Trade and Wage Inequality: Do Local Comparative Advantages matter?

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Abstract

In this paper we provide evidence in favour of the relevance of "local" comparative advantages. More specifically, we point out that considering the comparative advantages of a country with respect to its own *cone of diversification* (local), along with the other *cones of diversification* (global), helps to understand the impact of trade on wage inequality. We focus on Italy that represents, in our opinion, an appropriate case study. Indeed, within its *cone of diversification*, Italy is specialized in the production of unskilled intensive goods while, with respect to other *cones of diversification*, it is mainly specialized in the production of skilled intensive goods. According to these specialization patterns, we find evidence that the "local" trade strongly affects wage inequality, while the "global" trade has a less important impact.

JEL classification: F10; F16; J31
Keywords: International trade; Trade specialization; Wage inequality; Skill premium.

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1 Introduction

International trade is investigated as one of the possible explanations for the increase in the wage gap between skilled and unskilled workers observed in several developed countries in the last twenty years. The reference framework is the Heckscher-Ohlin-Samuelson theorem. It states that increasing trade with developing countries shifts labour demand from unskilled workers to skilled workers in developed economies, because the latter are specialized in the production of skilled intensive goods (skill abundant countries). This, in turn, results in an increase in wage inequality in developed economies. The opposite happens in developing countries.

However, the international empirical evidence concerning this relationship between international trade and wage inequality provides controversial findings. In the light of this evidence, some authors found out other channels through which trade can influence wage inequality. Feenstra and Hanson (2001) highlight the relevance of the delocalization issue, i.e., the impact of international outsourcing of production activities on the dynamics of internal labour markets. Epifani and Gancia (2002), within a microeconomic framework, point out the importance of the impact of changes in the scale of economic activities induced by trade on the increase in wage inequality. Haskel and Slaughter (2001) underline the sector bias of skill-biased technological and price changes. They observe that wage inequality decreases (increases) if prices (proxy for trade outcome) or total factor productivity (proxy for technological outcome) increase in unskilled (skilled) intensive sectors. Melitz (2003) investigates the performance of exporting firms versus non exporting, finding positive links between the export status of a firm, size, productivity and wages.

Other authors, instead of looking for alternative theoretical foundations to explain the relationship between trade and wage inequality, tried to revisit and reconcile the HOS theorem with the controversial empirical evidence. In particular, Davis (1996) highlights the "local" comparative advantages issue, i.e., the importance of the comparative advantages within the own *cone of diversification*, in order to get a better insight of the impact of trade on wage inequality. He states that "the relevant factor abundance comparison is not to the global economy, but relative to the cone within which one produces" (Davis 1996, p.13). In another paper, Wood (1997) investigates the impact of trade on wage inequality in medium skill abundant countries within a HOS scheme. He suggests that in this kind of countries trade can either decrease or increase inequality depending on the factor endowment of their trading partners, i.e., high or low skill abundant countries.

Empirically, there is a lack of evidence testing these intuitions, as also stressed by Davis (1996). One of the few exceptions is Hanson and Harrison (1999). They investigate the Mexican case pointing out the relevance of competition coming from other developing countries characterized by cheaper unskilled labour than in Mexico (e.g. China) in explaining the pattern of wage inequality. In another empirical paper, Gouveia and Tavares (1995), focusing on

Portugal, argue that trade with the EU countries contributed to decrease income inequality, because of Portuguese comparative advantages in the production of unskilled intensive goods within the EU.

However, these two empirical papers do not directly investigate and test the impact of "local" comparative advantages, along with that of "global" comparative advantages, on wage inequality.

In this paper we provide a direct empirical test for these intuitions since our data on exports and imports, which are classified by groups of origin/destination countries, allow us to separately identify both the "local" and the "global" impact of trade on wage inequality. We focus on Italy that represents an interesting case study in this context because of its specialization patterns. On the one hand, Italy is specialized in the production of unskilled intensive goods and relies on imports of capital intensive goods within its own *cone of diversification* (the Developed Countries' *cone*). On the other hand, Italy exports medium skilled intensive goods and imports unskilled intensive goods from the Less Developed Countries' *cone of diversification*. We show that these specialization patterns, i.e., the Italian "local" (unskilled intensive goods production) together with the "global" (skilled intensive goods production) patterns of comparative advantages, are relevant to figure out the impact of international trade on wage inequality.

