IMPORT DEMAND WITH PRODUCT DIFFERENTIATION: DISAGGREGATED ESTIMATION OF ITALIAN SECTORAL ELASTICITIES.

Stefano Chiarlone

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1. Introduction

This paper focuses on the estimation of sectoral import demand for Italy with European Union Countries, Japan, Canada and the United States. A precise estimate of the import elasticities is important to understand the international transmission of domestic shocks, the international spillovers of national economic policies and the sensitiveness of industrial sectors to price differentials. Estimation biases can arise if we use aggregate data. The relevance of product differentiation implies that factors different from price and income influence the import decision. These factors usually have not been included in any empirical analyses, as far as we know, because of the unavailability of reliable proxies for differentiation. That suggests a problem of missing variables. We have tried to face these issues and have precise estimates of the import elasticities to price and income. We have estimated sectoral import functions for Italy using a panel of highly disaggregated bilateral trade flows, to avoid biases. Then , given the unavailability of proxies for product differentiation, we have built from our bilateral disaggregated data dummy variables, which classify every and each trade flow as either homogeneous, or quality differentiated or non quality differentiated. These dummies have been used to account for the different reaction that import of differentiated goods should have, respect to prices.

The plan of the analysis is as follow. Section 2 presents the more common specifications of import demand and discusses the impact of product differentiation. Section 3 presents the indexes used to measure product differentiation. Section 4 presents the empirical analysis and discusses some econometric issues to be faced. Section 5 discusses the estimations and the resulting elasticities[1]. Section 6 comments our results.

2. Import Demand and Product Differentiation.

Many papers[2] have studied the import demand using a very simple and aggregated log-linear function, derived from traditional static utility maximization:

$$M_t=\alpha_1+\alpha_2 A_t+ \alpha_3 PM_t+\alpha_4 P_t \quad 1)$$

where M is the Import Volume, A is an activity variable such as income or expenditure, P is the domestic price of tradables and PM is the import price, expressed in domestic currency. With log-linearity the coefficients provide an estimate of the relevant elasticities and we expect the following signs: $\alpha_2>0$, $\alpha_3<0$ and $\alpha_4>0$. Often researcher have used relative prices specification, with RP being the relative price of imports respect to the price of domestic goods and $\beta_2>0$, $\beta_3<0$:

$$M_t=\beta_1+\beta_2 A_t+ \beta_3 RP_t \quad 2)$$

These functional forms have many problems. Nonetheless, many time series based, highly aggregated empirical analyses have used them. The level of aggregation at which they have been usually analysed generates serious biases. Furthermore they miss many factors, not linked to prices and income, which influence demand of imported goods in presence of product differentiation and non-price competition.

One of the main findings of the empirical analyses of international trade is the evidence of simultaneous imports and exports of goods, belonging to the same industry. This empirical evidence is explained with reference to product differentiation and linked to a pattern of trade with countries importing and exporting differentiated goods belonging to the same industry. Goods can be classified according to their characteristics (Lancaster, 1979) and a sector is a group of products having the same characteristics. The particular proportion of characteristics of a product determines its specification and product differentiation depends on the available goods having different specifications. If the products have a different proportion of characteristics, but none has a bigger amount of all the characteristics, they are similar or horizontally differentiated. If one product has a bigger amount of all the characteristics than the other goods in the sector, it is vertically differentiated. Vertical differentiation refers to the availability of different quality grades, while horizontal differentiation represents the availability of different varieties in a given quality grade.

In presence of product differentiation, the decision to import a differentiated good could depend on the inclusion of particular characteristics that are preferred by the consumers; or on quality, notwithstanding price considerations. Thus, the importance of price in import decisions change. It should decrease if either a true substitute with the same proportion of characteristics does not exist; or because the substitute is of a different quality. Overlooking that during estimation causes biases. It is not easy to account for product differentiation empirically, because on the unavailability of suitable proxies. Nonetheless, pooling homogeneous and differentiated goods is likely to yield biased results, because they react differently to prices and to income and have other determinants. That requires, at least, dividing products according to the trade typology they belong to and estimating separately the reaction to price and to income of the various differentiated (and homogeneous) goods, accounting for their heterogeneity.

3. Indexes of Product Differentiation

Applied researchers have used many indicators to measure the extent of product differentiation in international trade. Here we refer to a methodology, recently developed by Abd-El-Rahman (1986) and Freudenberg and Müller (1992). It is sensible to aggregation biases[3]. To face such problem, we have used bilateral 5 digit Italian trade flows[4]. The methodology is based on a Trade Overlap Index[5] (OI hereafter):

$$\text{Trade Overlap Index } \frac{\text{Min}(X_{k,k',p,t};> M_{k,k',p,t})}{\text{Max}(X_{k,k',p,t};> M_{k,k',p,t})} \quad 3)$$

and a Quality Index (QI hereafter):

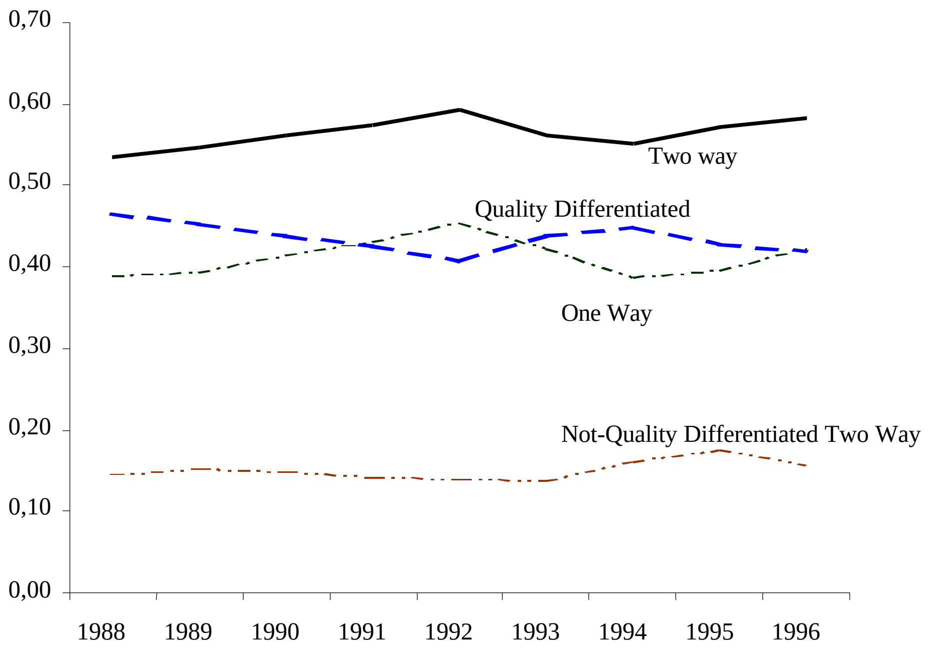
$$\text{Quality Index } \frac{\text{Unit Value of Import}_{k,k',p,t}}{\text{Unit Value of Export}_{k,k',p,t}} \quad 4)$$

Their application allows to classify each trade flow as either homogeneous, quality differentiated or not-quality differentiated.

OI measures the extent of overlap between imports and exports in the international trade of two countries. If it is big we can say that there is a substantial overlap in their bilateral trade, and we consider that a structural feature of their trade which is classified as two-way. Otherwise, we do not consider the overlap structural and we classify such bilateral trade as one way. In this way we classify every disaggregated flow as either one or two way. Evidence of two-way flows, at this disaggregated level, will be taken as an evidence of the relevance of product differentiation. That allows to completely break down the bilateral trade of a country into either trade of homogeneous products or trade of differentiated products. We refer to Freudenberg *et al.* (1998) to select a 10% threshol, to divide one-way from two way flows. If OI is greater than 10%, we classify the flow as product differentiated, otherwise as homogeneous.

