCERMG	CCEMG
log(Pht)	-0.03	-0.019	-0.051	-0.03	-0.007	0.025
	[0.101]	[0.153]	[0.179]	[0.104]	[0.149]	[0.165]
log(Pmt)	-0.002	0.139	0.102	-0.061	0.012	0.029
	[0.100]	[0.233]	[0.217]	[0.087]	[0.213]	[0.212]
log(Plt)	-0.893***	-0.944***	-0.900***	-0.929***	-0.959***	-0.935***
	[0.175]	[0.149]	[0.136]	[0.142]	[0.126]	[0.127]
log(Phtw)	-0.128	-0.102	-0.113	-0.166	-0.132	-0.035
	[0.111]	[0.212]	[0.220]	[0.171]	[0.174]	[0.195]
log(GDPpc)	0.487	0.691	1.013	1.231**	1.400*	0.687
	[0.353]	[0.817]	[1.137]	[0.409]	[0.722]	[1.230]
N	702	702	702	780	780	780
chi2	354.0	855.5	1389.8	1988.0	1161.6	454.3
rmse	0.092	0.133	0.123	0.096	0.135	0.128
CSD	1.45	-1.50	-3.8	3.12	-0.2	-4.1

Standard errors in brackets; * significant at 10% level, ** significant at 5% level, ***significant at 1% level.

Table 4 – Estimation results of equation (4)

			High quality			
		No crisis			Crisis	
	dumMG	CCERMG	CCEMG	dumMG	CCERMG	CCEMG
log(Pht)	-0.899***	-0.891***	-0.924***	-0.898***	-0.913***	-0.955***
	[0.050]	[0.066]	[0.063]	[0.048]	[0.056]	[0.051]
log(Pmt)	-0.013	-0.056	-0.078	-0.099	-0.073	-0.046
	[0.080]	[0.089]	[0.108]	[0.088]	[0.108]	[0.091]
log(Plt)	0.119	0.122	0.041	0.128	0.095	0.036
	[0.136]	[0.177]	[0.135]	[0.123]	[0.151]	[0.114]
log(Phtw)	0.933***	0.959***	0.946***	0.890***	0.971***	0.951***
	[0.134]	[0.123]	[0.146]	[0.140]	[0.085]	[0.137]
log(GDPpc)	-0.801***	-0.549**	-0.627	-0.216	-0.125	0.094
	[0.117]	[0.263]	[0.415]	[0.297]	[0.371]	[0.694]
N	702	702	702	780	780	780
chi2	7698.4	1824.7	3904.3	5416.1	7085.6	10993.9
rmse	0.049	0.063	0.06	0.051	0.068	0.065
CSD	2.8	0.79	2.8	5.7	2.1	-2.8
			Medium quality			
		No crisis			Crisis	
	dumMG	CCERMG	CCEMG	dumMG	CCERMG	CCEMG
log(Pht)	0.05	0.117	0.149	0.045	0.132	0.167*
	[0.106]	[0.094]	[0.094]	[0.078]	[0.081]	[0.086]
log(Pmt)	-0.904***	-1.012***	-0.943***	-0.867***	-1.016***	-0.997***
	[0.137]	[0.111]	[0.099]	[0.151]	[0.111]	[0.126]
log(Plt)	-0.057	0.077	0.12	0.055	0.143	0.175
	[0.087]	[0.060]	[0.097]	[0.084]	[0.099]	[0.128]
log(Phtw)	1.069***	0.879**	0.863**	1.060**	0.898***	1.002***
	[0.313]	[0.271]	[0.270]	[0.356]	[0.226]	[0.270]
log(GDPpc)	-0.155	-0.439	-0.808	-0.261	-0.630*	-0.445
	[0.384]	[0.457]	[0.930]	[0.430]	[0.343]	[0.841]
N	702	702	702	780	780	780
chi2	1447.2	1023.7	558.9	664.0	306.8	374.7
rmse	0.073	0.088	0.082	0.076	0.093	0.086
CSD	5.1	2.55	-4.15	4	1.52	-4.1
			Low quality			
		No crisis			Crisis	
	dumMG	CCERMG	CCEMG	dumMG	CCERMG	CCEMG
log(Pht)	0.198	0.13	0.208	0.144	0.137	0.173
	[0.134]	[0.200]	[0.168]	[0.159]	[0.215]	[0.176]
log(Pmt)	-0.015	-0.035	-0.089	0.002	-0.105	-0.058
	[0.163]	[0.140]	[0.126]	[0.152]	[0.142]	[0.126]
log(Plt)	-0.698***	-0.636***	-0.628***	-0.734***	-0.653***	-0.629***
	[0.174]	[0.135]	[0.117]	[0.151]	[0.149]	[0.126]
log(Phtw)	0.588**	0.380**	0.519**	0.660***	0.523***	0.506**
	[0.206]	[0.150]	[0.231]	[0.176]	[0.157]	[0.215]
log(GDPpc)	-1.274**	-0.523	1.203	-1.292**	-0.514	0.789
	[0.392]	[0.355]	[0.920]	[0.402]	[0.323]	[0.755]
N	702	702	702	780	780	780
chi2	651.2	690.0	1181.8	391.7	342.0	590.6
rmse	0.094	0.13	0.14	0.094	0.134	0.142
CSD	3.0	1.4	-2.7	2.9	1.0	-3.4

Standard errors in brackets; * significant at 10% level, ** significant at 5% level, ***significant at 1% level.