In the econometric analysis we use a matched employer-employee database provided by INPS (Italian Social Security Institute), merged with regional-sectoral data on exports and imports, classified according to groups of origin/destination countries (Developed Countries, Less Developed Countries and Transition Economies), and provided by ISTAT (Coeweb: Italian International Trade Statistics).

We carry out an analysis in two steps. In the first step, we use the individual level data. We regress the real gross weekly wages, both for all workers and for blue collars/white collars separately, on the export and import variables and on a battery of individual, firm and industrial characteristics, in order to analyze how trade separately impacts the wage structure of blue collars and white collars. Moreover, this first step provides robustness to the aggregate level of the analysis of the second step, since it allows us to control for individual (observed and unobserved) and firm heterogeneity.

In the second step, we aggregate the individual information to derive a regional-sectoral database. Thus, we compute two indexes of inequality (the Gini index and the average wage ratio of white collars to blue collars) at regional-sectoral level and we collapse the individual variables at the same level of aggregation. Then, we regress the indexes of inequality on the trade variables, in order to analyze the impact of international trade on wage inequality.

As for the individual level analysis, we find out that trade with Developed Countries has the strongest impact on wages. Exports positively impact blue collars' wages, while imports

positively impact white collars' ones. Concerning trade with the other groups of countries, the effect is less relevant.

As for the aggregate level of analysis, we show that trade with Developed Countries produces the strongest impact on wage inequality. More specifically, exports towards Developed Countries contribute to reduce wage inequality, while imports have the opposite effect. Further, trade with Less Developed Countries tends to increase wage inequality, while trade with Transition Economies has a "mixed" effect.

This evidence is consistent with Davis (1996). More specifically, the impact of trade with respect to the Developed Countries is in line with the "local" comparative advantage issue: blue collars gain from the comparative advantage that Italy has in unskilled intensive goods towards Developed Countries (its own *cone of diversification*), while imports of capital intensive goods from Developed Countries appear to be complement to white collar workers, thus favouring this category of workers.

On the other hand, we find out that the impact of trade with respect to the Less Developed Countries' *cone of diversification* is in line with standard HOS predictions, while that with respect to the Transition Economies' *cone* is less straightforward. However, these effects usually are less relevant.[1]

The structure of the paper is as follows. In Section 2 we review the theoretical as well as the empirical literature on the relationship between wage inequality and trade. In Section 3 we focus on the case of Italy, we describe its trade specialization patterns and briefly review the related literature. In Section 4 we describe the data and show some empirical evidence on the dynamics of wage inequality and international trade throughout the period 1991-2002. Section 5 introduces the first (individual) and the second (regional-sectoral) level of the analysis, discusses the empirical specification and presents the main results. Section 6 concludes.

2 Related Literature

International trade is one of the possible causes investigated to explain the increase in wage inequality observed in several developed countries in the last twenty years.[2]

The reference benchmark is the Heckscher-Ohlin-Samuelson theorem (HOS hereafter). This theorem states that international trade implies comparative advantages for the developed countries in the production of skilled intensive goods (because of more abundant skill endowment) and this generates, through the operating of the Stolper-Samuelson mechanism (SS hereafter), a skill premium.[3] At the same time, the conditions of unskilled workers

[1] It is also worth noting that this paper is only partially comparable with previous empirical papers concerning the Italian case because we use data on trade disaggregated by groups of origin/destination countries and because, using individual data, we are able to control for worker and firm heterogeneity.

[2] See Brandolini and Smeeding (2006) for a recent review of international patterns of inequality.

[3] The Stolper-Samuelson theorem states that if there is an increase in the price of a good relatively intensive of one factor, there will be an increase (more than proportional) in the return of that factor. Moreover, it is worth to remind

deteriorate because of the competition in unskilled intensive goods coming from developing countries. As a result, trade with developing countries increases wage inequality in developed countries. The opposite happens in developing countries: trade should decrease wage inequality between skilled and unskilled workers.

However, the empirical evidence concerning this relationship between trade and wage inequality, both in developed and in developing countries, has been controversial. In many developing countries wage inequality increased, instead of decreasing. Moreover, it has been questioned that the volume of North-South trade is so large to entail such a strong effect on wage inequality. Further, in many countries the SS effect did not take place and some of the hypothesis upon which the HOS theorem relies were questioned.