We are interested into dividing the product-differentiated flows according to whether differentiation relates to quality considerations or not. At the very disaggregated level, if we take two individual goods belonging to the same sector, quality differentiated goods will be characterised by huge price differences; while homogeneous or horizontal differentiated goods will not. Also, at this disaggregation level, unit value indexes are good proxies of goods' prices and we can use QI to proxy quality differences.[6]. If QI is very big or very low the price difference reflects quality differences between imported and domestic good; if it is near one that is an indication of similarity. We have followed the literature[7] and we have referred to an exogenously determined interval of values (0,85-1,15). Only if QI is external to this interval, the flow refers to

Figure 1 Evolution of Trade Types in the Italian Sectors. 1988-1996



quality-differentiated goods.

If we apply these indexes to the Italian Trade with the selected countries, we can measure the relevance of product differentiation and the relevance of accounting for it when estimating import demand. We present the aggregated picture for the Italian Trade[8] in Figure 1. Differentiated trade is clearly predominant and increasing along the sample, with a share over total trade of almost 60%. That is not surprising. On the one hand a well-known phenomenon in the economic literature is the rise of differentiated trade within the European Community (Fontagné *et al.* 1998). These countries are among the most developed in the world and a similar specialisation, which explains part of this overlap. Quality trade composes the main part of differentiated trade: in 1996 it is as important as homogeneous-trade (each equal to 42% of the total). Horizontal trade is clearly smaller, though increasing, and equal to 16% of total Italian trade in 1996. These results confirm our concerns about including proxies of differentiation when estimating these functions.

4. The empirical analysis

The objective of the empirical analysis is the estimations of the sectoral[9] import demand functions accounting for product differentiation. For Italy, we focus on 10 sectors on the time period 1988-1996, using bilateral trade data at the 5 digits disaggregation level of OECD SITC Revision 3[10] to avoid aggregation and composition biases, using the following specification:

$$M_{t,I,k'}=\alpha_1+\alpha_2 A_{t,I,k'}+\alpha_3 RP_{t,I,k'}+\alpha_4 WP_{t,I,k'}+\alpha_5 VD_{t,I,k}+\alpha_6 HD_{t,I,k} \qquad 5)$$

The dependent variable is the logarithm[11] of the volume of import (M hereafter). The activity variable is the index of manufacturing industrial production (MAN, hereafter). The relative price variable (RP, hereafter) is the unit value index of the specific individual flow, deflated by the deflator of the manufacturing production[12]. The world prices variable (WP, hereafter) has been calculated, for any trade flow as a weighted average of the import prices of the same product in the same year from the rest of the world[13]. VD is a vertical differentiation dummy, taking the value of one if the specific 5-digit flow shows evidence of quality differentiation (OI>0,1 and 1,15>QI<0,85) and zero elsewhere. HD, is a horizontal differentiation dummy taking the value of one if the 5 digit flow shows evidence of non-quality differentiation (OI>0,1 and QI∈(0,85, 1,15)) and zero elsewhere. The inclusion of the VD and HD characterises each Italian disaggregated trade flows as based either on trade of homogeneous, or on trade of non-quality differentiated goods; or finally on trade of quality differentiated goods. These dummies allow considering the different reactions of the trade flows, but it is difficult to attach a clear economic meaning to their coefficients.

Our dataset has more than the usual two dimensions. We have a time dimension, a partner country dimension and a product dimension, because in any sector we consider the 5 digit trade flows of SITC Rev. 3 as individual observations. Given that, we have used a Least Square Dummy Variable (LSDV) model to account for the heterogeneity present in the data. In any of the sectoral equations we have included dummy variables to account for any of the three dimensions[14]. We have tested for evidence of heteroskedasticity and non-normality in the residuals of our LSDV estimations, respectively with the Cook-Weisberg test (CW hereafter); and the Shapiro-Wilk test (SW hereafter). Then, if CW was suggesting of residuals we have re-estimated the equation with the method robust to heteroskedsasticity introduced by White (1980. In the same way, if SW was significant we have re-estimated the sectoral equation with a regression method robust to non-normality[15].

Finally, we underline some features of the estimations. First, WP suffers from composition biases, which can affect its coefficient, even if we are using a very high disaggregation level. If Italy imports different baskets of goods, included in the same product line, from different countries, WP could be a biased proxy of the true world price and estimation give a wrong coefficient. Second, including the dummies together or separately change their interpretation. Only when we include the two dummies together, we fully apply the trade types division to the estimations. When we include them separately, we are simply assuming that either the vertical or the horizontal differentiated goods behave differently; while the other category behaves exactly as the homogeneous goods. In the light of that, we could easily find difference in the estimated parameters for the dummies if including them together or separately. Finally import prices are recorded c.i.f., that means inclusive of transport costs. If the costs are important and different across source countries, that could affect the results. Nonetheless, we are using country dummies and they should be able to account for such transportation costsl[16].

5. Empirical Results

The estimations are presented in the Appendix, from Table A4 to Table A13. For Food, Beverages and Tobacco (Table A4) we only fail normality. Robust regression gives a significant and not that stronger (around –0,5) elasticity to relative prices. World price has a positive significant impact on imports (about 0,2). Activity variable is not significant. This is not surprising: on the one hand, manufacturing production could not be the right activity variable for this sector; on the other hand, we don't expect demand for these products to depend on economic activity. Finally, we find positive and significant differentiation dummies, when included together. If we include them separately, only the horizontal dummy is significant, even if smaller than in the other case.

For Chemicals (Table A5), the estimations robust to heteroskedasticity and non-normality confirm the results of the OLS: a very strong and positive elasticity to the activity variable (about 3,4) and a significant elasticity to relative prices (around –0,9). Differentiation dummies are significant and positive when included together, though the vertical dummy is not significant when included alone. Finally, it is strange the negative (-0,05) significant reaction to world prices, though the value is very low.

For Wood, Paper and Printing (Table A6), accounting for non-normality and heteroskedasticity doesn't change the results. We find significant strong reactions to both activity variable (around 3,5) and relative prices (around –1,1). Both the differentiation dummies are significant, when included together. If we include them separately, VD is negative and less significant; while HD keeps its sign, even decreasing in absolute value. Elasticity to world price is significant (and positive, 0,03) only if we include the differentiation dummies separately and use Robust Standard Errors.

For Textiles, Leather and Footwear (Table A7) the robust regressions show a more than unitary elasticity to the activity variable (1,7) and a less than unitary reaction (-0,7) to relative prices. The differentiation dummies are significant if included separately. VD is negative, while HD is positive. Finally, the world price is negative (about –0,03) and significant.

For Non Metallic Mineral Products (Table A8), after accounting for non-normality and heteroskedasticity in the residuals, we find a very strong reaction to activity variable (4,1) and an almost unitary reaction to relative prices (about –0,97). Vertical Dummy is significant (and negative) when included separately and non-significant otherwise; while horizontal dummy is positive and significant anyway. World price elasticity is negative, though very low (-0,03), and significant.

For Basic Metals and Fabricated Metal Products (Table A9), robust regressions show a unitary elasticity to relative price (about –1,001) and a strong elasticity to activity variable (around 2,5). VD is significant, and positive, only if we include it separately; while HD is significant, and positive, anyway. The sector, even if lower than in other sectors. Finally elasticity to world prices is significant and positive (about 0,2).

For Non Electrical Machinery (Table A10), we only fail homoskedasticity. The elasticity to activity variable is more than unitary (1,36-1,4) while that to relative prices is less than unitary (about -0,63). We find a positive and significant reaction to world prices (around 0,075). The differentiation dummies are significant: HD is always positive, while VD is negative when included separately and positive otherwise.