As for income elasticities, in the estimation period up to the beginning of the crisis, the sign is negative for all categories of goods and with similar values, although only for high quality products the impact (-0.55) is significant at the 5% level. The negative income elasticity could be a reflection of the declining market shares of Italian products over our sample period owing to the increasing competitiveness of emerging economies: an increase in per capita income led to a larger rise in the volumes of goods produced by competitors than by the Italians themselves.

When we include the crisis in the sample the income elasticity for high quality products becomes zero, while that of low quality goods remains unchanged. The opposite behaviour is observed for medium quality goods, where the inclusion of the crisis makes the coefficient barely significant. Indeed, regarding the magnitude of coefficients, sensitivity increases in the case of medium quality goods (from -0.44 to -0.63), in line with the increase in market share previously seen in the descriptive analysis.

The recursive estimates in Table A3 confirm the pattern during the crisis: the coefficient for high quality goods goes from -0.6 to slightly over -0.2, while for medium quality goods it falls from -0.4 to -0.8 and increases slightly in the second half of 2009; in the case of low quality goods the coefficient is not stable, but its behaviour during the crisis indicates a temporary reaction lasting until the third quarter of 2009. These results are consistent with the hypothesis of a regime shift due to the real effect of the financial crisis. In particular, the increase (in absolute terms) in income elasticity for medium quality imports from Italy and their market share is perfectly consistent with their evolution during the crisis.

Summing up, the evidence provided so far confirms the assumption of a quality Engel curve in explaining the behaviour of EU imports from Italy as well as of market shares of high and low quality products during the crisis. The income elasticity of EU import volumes from Italy is significantly higher than 1 for high quality goods, while it is not significantly different from zero for low quality goods. In addition, the higher elasticity for medium quality goods explains why this quality category recorded a larger contraction during the crisis.

As to market shares, we find evidence for a change in income elasticities – whether temporary or permanent – which is in line with their behaviour during the crisis.

The market share of high quality exports reacts negatively to income changes, but during the crisis, when it was expected to increase according to the pre-crisis elasticity, its reaction to GDP per capita became zero. At the same time, the negative elasticity for medium and, to a smaller extent, low quality goods dropped further during the crisis, explaining the increase in their market share. Such behaviour is consistent with our two explanatory hypotheses. On the one hand, consumers may have changed their preference from higher to lower quality goods as an effect of the contraction in income during the global financial crisis. On the other hand, medium quality consumption products could be perceived as high quality varieties compared with those of competitors due to a “made in Italy” brand effect or because of an actual higher quality not apparent from their relative unit value.

Finally, from the econometric point of view an additional result is that the CCERMG estimator is on average more successful in eliminating cross-sectional dependence in the estimation residuals.

5. Conclusions

During the financial crisis, EU import volumes from Italy decreased sharply. However, this trend appears heterogeneous when evaluated in terms of quality. As expected, the greater sensitivity to income of higher quality goods has resulted in a larger contraction in their volume than in that of lower quality goods. Econometric analyses confirm the quality Engel curve assumption, as the responsiveness to income changes increases with the quality level of imported products.

The recursive estimates provide the first evidence, albeit partial, of a possible break in income elasticities during the years of the crisis as result of the changing preference for quality of consumers in the EU15 member states. In terms of volume, the presence of a symmetric shock may have determined an increasing sensitivity of import volumes to income for all quality categories. As for market shares, income elasticity changes seem to explain the behaviour observed in the descriptive analysis. In particular, the introduction of a medium quality category seems useful in order to obtain a clearer picture of the behaviour of Italian trade. Our results indicate that a demand shift could have benefited Italian medium quality products more than low quality ones. There are two possible explanations for this result: first, the contraction in income caused by the global financial crisis may have induced consumers to shift consumption from high to medium quality, and to a smaller extent low quality, Italian products; second, medium quality consumption products could be perceived as high quality varieties compared with those of competitors due to a “made in Italy” brand effect or because of an actual higher quality not apparent from their relative unit value. Further analysis is required in order to assess which of these two explanations better fits the Italian case.