For these reasons several authors tried to find out new theoretical frameworks to explain the empirical evidence, looking for other channels through which trade exerts its impact on wage inequality.[4] For instance, Feenstra and Hanson (2001) highlight the relevance of the "delocalization" issue, i.e., the international outsourcing of production activity, as another aspect of trade influencing wage inequality. Epifani and Gancia (2002) take into account the phenomenon of North-North and South-South trade, along with North-South trade, and highlight the importance of the total volume of trade in influencing the pattern of wage inequality (the *scale effect*). Haskel and Slaughter (2001) underline the "sector bias" of skill-biased technological and price (proxy for trade outcome) changes. They observe that wage inequality decreases (increases) if prices of total factor productivity increase in unskilled (skilled) intensive sectors. Melitz (2003) investigates the interaction effect between export and technology and analyzes the role of exporting versus non exporting firms within a microeconomic framework, finding positive links between the export status of a firm, size, productivity and wages.

Other authors, instead of looking for alternative theoretical foundations, tried to reconcile the HOS theory with the controversial empirical evidence. In particular, Davis (1996) stresses the importance of the "local" versus "global" pattern of comparative advantages. Indeed, he states that "the relevant factor abundance comparison is not to the global economy, but relative to the cone within which one produces" (Davis 1996, p.13). Its starting point is that the factor price equalization[5] (FPE hereafter) does not occur between countries belonging to different *cones of diversification*, due to too pronounced differences in factor endowments. At the same time FPE should be more effective in countries belonging to the same *cone of diversificatio*n. More specifically, since different countries might be characterized by different factor endowments within their own *cone of diversification*, the impact of trade on relative factor return

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that with the openness to trade there is a tendency of relative goods prices to converge, and therefore the relative price of the skill intensive goods will increase in the developed countries.

[4] Other authors concentrate on other factors influencing wage inequality such as technology (see Krugman 2000, Acemoglu 1998, Bound and Johnson 1992) and institutions (see Di Nardo, Fortin and Lemieux 1996).

[5] The Factor Price Equalization theorem states that international trade in commodities, under the HOS assumptions and notwithstanding the international mobility of factors, equalizes the factor prices across countries. It represents one of the most significant conclusion of the HOS model.

can be determined by the pattern of comparative advantages within their own *cone*. In his paper, Davis applies this reasoning to the developing countries and considers capital and labour as factor endowments. However, he stresses that the reasoning is symmetric and can be applied to different qualities of labour (unskilled and skilled) as factor endowments. Therefore, if a country belongs to the *cone* of Developed Countries ("globally" skill abundant) but, at the same time, it is relatively unskilled abundant within its own *cone* ("locally" unskilled abundant), trade could decrease wage inequality instead of increasing it, as it should be following standard HOS predictions.

In another paper, Wood (1997) analyses the impact of trade in developing countries. He stresses that "analysts devote insufficient attention to variations among developing countries in the skill intensity of exports, which theory implies should be higher in better-educated (or middle income) countries. Few analysts divide the imports of middle income countries between those from higher-skilled trading partners and those from lower-skilled partners, which in theory should have different effects on the skill structure of domestic demand" (Wood 1997, p.40). Hence, Wood underlines that the net effect of trade in such countries (medium skill intensive) can be in either direction, both widening and narrowing the wage gap between skilled and unskilled workers, depending on the skill endowment of their trading partners.

These papers outline that it is important to consider the position of a country, in terms of its skill intensity, within its own *cone of diversification*, along with that relative to the other *cones of diversification*, to understand the likely impact of trade on wage inequality.[6] Empirically there are no many works which address this issue, as also stressed by Davis (1996). One of the few exceptions is the paper of Hanson and Harrison (1999) that analyzes the case of Mexico. They study the impact of Mexican trade with both the US and other developing countries (characterized by a larger amount of unskilled workers than Mexico -e.g. China-) on the skilled-unskilled wage gap. They find that the reduction in trade barriers was most important in the low-skill intensive industries, suggesting that the reduction mainly affected unskilled workers. They link this finding with the evidence that Mexico is a country with an intermediate abundance of skilled labour within the global economy, and that "the exposure of Mexico to competition from China and other developing countries that have abundant unskilled labour appears to have contributed to a decrease in the relative wages of unskilled workers" (Hanson and Harrison 1999, p.287). Therefore, even if Mexico belongs to the Less Developed Countries' *cone* ("globally" unskilled abundant), within its own *cone* it has a position of a relatively skill abundant country. This means that in Mexico trade might increase wage inequality, rather than decreasing it, as it should be following standard HOS predictions. In another paper, Gouveia and Tavares (1995) analyze and investigate the causes behind the