Estimation of Electrical Machinery sector (Table A11) requires accounting for heteroskedasticity and non-normality. Elasticity to relative prices is significantly negative, even if less than unitary (-0,85), while elasticity to activity variable is highly positive (3,1-3,2) and significant. WP, though positive, is not significant. Both the differentiation dummies are significant. HD is always positive, even if smaller when we include it separately; while VD is positive when included together with HD and negative otherwise.

We estimated the Motor Vehicles Sector and the Other Equipment Sector together (Table A12), to get a satisfactory number of observations. This unification worsen the estimation, because of the heterogeneity of some product lines. Heteroskedastic residuals suggests using robust standard errors Elasticity to the activity variable is not significant, and far smaller than in any other sector. Elasticity to the relative prices is significant and less than unitary (around -0,41). Elasticity to WP is negative (around –0,12; -0,13) and significant. The differentiation dummies are not significantly different from zero.

For Professional Goods (Table A13) accounting for normality failure or for heteroskedasticty changes the significance of some of the variables. Elasticity to the activity variable is significant, and positive (about 1,5) if we account for non-normality, while it is not if we only account for heteroskedasticity. Elasticity to relative prices is negative (about -0,47) and significant, in any case. Elasticity to world prices is significant and positive if we account for heteroskedasticty, while positive and not significant if we account for non-normality. Both the dummies are significant and positive only when included together.

We present in Table 1 the significant elasticities to relative prices and activity variable, to easily compare the evidence related to the various sectors. Given the various estimates reported, for any elasticity we present a minimum and a maximum value[17].

Wood, Paper and Printing and Basic Metals and Fabricated Metal Products have a unitary or more than unitary elasticity to relative prices. Chemicals; Non Metallic Products and Electrical Machinery have less than unitary elasticity to relative prices, but they are not far from 1. Finally the other sectors seem less reactive to relative prices. None of the sectors has elasticity smaller than –0,41, which is the value of Motor Vehicles and Other Transport equipment. As for elasticity to Activity Variable, all the sectors share very strong elasticities. In particular various sectors (Chemicals, Wood, Paper and Printing, Non Metallic Product, Electrical Machinery) show elasticity bigger than three. Basic Metals and Fabricated Metal Products has an elasticity bigger than two, while all the others have elasticity more than unitary, with the lowest value being around 1,4 in the Non Electrical Machinery. As for both the elasticities, Wood Paper and Printing seems by large the most reactive sector. Basic Metals and Fabricated Metal Products, Electrical Machinery and Non Metallic Product seem very reactive as well. Finally, Professional Goods and Non Electrical Machinery seem among the less reactive sectors.

Table 1 Sectoral Elasticity to the Relative Prices and Activity Variable

	Relative Price		Activity Variable	
	Min	Max	Min	Max
Food, Beverages and Tobacco.	-0,55	-0,53	Not Significant	
Chemicals.	-0,91	-0,89	3,41	3,51
Wood, Paper and Printing.	-1,15	-1,12	3,47	3,88
Textiles, Leathers and Footwear.	-0,74	-0,71	1,72	1,90
Non Metallic Product.	-0,99	-0,97	4,11	4,19
Basic Metals and Fabricated Metal Products.	-1,02	-1,00	2,26	2,49
Non Electrical Machinery.	-0,64	-0,63	1,36	1,40
Electrical Machinery.	-0,9	-0,85	3,16	3,37
Motor Vehicles and Other Transport equipment.	-0,41		Not Significant	
Professional Goods	-0,48	-0,46	1,49	1,57

Our results are hardly comparable with other existing estimates of Italian trade elasticities because of the disaggregation level. Nonetheless, we want to highlight that other empirical studies of Italian elasticities share our result of strong reactions to prices and to income.. Helg and Tajoli (1992) present both a review of many empirical estimations of the elasticities of the Italian import and an original econometric analysis of italian imports, divided according to economic destination in a cointegration framework. Most of the studies they review present high elasticities to both activity variables and prices. As for their own original estimate, they report high elasticities to both prices and activity variable for the total imports and for the imports divided according to economic destination. We can't explicitly compare our results with any of the estimation presented in that work, because of the differences in the level of disaggregation; the time span considered and the specific activity variable and price variables considered. Nonetheless, we share with them the result of high elasticities of Italian imports to both price and activity variables. Caporale and Chui (1995) share this result of more than unitary elasticities to the activity variable (about 1.7) and high elasticity to relative prices (about –0.74), in a cointegration framework. Finally, Hooper *et al.* estimate more than unitary (1.4) elasticity to income and an elasticity to prices which is lower than ours (0.4). Anyway their price elasticities are lower than those generally found in literature for most of the countries they consider, probably because they include oil and services in their measure of trade volumes.

Elasticities to prices, comparable to those found by previous analyses, are consistent with the fast adjustment of the Italian trade balance after the strong devaluation of Italian Lira of 1992. This sensibility to prices of Italian imports suggest to pay careful attention to domestic prices when evaluating the competitiveness of national firms. When considering trade with European Union (EU hereafter) countries, if national inflation is higher than foreign inflation that could cause both a strong deterioration of trade balance and competitiveness problems for Italian firms without the possibility of using competitive devaluations. When considering trade with non-EU countries the evolution of the exchange rate between Euro and the relevant foreign currency should be taken into account. Euro, which is under the control of European Central Bank, reacts to EU trade flows and not only to Italian trade flows. Thus Italy cannot rely on exchange rate policies to preserve the competitiveness of its firms. Moreover, nothing exclude the possibility of a revaluation of the Euro happening in presence of an Italian inflation higher than foreign inflation. These two phenomenon together would affect negatively the competitiveness of Italian firms and the Italian trade balance. In presence of high reactions of import to prices and without the possibility of using expenditure-switching policies, Italy should carefully monitor both domestic inflation and non-price competitiveness factors, to preserve trade balance and the competitiveness of its firms.

As for income elasticities the high values estimated in most of the sectors suggest that Italian imports tend to rise strongly when the national production rises. This is consistent with the rising importance of the share of import in the domestic demand which has risen from 17% to 22% in our time span and to its maximum of 24,7% in 1998, as reported from ICE (1999). We can’t say whether these strong elasticities of income can represent a true external constraint to national economic growth, because we have not estimated the elasticities of exports. Furthermore, we should consider Hooper (1978) who says that not including the supply capacity of the exporting countries among the explanatory variables could upward bias the estimations. Notwithstanding these caveats, these elasticities are a first indication that Italy could be facing an external constraint to its national growth, at least for what concerns its relationships with the main industrialised countries. In fact, national economic growth tends to cause an increase in import demand and thus the trade balance deficits. It is therefore crucial to check whether Italian exports are able to balance the account. That depends on both the sensibility of Italian exports to partner countries’ income and to relative prices; and on the rate of economic growth of Italian trade partners.

6. Conclusion

In this paper we have used disaggregated data to estimate sectoral demand functions for the Italian imports from a number of industrialised countries, with a three-dimension panel approach. Given the evidence of product differentiation, we have classified trade flows as horizontal differentiated, vertical differentiated or homogenous. We have applied this classification to sectoral import demand estimation, through dummy variables. This is an original way to account for product differentiation when estimating import demand.

The elasticities to relative prices and to the activity variable are significant and show the right signs in most of the sectors. Many of them are very strong, showing a very dynamic pattern of reaction of Italian imports. The strong reaction to income implies the likely existence of a trade-balance problem, which could constraint the potential of Italian economic growth. The elasticities to prices suggest that in some sectors Italian firms could be very sensitive to foreign price-competition and generally to price differentials. The dummies are significant in most of the sectors, suggesting that imports of quality differentiated, horizontally differentiated and homogeneous goods behave differently.