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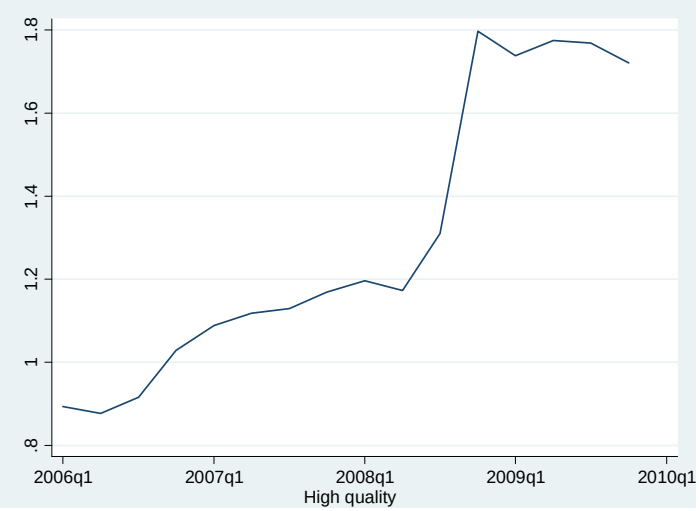
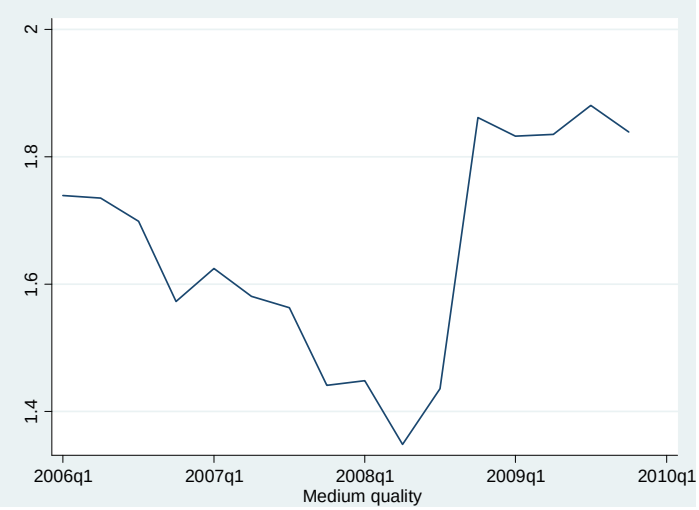
Appendix

Figure A1 – Effect of GDP per capita on import volumes from Italy: recursive estimates

a)



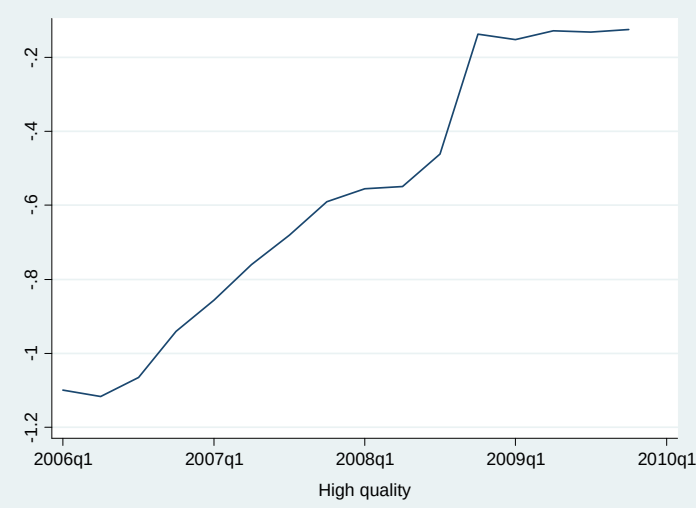
b)



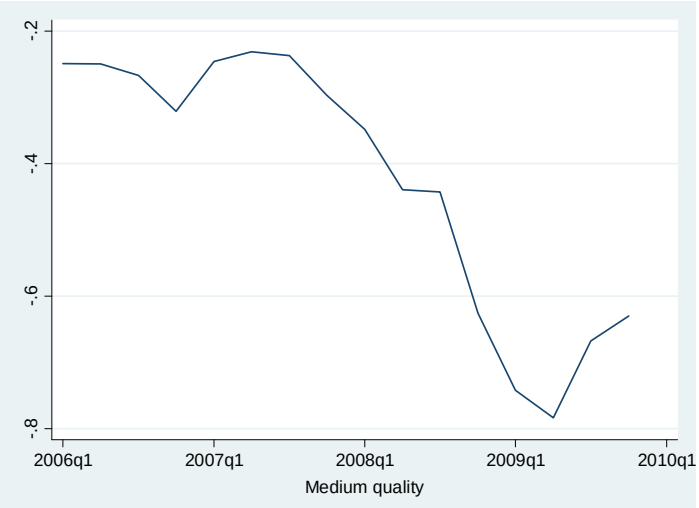
c)

Figure A2 – Effect of GDP per capita on Italian market shares: recursive estimates

a)



b)



c)