[6] This does not mean that both the other factors studied in the literature as impacting wage inequality (technology, institutions) and that the other theoretical frameworks on the relationship between trade and wage inequality are without foundations. Most likely all these factors and theoretical points of view, instead of being substitute for each others, are complementary and interact.

dynamics of income distribution in Portugal. Along with other factors, they point out the role of trade with the EU in explaining the decrease in income inequality, because Portugal has comparative advantages in the production of unskilled intensive goods within the EU.

3 The Case of Italy

Italian specialization pattern is quite peculiar. In fact, even if Italy is a medium capital abundant country (Epifani 1999), it is specialized in the production of unskilled intensive goods (Faini et al. 1998, Falzoni, Venturini and Villosio 2005). This might be due to the fact that after the Second World War, when it was a relatively labour abundant country, it began to specialize in labour intensive goods production. Later, even if the relative endowment has changed, it continued to follow the same specialization pattern, because of a kind of "path dependence" (Epifani 1999).

This structure of trade is atypical for a developed country. As already stressed in the introduction, Italy has comparative advantages in the production of unskilled intensive goods within its own *cone of diversification* (Developed Countries'-DC's hereafter- *cone*). Hence, it is a "local" exporter of unskilled intensive goods towards DC's and a "local" importer of capital intensive goods from DC's. On the contrary, Italy has comparative advantages in the production of medium-high skilled intensive goods with respect to the *cone of diversification* of the Less Developed Countries (LDC's hereafter). Hence, Italy is a "global" exporter of medium-high skilled intensive goods towards LDC's and a "global" importer of unskilled intensive goods from LDC's. The pattern of trade with respect to the Transition Economies' (TE's hereafter) *cone* is less clear: on one hand Italy is a net exporter of some unskilled (and medium skilled) intensive goods, wherein Italy is highly specialized, on the other hand it is a net importer of both unskilled and skilled intensive goods.

We argue that this structure of trade is crucial to understand the impact of international trade on wage inequality in Italy. Indeed, our results point out that the impact of trade on wage inequality in Italy strongly depends on the pattern of comparative advantages that Italy shows with respect to both its own and the other *cones of diversification*.

Some empirical studies have already investigated the impact of international trade on wage inequality in Italy. Falzoni, Venturini and Villosio (2005) perform an econometric analysis at a regional-sectoral level on the relationship between trade variables (exports/imports) and the wage differential between white collars and blue collars. They find that both exports and imports contribute to reduce wage inequality. Manasse and Stanca (2002) perform a firm level analysis to detect the effects of international trade and technology on the relative employment and wages of non manual/manual workers. As for the effect of trade on relative wages, they find a decreasing skill premium for the period 1992-1995 due to export performance. Bella and Quintieri (2000), using firm level data, investigate the effects of trade variables on the employment and wages of Italian workers. They find out that the effect of trade take place

mainly through adjustment in terms of relative employment. The effect on wages is lower and often not significant. However, when significant, the impacts of exports and imports go in the same direction for both categories of workers: exports positively affect wages, while the impact of imports is negative. Therefore, in terms of wage inequality outcome, the impact of trade is not clear.[7]

To sum up, these investigations substantially agree that in Italy the export performance favours blue collar workers. On the other hand, the findings concerning the impact of imports are not homogeneous. However, these studies do not take into consideration the pattern of Italian comparative advantages according to the main groups of origin/destination countries.[8] Moreover, these papers, using industrial and firm level data are not able to control for observed and unobserved individual heterogeneity.

4 Description of the Data and Empirical Evidence

4.1 Description of the Data

We merge data of two different sources: an administrative database provided by INPS (Italian Social Security Institute) and a set of regional-sectoral data, provided by ISTAT (Italian Institute of Statistics).

The first dataset we use is derived by a panel version of the INPS dataset, elaborated by ISFOL.[9] It is a matched employee-employer dataset, constructed merging the INPS employee information[10] with both the INPS employer information database from 1985 to 1998 and the ASIA[11] database from 1999 to 2002.