Future researches providing aggregated time-series based sectoral estimations, and further separating trade flows where Italy is exporting quality from those in which it is importing quality would be very useful to better understand the impact of product differentiation on imports.

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Notes

[1]All the estimations have been done using Intercooled Stata 5.0.

[2]Goldstein and Khan (1985) offers a dated but still referenced overview of the field.

[3]Geographical aggregation biases arise when we use non-bilateral data. Summing up trade flows from and to different countries before of making the calculations can increase the evidence of product differentiation. Product aggregation biases refers to the measurement errors that arise from using trade flows, which are not sufficiently disaggregated. As much aggregated is the trade flow considered, as bigger the evidence of product differentiation will be.

[4]We use the 5 digits bilateral data recorded into the OECD SITC. Rev. 3 Dataset for the Sectors and the Countries presented in TableA1 and Table A2 of the and variance between years.

[5]All along the paper we stick to:

$$\begin{array}{l} j = \text{Sector 1, ..., Sector 14, Total of Sectors.} \\ k = \text{Partner Country : Austria,..., United States of America} \\ t = \text{time} \\ p = \text{product} \end{array}$$

[6]Greenaway et al. (1994) extensively discusses the potential problems related to measuring prices and quality by using unit value indexes. If we use sufficiently disaggregated data, we can expect price-ratio to be a good indicator of quality. Greenaway et al. (1994) themselves, notwithstanding some criticism, use such indicator to divide vertical from horizontal differentiated products.

[7]See Fontagné, L., M. Freudenberg (1997); Fontagné, L., M. Freudenberg, N. Péridy (1998); Greenaway, D., J. Torstensson (1998); Greenaway, D., R. Hine and C. Milner (1994).

[8]The analysis of these aggregated results hides a huge sectoral and country heterogeneity. Disaggregated sectoral and geographical results are discussed in Chiarlone (1999).

[9]Respect to the Sectors presented in Table 2A of Appendix A:

i) We have considered together the Sectors “Motor Vehicles” and “Other Transport Equipment”.

ii) We have skipped the sector “Mining, Quarrying and Petroleum” because the presence of petroleum good would have made the analysis unclear.

iii) We have skipped the sector Agriculture Hunting and Forestry because it is not an industrial sector.

iv) We have skipped the sector Other Industries, because it is not enough homogeneous.

[10]We have excluded from the estimation the product lines for which there were not imports in every year of our time range, to have a balanced panel. We have also excluded all the product lines for which we had imports smaller than 5 tons. Finally we have excluded all the product lines referring to *other goods*, *n.e.s. products*, or to *parts* of goods, because from one year to the other the changing composition of this sets could bias the estimations.

[11]All the variables used in the estimation are natural logarithms.

[12]Even if we are aware that using an aggregated domestic deflator could be biasing the analysis, we can’t avoid that because there is not any disaggregated national price data index available.

[13]To build the world price variable, we have considered all the countries with whom Italy has a trade flow greater than 100.000.000 US Dollars

[14]We have included 15 dummy variables for the 16 countries considered; 8 dummy variables for the 9 years considered; and a number of dummy variables equal to the number of four digit subsectors included minus one.

[15]The robust regression used by Intercooled Stata 5.0 works iteratively. It performs a regression; calculating weight based on absolute residuals. Then it performs further regressions using such weights, until changes in weights are lower than a tolerance level.

[16]Greenaway and Torstensson (1998) in an empirical analysis of determinant trade within industries attach the same interpretation to country dummies.

[17]In Table 4 of the Appendix we present the elasticities estimated without including the Horizontal and Vertical Dummies. We underline that they are different from those presented in Table 1 for many sectors, though the difference is not dramatic. That confirms that including the dummies changes the

results. Including the dummies implies accounting for the heterogeneous reaction of goods belonging to different trade typologies and therefore improves the precision of the estimates.

Appendix

Table A1 Countries

Austria;	Belgium-Luxembourg;	Canada;	Denmark;
Finland;	France	Japan;	Germany;
Greece;	Ireland;	Netherlands;	Portugal;
Spain;	Sweden;	United Kingdom;	United States of America.

Table A2 Sectors and Sectoral Aggregation from SITC Rev. 3

Sector	Included Codes	Excluded Codes
Agriculture, Hunting and Forestry.	001, 011, 012, 016, 019, 022, 023, 024, 025, 029, 034, 035, 036, 041, 042, 043, 044, 045, 046, 047, 054, 057, 058, 074, 075, 291, 292, 411, 421, 422, 431, 05611, 05612, 05613, 05619, 05641, 05642, 05646, 05647, 05648, 51217, 51222, 04813, 04814, 04815, 0482, 0616, 07111, 07112, 07113, 0712, 07132, 08111, 08112, 08113, 2632, 26851, 59211, 59212, 59213, 59214, 59215, 59216, 59217	02233, 0253, 0581, 05892, 05893, 05894, 05895, 05896, 05897, 07432
Food, Beverages and Tobacco.	017, 037, 048, 059, 061, 062, 071, 072, 073, 081, 091, 098, 111, 112, 121, 122, 222, 223, 05645, 05661, 05669, 05671, 05672, 05673, 05674, 05675, 05676, 05677, 05679, 51215, 51216, 02233, 0581, 05892, 05893, 05894, 05895, 05896, 05897, 07432	04813, 04814, 04815, 0482, 0616, 07111, 07112, 07113, 0712, 07132, 08111, 08112, 08113
Mining, Quarrying and Petroleum.	273, 274, 277, 278, 281, 283, 284, 285, 286, 287, 288, 289, 321, 322, 325, 333, 334, 335, 342, 343, 344, 345, 351, 27231, 27232, 66111, 66112, 66113, 66121, 66122, 66123, 66129	27711, 27719, 27721, 28321, 28322, 28421, 28422, 28821, 28822, 28823, 28824, 28825, 28826, 28921, 28929
Chemicals.	231, 232, 272, 511, 513, 514, 515, 516, 522, 523, 524, 525, 531, 532, 533, 541, 542, 551, 553, 554, 562, 571, 572, 573, 574, 575, 579, 581, 582, 583, 591, 592, 593, 597, 598, 621, 625, 629, 882, 883, 893, 51211, 51212, 51213, 51214, 51219, 51221, 51223, 51224, 51225, 51229, 51231, 51235, 51241, 51242, 51243, 51244, 84821, 84822, 84829, 89931, 89932, 89934, 89939, 0253, 66133, 89591	27231, 27232, 59211, 59212, 59213, 59214, 59215, 59216, 59217
Wood, Paper and Printing.	244, 245, 246, 247, 248, 251, 633, 634, 635, 639, 641, 892, 89971, 89973, 89974, 89979,	
Textiles, Leathers and Footwear.	211, 212, 261, 263, 264, 265, 266, 267, 268, 269, 611, 612, 613, 651, 652, 653, 654, 655, 656, 657, 658, 659, 831, 841, 842, 843, 844, 845, 846, 851, 77585, 84811, 84812, 84813, 84819, 84831, 84832, 84841, 84842, 84843, 84844, 84845, 84848, 84849, 89921, 89929, 89941, 89942, 89949, 89991, 89992, 89994, 89995, 89477	2632, 26851, 65195, 8313
Non Metallic Product.	282, 661, 662, 663, 664, 665, 666, 667, 671, 672, 673, 674, 675, 676, 678, 897, 961, 971, 81221, 81229, 27711, 27719, 27721, 65195	66111, 66112, 66113, 66121, 66122, 66123, 66129, 66133, 67686
Basic Metals and Fabricated Metal Products.	677, 679, 681, 682, 683, 684, 685, 686, 687, 689, 691, 692, 693, 694, 695, 696, 697, 699, 81211, 81215, 28321, 28322, 28421, 28422, 28821, 28822, 28823, 28824, 28825, 28826, 28921, 28929, 67686, 74831, 74832, 74839	

Table A2 Sectors and Sectoral Aggregation from SITC Rev. 3(Continuation)

Sector	Included Codes	Excluded Codes
Non Electrical Machinery.	711, 712, 713, 714, 718, 723, 724, 725, 726, 727, 728, 731, 733, 735, 737, 741, 742, 743, 744, 745, 746, 747, 748, 749, 751, 752, 759, 77511, 77512, 77521, 77522, 7753, 81217, 81219, 89841, 89843, 89845, 89851, 89859, 89861, 89865, 89867, 89871, 89879	74131, 74132, 74133, 74134, 74135, 74414, 74415, 74419, 74831, 74832, 74839, 75131, 75132, 75133, 75134, 75135
Electrical Machinery.	716, 761, 762, 763, 764, 771, 772, 773, 776, 778, 77541, 77542, 77549, 77571, 77572, 77573, 77579, 77581, 77582, 77583, 77584, 77586, 77587, 77588, 77589, 74131, 74132, 74133, 74134, 74135, 81312, 81380	
Motor Vehicles.	721, 722, 781, 782, 783, 784, 785, 786, 74414, 74415, 74419, 89111	
Other Transport equipment.	791, 792, 793, 89996,	
Professional Goods	774, 871, 872, 873, 874, 881, 884, 885, 898, 89961, 89963, 89965, 89966, 89967, 89969, 75131, 75132, 75133, 75134, 75135	77422, 87229, 8724, 89591, 89841, 89843, 89845, 89851, 89859, 89861, 89865, 89867, 89871, 89879
Other Industries.	811, 813, 821, 891, 894, 895, 896, 931, 89911, 89919, 89933, 89935, 89936, 89937, 89972, 89981, 89982, 89983, 89984, 89985, 89986, 89987, 89988, 89989, 89997, 77422, 8313, 87229, 8724	81312, 81380, 89111, 89477

Table A3 Elasticity to Relative Prices & Activity Variable in the Italian Industrial Sectors without Trade-type Dummies

	Elasticity to Relative Price		Elasticity to Relative Price	
	Min	Max	Min	Max
Food, Beverages and Tobacco.	-0,39		Not Significant	
Chemicals.	-0,92	-0,90	3,30	3,36
Wood, Paper and Printing.	-1,16	-1,13	3,58	3,93
Textiles, Leathers and Footwear.	-0,74	-0,71	1,66	1,82
Non Metallic Product.	-0,99	-0,97	4,09	4,14
Basic Metals and Fabricated Metal Products.	-1,04	-0,99	2,87	3,01
Non Electrical Machinery.	-0,65		1,64	
Electrical Machinery.	-0,90	-0,87	3,25	3,40
Motor Vehicles and Other Transport equipment.	-0,41		Not Significant	
Professional Goods	-0,49	-0,47	1,58	

Table A4 Estimation of Import Demand for Food, Beverages and Tobacco

Obs. = 1755	**Vertical and Horizontal Dummy**		**Vertical Dummy**		**Horizontal Dummy**	
	Least square Regression					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.192 ***	0.025	0.198 ***	0.025	0.197 ***	0.025
Relative Price	-0,493 ***	0,078	-0,505 ***	0,078	-0,502 ***	0,078
Activity Variable	1,271	1,375	1,471	1,375	1,466	1,373
Vertical Diff. Dummy	0,255 **	0,124	0,018	0,091		
Horizontal Diff. Dummy	0,430 ***	0,153			0,217 *	0,112
Constant	-1,083	6,386	1,437	6,371	1,434	6,360
	F(44, 1710) = 23.81		F(43, 1711) = 24.08		F(43, 1711) = 24.22	
	Adj R2 = 0.3639		Adj R2 = 0.3614		Adj R2 = 0.3627	
Cook-Weisberg test for heteroskedasticity	$\chi2$ (1)	0,560	$\chi2$ (1)	0,340	$\chi2$ (1)	0,300
Shapiro-Wilk W test for Normality	Z	2,002**	Z	1,766**	Z	1,875**
	Robust Regression Estimates					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.205 ***	0.026	0.210 ***	0.026	0.209 ***	0.026
Relative Price	-0,539 ***	0,081	-0,552 ***	0,081	-0,549 ***	0,081
Activity Variable	0,676	1,425	0,929	1,425	0,914	1,422
Vertical Diff. Dummy	0,246 **	0,129	0,011	0,095		
Horizontal Diff. Dummy	0,422 ***	0,159			0,216 *	0,116
Constant	0,484	6,597	3,939	6,600	0,397	6,587
	F(44, 1710) = 24.13		F(43, 1711) = 24.46		F(43, 1711) = 24.58	

Table A5 Estimation of Import Demand for Chemicals

Obs. = 11277	**Vertical and Horizontal Dummy**		**Vertical Dummy**		**Horizontal Dummy**	
	Least square Regression					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	-0.050 ***	0.008	-0.050 ***	0.008	-0.050 ***	0.008
Relative Price	-0,900 ***	0,014	-0,900 ***	0,014	-0,895 ***	0,014
Activity Variable	3,479 ***	0,441	3,413 ***	0,444	3,450 ***	0,442
Vertical Diff. Dummy	0,357 ***	0,042	-0,032	0,029		
Horizontal Diff. Dummy	0,654 ***	0,051			0,344 ***	0,035
Constant	-7,353 ***	2,065	-6,689 ***	2,079	-0,691 ***	2,071
	F(63, 11213) = 214.43		F(62, 11214) = 212.10		F(62, 11214) = 215.36	
	Adj R2 = 0.5439		Adj R2 = 0.5372		Adj R2 = 0.5410	
Cook-Weisberg test for heteroskedasticity	χ2 (1)	30,71***	χ2 (1)	40,78***	χ2 (1)	32,77***
Shapiro-Wilk W test for Normality	Z	7,728***	Z	7,996***	Z	7,868***
	Regression with Robust standard Errors					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	-0.050 ***	0.009	-0.050 ***	0.009	-0.050 ***	0.009
Relative Price	-0,900 ***	0,016	-0,900 ***	0,016	-0,895 ***	0,016
Activity Variable	3,479 ***	0,444	3,413 ***	0,447	3,450 ***	0,446
Vertical Diff. Dummy	0,357 ***	0,043	-0,032	0,030		
Horizontal Diff. Dummy	0,654 ***	0,051			0,344 ***	0,035
Constant	-7,353 ***	2,060	-6,689 ***	2,075	-0,691 ***	2,069
	F(63, 11213) = 230.99		F(62, 11214) = 224.53		F(62, 11214) = 230.36	
	R2 = 0.5464		R2 = 0.5397		R2 = 0.5435	
	Robust Regression Estimates					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	-0.049 ***	0.008	-0.050 ***	0.009	-0.049 ***	0.009
Relative Price	-0,915 ***	0,015	-0,916 ***	0,015	-0,910 ***	0,015
Activity Variable	3,517 ***	0,450	3,450 ***	0,453	3,497 ***	0,451
Vertical Diff. Dummy	0,353 ***	0,043	-0,035	0,030		
Horizontal Diff. Dummy	0,641 ***	0,052			0,335 ***	0,036
Constant	-7,623 ***	2,108	-6,940 ***	2,119	-7,218 ***	2,112
	F(63, 11213) = 213.19		F(62, 11214) = 212.68		F(62, 11214) = 215.13	