The sample units are industrial (manufacturing and mining) dependent workers, both part-time (converted in full-time equivalent) and full time. We exclude workers in apprenticeship status in order to concentrate the analysis on standard labour market contracts: blue collar and white collar workers. We consider male and females, aged between 15 and 64 (when they first enter in the database). In this way we end up with a panel of 104,963 workers and 551,224 observations.[12]

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[7] Other papers concerning the Italian case are Quintieri and Rosati (1995) and Brenton and Pinna (2001) who focus on the effect of trade on employment.

[8] The only exception is Brenton and Pinna (2001) who consider imports from OECD and non-OECD countries and focus on employment outcomes.

[9] "Institute for the Development of Vocational Training". In particular, the panel version has been constructed considering only one observation per year for each worker. For those workers who display more than one observation per year we selected the longest available contract in terms of weeks worked. We further eliminated those extreme observations below (above) the 0.5th (99.5th) percentile of the wage distribution.

[10] The sample scheme has been set up to follow individuals born on the 10th of March, June, September and December and therefore the proportion of this sample on the Italian employees population is approximately of 1/90.

[11] "Italian Statistical Archive of Operating Firms", provided by ISTAT. This database has been used since 1999, because the INPS employer database was not available after 1998. However, the two databases provide the same set of information that we use in our analysis.

[12] Due to missing observations in some explanatory variables, the regression analysis will be performed on a sample of 104,253 workers and 546,762 observations.

The dependent variable in our regressions is the (log) real gross weekly wage in euro. The wages have been deflated using as deflator the Consumer Price Index specific for blue collars and white collars (FOI[13] index –ISTAT-). The base year is 2002. As far as workers' characteristics are concerned, the database contains individual information such as age, gender, occupation, workplace, date of beginning and end of the current contract (if any), the social security contributions, the worker status (part-time or full-time), the real gross yearly wage and the number of worked weeks and days. As for firms, we have the plant location (province), the average number of employees and the sector (Ateco91).

The second dataset we use is provided by ISTAT (Coeweb: Italian International Trade Statistics). The dataset includes data on imports and exports (in values), defined according to the main groups of origin/destination countries (DC's, LDC's and TE's - see the Appendix 2 for the detailed list of the countries belonging to each of the groups -), at regional-sectoral[14] level from 1991 to 2002. We match these information with other variables collected by ISTAT such as value added (regional-sectoral), effective units of labour (regional-sectoral) and unemployment rate (regional). Exports, imports and value added have been deflated using as deflator the value added deflator (ISTAT). The base year is 2002.

Because of the different periods of availability of the data, we use the whole INPS dataset (1985-2002) to perform descriptive statistics on inequality. However, for the econometrics analysis, we focus on the period 1991-2002 for which aggregated data are available. See the Appendix 1 for descriptive statistics of the variables of the analysis. The variables of interest are in logarithms.

4.2 Evidence on Inequality and Trade

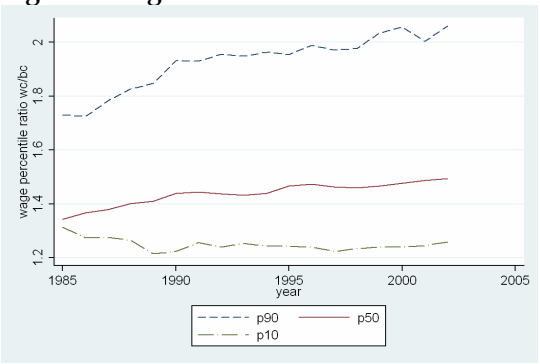
Inequality between occupational categories increased in Italy in the last twenty years. This evidence is documented by several papers (Brandolini, Cipollone and Sestito 2001, Lilla and Staffolani 2005).

This inequality trend is also confirmed in our data. Figure 1 shows the dynamics of the 90th, 50th and 10th wage percentile ratios of white collars to blue collars. From figure 1 it is clear that while the ratio of the wages at the 10th percentile has been relatively stable during the period, the median ratio and in particular the top percentile ratio (90th) increased throughout all the period of the analysis. Therefore, inequality increased between occupational categories. Figure 2 shows the dynamic of the Gini index computed for all workers and separately for white collars and blue collars. The index for all workers increases throughout all the reference period, especially before 1991. Considering the index for the two categories, only the index for white collars shows a similar evolution, while that for blue collars is relatively stable over the period of the analysis: in 2002 it is just slightly higher than it was in 1985.