Table A6 Estimation of Import Demand for Wood Paper and Printing

Obs. = 3492	**Vertical and Horizontal Dummy**		**Vertical Dummy**		**Horizontal Dummy**	
	Least square Regression					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.027	0.019	0.030 *	0.019	0.029 *	0.019
Relative Price	-1,126 ***	0,033	-1,128 ***	0,033	-1,125 ***	0,033
Activity Variable	3,535 ***	0,873	3,496 ***	0,876	3,477 ***	0,874
Vertical Diff. Dummy	0,362 ***	0,112	-0,097 *	0,061		
Horizontal Diff. Dummy	0,606 ***	0,124			0,269 ***	0,068
Constant	-6,659 *	4,084	-6,312	4,096	-6,279	4,087
	F(38, 3453) = 147.46 Adj R2 = 0.6145		F(37, 3454) = 149.82 Adj R2 = 0.6120		F(37, 3454) = 150.75 Adj R2 = 0.6135	
Cook-Weisberg test for heteroskedasticity	χ2 (1)	36,820***	χ2 (1)	42,470***	χ2 (1)	38,290***
Shapiro-Wilk W test for Normality	Z	5,640***	Z	6,157***	Z	5,945***
	Regression with Robust standard Errors					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.027	0.019	0.030 *	0.019	0.029 *	0.019
Relative Price	-1,126 ***	0,035	-1,128 ***	0,035	-1,125 ***	0,035
Activity Variable	3,535 ***	0,892	3,496 ***	0,895	3,477 ***	0,893
Vertical Diff. Dummy	0,362 ***	0,132	-0,097 *	0,062		
Horizontal Diff. Dummy	0,606 ***	0,141			0,269 ***	0,065
Constant	-6,659 *	4,121	-6,312	0,413	-6,279	4,123
	F(38, 3453) = 214.97 R2 = 0.6187		F(37, 3454) = 232.81 R2 = 0.6161		F(37, 3454) = 230.31 R2 = 0.6176	
	Robust Regression Estimates					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.012	0.019	0.014	0.019	0.014	0.019
Relative Price	-1,155 ***	0,034	-1,159 ***	0,034	-1,154 ***	0,034
Activity Variable	3,858 ***	0,886	3,881 ***	0,887	3,836 ***	0,886
Vertical Diff. Dummy	0,333 ***	0,114	-0,121 **	0,062		
Horizontal Diff. Dummy	0,572 ***	0,126			0,259 ***	0,069
Constant	-7,980 **	4,145	-7,908 *	4,149	-0,777 *	4,141
	F(38, 3453) = 148.98		F(37, 3454) = 152.47		F(37, 3454) = 152.94	

Table A7 Estimation of Import Demand for Textiles, Leather and Footwear

Obs. = 5697	Vertical and Horizontal Dummy		Vertical Dummy		Horizontal Dummy	
	Least square Regression					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	-0.036 ***	0.012	-0.036 ***	0.012	-0.037 ***	0.012
Relative Price	-0,710 ***	0,026	-0,709 ***	0,026	-0,711 ***	0,026
Activity Variable	1,762 ***	0,586	1,748 ***	0,585	1,783 ***	0,585
Vertical Diff. Dummy	-0,053	0,094	-0,083 **	0,042		
Horizontal Diff. Dummy	0,035	0,099			0,085 **	0,044
Constant	-0,266	2,756	-0,907	2,746	-0,378	0,275
	F(57, 5639) = 101.39		F(56, 5640) = 103.22		F(56, 5640) = 103.21	
	Adj R2 = 0.5012		Adj R2 = 0.5012		Adj R2 = 0.5012	
Cook-Weisberg test for heteroskedasticity	χ2 (1)	165,730***	χ2 (1)	165,700***	χ2 (1)	166,080***
Shapiro-Wilk W test for Normality	Z	3,126***	Z	3,125***	Z	3,117***
	Regression with Robust standard Errors					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	-0.036 ***	0.012	-0.036 ***	0.012	-0.037 ***	0.012
Relative Price	-0,710 ***	0,026	-0,709 ***	0,026	-0,711 ***	0,026
Activity Variable	1,762 ***	0,580	1,748 ***	0,580	1,783 ***	0,580
Vertical Diff. Dummy	-0,053	0,094	-0,083 **	0,042		
Horizontal Diff. Dummy	0,035	0,100			0,085 *	0,045
Constant	-0,266	2,678	-0,907	2,678	-0,378	2,676
	F(57, 5639) = 140.24		F(56, 5640) = 142.26		F(56, 5640) = 143.52	
	R2 = 0.5061		R2 = 0.5061		R2 = 0.5061	
	Robust Regression Estimates					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	-0.031 ***	0.013	-0.031 ***	0.013	-0.032 ***	0.013
Relative Price	-0,739 ***	0,027	-0,739 ***	0,027	-0,740 ***	0,027
Activity Variable	1,906 ***	0,605	1,898 ***	0,603	1,922 ***	0,604
Vertical Diff. Dummy	-0,048	0,097	-0,067 *	0,043		
Horizontal Diff. Dummy	0,024	0,103			0,069	0,045
Constant	-0,810	2,845	-1,563	0,283	-0,902	0,284
	F(57, 5639) = 95.92		F(56, 5640) = 97.65		F(56, 5640) = 97.65	

Table A8 Estimation of Import Demand for Non Metallic Mineral Product

Obs. = 4383	**Vertical and Horizontal Dummy**		**Vertical Dummy**		**Horizontal Dummy**	
Least square Regression						
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	-0.029 **	0.015	-0.027 *	0.015	-0.029 **	0.015
Relative Price	-0,978 ***	0,026	-0,971 ***	0,027	-0,975 ***	0,026
Activity Variable	4,116 ***	0,762	4,198 ***	0,765	4,141 ***	0,762
Vertical Diff. Dummy	0,154	0,100	-0,338 ***	0,052		
Horizontal Diff. Dummy	0,607 ***	0,105			0,468 ***	0,054
Constant	-9,024 ***	3,535	-9,045 ***	3,548	-9,044 ***	3,536
	F(42, 4340) = 127.73		F(41, 4341) = 129.07		F(41, 4341) = 130.74	
	Adj R2 = 0.5485		Adj R2 = 0.5451		Adj R2 = 0.5483	
Cook-Weisberg test for heteroskedasticity	$\chi 2$ (1)	11,11***	$\chi 2$ (1)	15,46***	$\chi 2$ (1)	11,59***
Shapiro-Wilk W test for Normality	Z	3,961***	Z	4,128***	Z	4,621***
Regression with Robust standard Errors						
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	-0.029 **	0.013	-0.027 **	0.013	-0.029 **	0.013
Relative Price	-0,978 ***	0,026	-0,971 ***	0,026	-0,975 ***	0,026
Activity Variable	4,116 ***	0,772	4,198 ***	0,772	4,141 ***	0,771
Vertical Diff. Dummy	0,154	0,104	-0,338 ***	0,053		
Horizontal Diff. Dummy	0,607 ***	0,109			0,468 ***	0,055
Constant	-9,024 ***	0,356	-9,045 ***	0,357	-9,044 ***	3,563
	F(42, 4340) = 218.38		F(41, 4341) = 221.04		F(41, 4341) = 223.18	
	R2 = 0.5528		R2 = 0.5494		R2 = 0.5525	
Robust Regression Estimates						
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	-0.038 **	0.015	-0.036 ***	0.015	-0.038 ***	0.015
Relative Price	-0,993 ***	0,027	-0,988 ***	0,027	-0,991 ***	0,027
Activity Variable	4,171 ***	0,787	4,260 ***	0,789	4,187 ***	0,786
Vertical Diff. Dummy	0,118	0,103	-0,366 ***	0,053		
Horizontal Diff. Dummy	0,590 ***	0,109			0,484 ***	0,056
Constant	-0,899 ***	3,648	-9,054 ***	3,660	-8,991 ***	3,647
	F(42, 4340) = 122.79		F(41, 4341) = 124.38		F(41, 4341) = 125.81	

Table A9 Estimation of Import Demand for Basic Metals and Fabricated Metal Products

Obs. = 4554	**Vertical and Horizontal Dummy**		**Vertical Dummy**		**Horizontal Dummy**	
	Least square Regression					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.199 ***	0.016	0.201 ***	0.016	0.198 ***	0.016
Relative Price	-1,009 ***	0,029	-1,007 ***	0,029	1,010 ***	0,029
Activity Variable	2,486 ***	0,702	2,466 ***	0,703	2,498 ***	0,702
Vertical Diff. Dummy	-0,067	0,094	-0,257 ***	0,048		
Horizontal Diff. Dummy	0,240 **	0,102			0,302 ***	0,052
Constant	-0,229	3,298	-1,402	3,272	-1,331	3,270
	F(47, 4506) =		F(46, 4507) =		F(46, 4507) = 130.78	
	Adj R2 = 0.5673		Adj R2 = 0.5668		Adj R2 = 0.5673	
Cook-Weisberg test for heteroskedasticity	χ2 (1)	27,19***	χ2 (1)	27,79***	χ2 (1)	27,15***
Shapiro-Wilk W test for Normality	Z	6,070***	Z	6,114***	Z	6,045***
	Regression with Robust standard Errors					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.199 ***	0.016	0.201 ***	0.016	0.198 ***	0.016
Relative Price	-1,009 ***	0,034	-1,007 ***	0,034	-1,010 ***	0,034
Activity Variable	2,486 ***	0,704	2,466 ***	0,704	2,498 ***	0,705
Vertical Diff. Dummy	-0,067	0,096	-0,257 ***	0,050		
Horizontal Diff. Dummy	0,240 **	0,105			0,302 ***	0,054
Constant	-1,332	3,266	-1,402	3,263	-1,331	3,267
	F(47, 4506) = 145.50		F(46, 4507) = 147.33		F(46, 4507) = 148.88	
	R2 = 0.5717		R2 = 0.5712		R2 = 0.5717	
	Robust Regression Estimates					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.202 ***	0.016	0.205 ***	0.016	0.202 ***	0.016
Relative Price	-1,024 ***	0,030	-1,023 ***	0,030	-1,024 ***	0,030
Activity Variable	2,259 ***	0,729	2,264 ***	0,729	2,262 ***	0,728
Vertical Diff. Dummy	-0,024	0,098	-0,263 ***	0,050		
Horizontal Diff. Dummy	0,301 ***	0,106			0,324 ***	0,054
Constant	-0,198	3,393	-0,443	3,396	-0,187	3,392
	F(47, 4506) = 121.77		F(46, 4507) = 124.01		F(46, 4507) = 124.49	

Table A10 Estimation of Import Demand for Non Electrical Machinery

Obs. = 4545	**Vertical and Horizontal Dummy**		**Vertical Dummy**		**Horizontal Dummy**	
	Least square Regression					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.076 ***	0.014	0.075 ***	0.014	0.076 ***	0.014
Relative Price	-0,639 ***	0,030	-0,645 ***	0,030	-0,640 ***	0,030
Activity Variable	1,369 **	0,649	1,400 **	0,650	1,375 **	0,649
Vertical Diff. Dummy	0,261 *	0,141	-0,346 ***	0,046		
Horizontal Diff. Dummy	0,663 ***	0,145			0,409 ***	0,048
Constant	-0,503	3,029	-2,345	0,360	-2,658	3,027
	F(49, 4495) = 45.14 Adj R2 = 0.3225		F(48, 4496) = 45.45 Adj R2 = 0.3195		F(48, 4496) = 45.99 Adj R2 = 0.3221	
Cook-Weisberg test for heteroskedasticity	$\chi 2$ (1)	186,16***	$\chi 2$ (1)	200,23***	$\chi 2$ (1)	190,3***
Shapiro-Wilk W test for Normality	Z	0,312	Z	0,464	Z	0,503
	Regression with Robust standard Errors					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.076 ***	0.017	0.075 ***	0.017	0.076 ***	0.017
Relative Price	-0,639 ***	0,031	-0,645 ***	0,031	-0,640 ***	0,031
Activity Variable	1,369 **	0,661	1,400 **	0,661	1,375 **	0,661
Vertical Diff. Dummy	0,261 *	0,159	-0,346 ***	0,049		
Horizontal Diff. Dummy	0,663 ***	0,164			0,409 ***	0,050
Constant	-2,918	3,067	-2,345	3,061	-2,658	3,059
	F(49, 4495) = 57.95 R2 = 0.3298		F(48, 4496) = 58.31 R2 = 0.3267		F(48, 4496) = 59.19 R2 = 0.3293	

Table A11 Estimation of Import Demand for Electrical Machinery

Obs. = 3222	**Vertical and Horizontal Dummy**		**Vertical Dummy**		**Horizontal Dummy**	
	Least square Regression					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.006	0.014	0.005	0.015	0.006	0.015
Relative Price	-0,854 ***	0,024	-0,864 ***	0,025	-0,855 ***	0,025
Activity Variable	3,160 ***	0,789	3,224 ***	0,793	3,197 ***	0,792
Vertical Diff. Dummy	0,830 ***	0,171	-0,094 *	0,060		
Horizontal Diff. Dummy	1,033 ***	0,179			0,220 ***	0,063
Constant	-9,012 ***	3,655	-9,161 ***	3,671	-9,224 ***	3,665
	F(37, 3184) = 56.54		F(36, 3185) = 56.60		F(36, 3185) = 57.05	
	Adj R2 = 0.3895		Adj R2 = 0.3833		Adj R2 = 0.3851	
Cook-Weisberg test for heteroskedasticity	χ2 (1)	17,01***	χ2 (1)	17,23***	χ2 (1)	17,66***
Shapiro-Wilk W test for Normality	Z	3,295***	Z	3,517***	Z	3,495***
	Regression with Robust standard Errors					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.006	0.015	0.005	0.015	0.006	0.015
Relative Price	-0,854 ***	0,026	-0,864 ***	0,026	-0,855 ***	0,026
Activity Variable	3,160 ***	0,796	3,224 ***	0,795	3,197 ***	0,794
Vertical Diff. Dummy	0,830 ***	0,180	-0,094	0,064		
Horizontal Diff. Dummy	1,033 ***	0,188			0,220 ***	0,065
Constant	-9,894 ***	3,668	-9,161 ***	3,664	-9,224 ***	3,658
	F(37, 3184) = 63.53		F(36, 3185) = 64.39		F(36, 3185) = 64.47	
	R2 = 0.3965		R2 = 0.3902		R2 = 0.3920	
	Robust Regression Estimates					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.008	0.015	0.007	0.015	0.008	0.015
Relative Price	-0,889 ***	0,026	-0,900 ***	0,026	-0,890 ***	0,026
Activity Variable	3,281 ***	0,822	3,379 ***	0,825	3,349 ***	0,825
Vertical Diff. Dummy	0,890 ***	0,178	-0,101 *	0,063		
Horizontal Diff. Dummy	1,098 ***	0,186			0,225 ***	0,066
Constant	-1,040 ***	3,807	-9,761 ***	3,821	-9,810 ***	3,817
	F(37, 3184) = 56.14		F(36, 3185) = 56.24		F(36, 3185) = 56.64	

Table A12 Estimation of Import Demand for Motor Vehicles and Other Transport Equipment