[13] "Indice dei Prezzi al Consumo per le Famiglie di Operai e Impiegati".

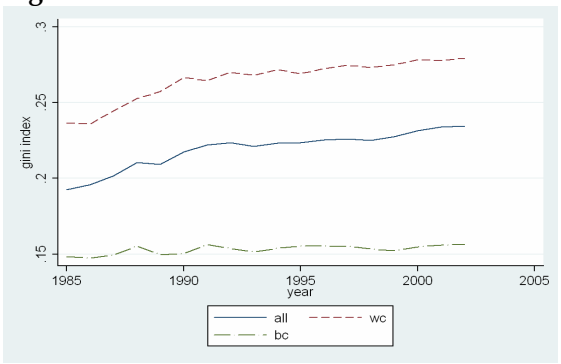
[14] Sectors follow the NACE classification: subsections level, two letters codes from C to DN (15 sectors). Moreover, the NACE classification and the Ateco91 classification correspond up to the 4th level of detail. As for regions, there are 20 regions.

Figure 1:Wage Percentile Ratios of Wc on Bc



Source: Panel ISFOL on INPS data.

Figure 2: Gini Index



Source: Panel ISFOL on INPS data.

We turn now to describe the peculiar features and the evolution of international trade in Italy. Summary statistics (table 1) show that the means of exports and imports over time are almost the same (slightly higher for exports) in each of the groups related to different origin/destination countries. Moreover, it is worth noting that Italy trades significantly more with the DC's than with the other groups of countries.

Table 1: Summary Statistics on Trade 1991-2002

Variable	Mean	Std. Dev.	Min	Max	Observations
Exp DC	820,000	2,070,000	2.63	24,200,000	N = 2,398
Imp DC	719,000	2,560,000	38.62	41,400,000	N = 2,400
Exp LDC	161,000	541,000	1.06	7,120,000	N = 2,373
Imp LDC	161,000	452,000	0.85	8,710,000	N = 2,362
Exp TE	81,000	225,000	0.56	3,380,000	N = 2,370
Imp TE	76,800	228,000	0.79	3,910,000	N = 2,326

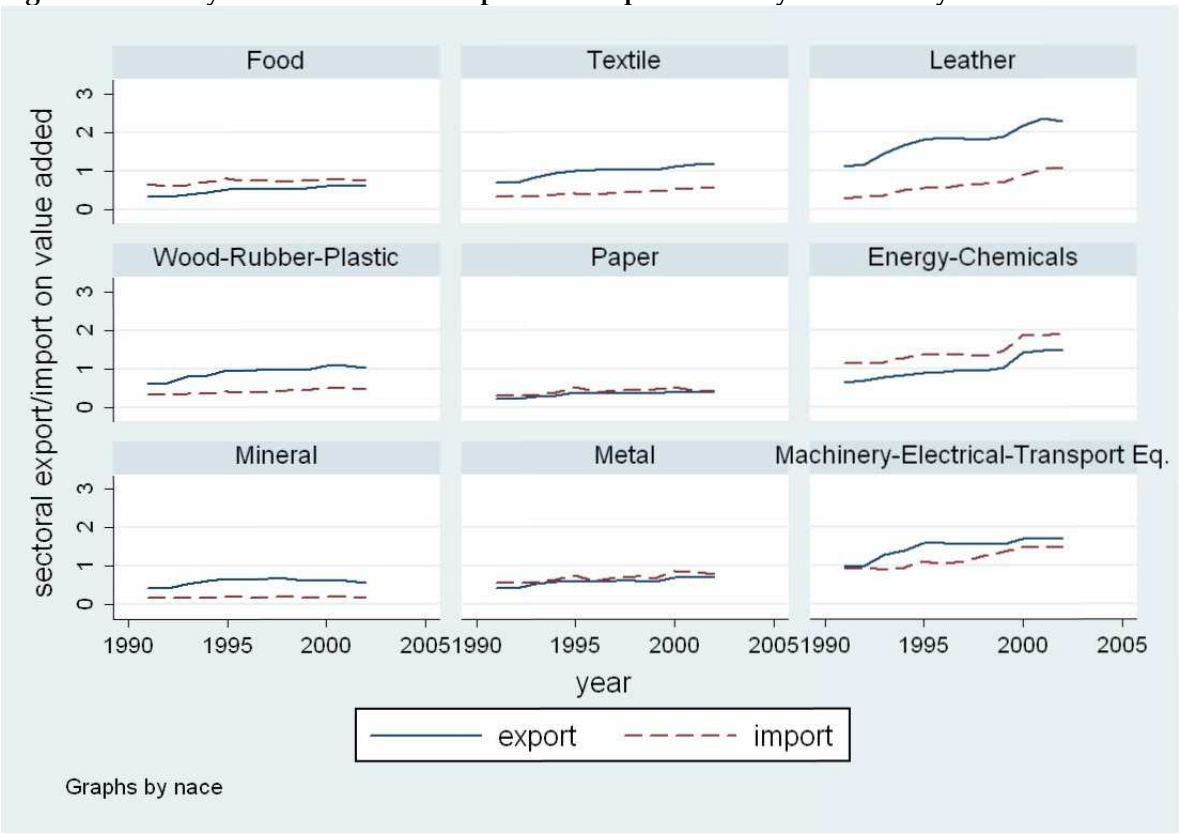
Notes: Data expressed in thousands of euro, constant price, base year 2002.
Source: ISTAT (Coeweb: International Trade Statistics).