Obs. = 801	**Vertical and Horizontal Dummy**		**Vertical Dummy**		**Horizontal Dummy**	
	Least square Regression					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	-0.128 **	0.050	-0.128 ***	0.050	-0.129 ***	0.050
Relative Price	-0,419 ***	0,075	-0,416 ***	0,074	-0,414 **	0,075
Activity Variable	0,362	1,617	0,345	1,616	0,331	1,616
Vertical Diff. Dummy	-0,232	0,332	-0,130	0,110		
Horizontal Diff. Dummy	-0,112	0,347			0,116	0,115
Constant	3,864	7,422	3,921	7,415	3,962	7,418
	F(32, 768) = 13.55 Adj R2 = 0.3343		F(31, 769) = 14.00 Adj R2 = 0.3351		F(31, 769) = 13.99 Adj R2 = 0.3347	
Cook-Weisberg test for heteroskedasticity	$\chi 2$ (1)	11,230***	$\chi 2$ (1)	11,310***	$\chi 2$ (1)	11,64***
Shapiro-Wilk W test for Normality	Z	-1,544	Z	-1,468	Z	-1,448
	Regression with Robust standard Errors					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	-0.128 **	0.060	-0.128 **	0.060	-0.129 **	0.060
Relative Price	-0,419 ***	0,085	-0,416 ***	0,084	-0,414 ***	0,085
Activity Variable	0,362	1,652	0,345	1,647	0,331	1,648
Vertical Diff. Dummy	-0,232	0,204	-0,130	0,105		
Horizontal Diff. Dummy	-0,112	0,230			0,116	0,113
Constant	3,864	7,491	3,921	7,473	3,962	0,748
	F(32, 768) = 20.43 R2 = 0.3609		F(31, 769) = 21.12 R2 = 0.3608		F(31, 769) = 21.04 R2 = 0.3605	

Table A13 Estimation of Import Demand for Professional Goods

Obs. = 1467	**Vertical and Horizontal Dummy**		**Vertical Dummy**		**Horizontal Dummy**	
	Least square Regression					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.046 ***	0.020	0.043 **	0.020	0.043 **	0.020
Relative Price	-0,473 ***	0,037	-0,469 ***	0,037	-0,467 ***	0,037
Activity Variable	1,097	0,892	1,113	0,893	1,092	0,893
Vertical Diff. Dummy	0,460 **	0,199	0,001	0,072		
Horizontal Diff. Dummy	0,520 ***	0,211			0,067	0,077
Constant	-0,458	4,123	0,954	4,126	1,046	4,122
	F(34, 1432) = 25.29		F(33, 1433) = 25.78		F(33, 1433) = 25.82	
	Adj R2 = 0.3604		Adj R2 = 0.3581		Adj R2 = 0.3584	
Cook-Weisberg test for heteroskedasticity	χ2 (1)	98,56***	χ2 (1)	100,48***	χ2 (1)	100,66***
Shapiro-Wilk W test for Normality	Z	2,226***	Z	2,311***	Z	2,244**
	Regression with Robust standard Errors					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.046 **	0.022	0.043 **	0.022	0.043 **	0.022
Relative Price	-0,473 ***	0,036	-0,469 ***	0,036	-0,467 ***	0,036
Activity Variable	1,097	0,918	1,113	0,925	1,092	0,927
Vertical Diff. Dummy	0,460 *	0,239	0,001	0,075		
Horizontal Diff. Dummy	0,520 *	0,251			0,067	0,077
Constant	0,566	4,191003	0,954	4,241	1,046	4,255
	F(34, 1432) = 30.60		F(33, 1433) = 31.33		F(33, 1433) = 31.34	
	R2 = 0.3752		R2 = 0.3725		R2 = 0.3729	
	Robust Regression Estimates					
	Coefficient	Standard Error	Coefficient	Standard Error	Coefficient	Standard Error
World Price	0.003	0.019	0.002	0.019	0.002	0.019
Relative Price	-0,489 ***	0,037	-0,486 ***	0,037	-0,485 ***	0,037
Activity Variable	1,499 *	0,888	1,574 *	0,887	1,564 *	0,888
Vertical Diff. Dummy	0,399 **	0,198	0,014	0,072		
Horizontal Diff. Dummy	0,428 **	0,210			0,033	0,076
Constant	0,336	4,089	0,363	4,082	0,409	4,082
	F(33, 1433) = 28.09		F(32, 1434) = 28.83		F(32, 1434) = 28.84	

1 All the estimations have been done using Intercooled Stata 5.0.

[2] Goldstein and Khan (1985) offers a dated but still referenced overview of the field.

[3] Geographical aggregation biases arise when we use non-bilateral data. Summing up trade flows from and to different countries before of making the calculations can increase the evidence of product differentiation. Product aggregation biases refers to the measurement errors that arise from using trade flows, which are not sufficiently disaggregated. As much aggregated is the trade flow considered, as bigger the evidence of product differentiation will be.

[4] We use the 5 digits bilateral data recorded into the OECD SITC. Rev. 3 Dataset for the Sectors and the Countries presented in TableA1 and Table A2 of the and variance between years.

[5] All along the paper we stick to:

$$\begin{aligned} &j = \text{Sector } 1, ..., \text{Sector } 14, \text{Total of Sectors.} \\ &k = \text{Partner Country : Austria}, ..., \text{United States of America} \\ &t = \text{time} \\ &p = \text{product} \end{aligned}$$

[6] Greenaway et al. (1994) extensively discusses the potential problems related to measuring prices and quality by using unit value indexes. If we use sufficiently disaggregated data, we can expect price-ratio to be a good indicator of quality. Greenaway et al. (1994) themselves, notwithstanding some criticism, use such indicator to divide vertical from horizontal differentiated products.

[7] See Fontagné, L., M. Freudenberg (1997); Fontagné, L., M. Freudenberg, N. Péridy (1998); Greenaway, D., J. Torstensson (1998); Greenaway, D., R. Hine and C. Milner (1994).

[8] The analysis of these aggregated results hides a huge sectoral and country heterogeneity. Disaggregated sectoral and geographical results are discussed in Chiarlone (1999).

[9] Respect to the Sectors presented in Table 2A of Appendix A:
i) We have considered together the Sectors “Motor Vehicles” and “Other Transport Equipment”.
ii) We have skipped the sector “Mining, Quarrying and Petroleum” because the presence of petroleum good would have made the analysis unclear.
iii) We have skipped the sector Agriculture Hunting and Forestry because it is not an industrial sector.
iv) We have skipped the sector Other Industries, because it is not enough homogeneous.

[10] We have excluded from the estimation the product lines for which there were not imports in every year of our time range, to have a balanced panel. We have also excluded all the product lines for which we had imports smaller than 5 tons. Finally we have excluded all the product lines referring to *other goods*, *n.e.s. products*, or to *parts* of goods, because from one year to the other the changing composition of this sets could bias the estimations.

[11] All the variables used in the estimation are natural logarithms.

[12] Even if we are aware that using an aggregated domestic deflator could be biasing the analysis, we can’t avoid that because there is not any disaggregated national price data index available.

[13] To build the world price variable, we have considered all the countries with whom Italy has a trade flow greater than 100.000.000 US Dollars

[14] We have included 15 dummy variables for the 16 countries considered; 8 dummy variables for the 9 years considered; and a number of dummy variables equal to the number of four digit subsectors included minus one.

[15]The robust regression used by Intercooled Stata 5.0 works iteratively. It performs a regression; calculating weight based on absolute residuals. Then it performs further regressions using such weights, until changes in weights are lower than a tolerance level.

[16] Greenaway and Torstensson (1998) in an empirical analysis of determinant trade within industries attach the same interpretation to country dummies.

[17] In Table 4 of the Appendix we present the elasticities estimated without including the Horizontal and Vertical Dummies. We underline that they are different from those presented in Table 1 for many sectors, though the difference is not dramatic. That confirms that including the dummies changes the results. Including the dummies implies accounting for the heterogeneous reaction of goods belonging to different trade typologies and therefore improves the precision of the estimates.