The dynamics of export and import intensity[15] in each sector for the reference period are shown in figure 3 (see the Appendix 3 for a detailed description of the sectors, their relative skill intensity[16] and the abbreviations we use in the paper).

The sectors characterized by a higher export intensity are, within the unskilled intensive ones, the textile and the leather, within the medium skilled intensive, the wood-rubber-plastic, and within the skilled intensive, the energy-chemicals and the machinery-electrical-transport equipment. All these sectors show a rise of their export intensity during the period of analysis.

[15] The export (import) intensity is defined as the share of export (import) over value added.
[16] The relative skill intensity for each sector is computed from the INPS data and it refers to the relative employment ratio of white collars to blue collars.

Figure 3: Time Dynamics of Sectoral Export and Import Intensity 1991-2002 by Nace



Notes: We have excluded from the picture the mining and quarrying sector (c) due to its strong reliance on imports that would have flattered all the other lines. This sector shows an increasing trend in imports intensity, with an average of 4, while the export dynamic is constant and close to 0.
Source: ISTAT (Coeweb: International Trade Statistics)..

As for import intensity, the sectors which rely more on imports and that show an increasing incidence during all the period are, within the unskilled intensive ones, the leather and the mining sectors, and within the skilled intensive, the energy-chemicals and the machinery-electrical-transport equipment. Sectors which do not show a similar upward trend, but that are characterized by a significant intensity of imports, are the food and the metal sectors.

Therefore, considering the net export intensity,[17] the top net exporting sectors are leather, textile and wood-rubber-plastic. On the contrary, the top net importer sectors are mining, energy-chemicals and food. The paper and metal sectors are also net importers, but the difference between the import and export intensity is close to zero. The remaining sectors, mineral and machinery-electrical-transport equipment, are slightly net exporters.

In terms of relative skill intensity, the top net exporter sectors are all unskilled intensive (but for wood-rubber-plastic that is medium skilled intensive). Within the top net importer sectors there are both skilled intensive sectors, such as energy-chemicals, and medium skilled-unskilled intensive, such as food and mining.

[17] The net export intensity is defined as the share of export over value added minus the share of import over value added.

In order to get a clear understanding of the Italian specialization pattern we analyze the trade variables defined by the main groups of origin/destination countries (table 2).

From table 2 it is possible to understand for each sector with which group of countries Italy is a net exporter or importer. This is relevant because it helps to predict the impact of trade on the wages of Italian workers. Table 2 shows that Italy is a net exporter towards DC's in the unskilled intensive sectors (textile and leather), sectors in which Italy shows the highest net export intensity. At the same time, Italy is a net importer from LDC's in the same sectors. This means that Italy has comparative advantages in the production of unskilled intensive goods towards DC's (relatively more skill abundant) and this is likely to generate an effect of decreasing inequality (paying an "unskilled premium"). Nevertheless, Italy suffers import competition for the same kind of goods from LDC's and this is likely to hurt blue collar workers.

As for the skilled intensive sectors (energy-chemicals, machinery-electrical-transport equipment and paper), we get the opposite picture, i.e., Italy is a net importer from DC's and a net exporter towards LDC's. This should contribute to widen inequality. Indeed, imports of skilled intensive goods from DC's are likely to be related to imports in technology that might induce an effect of skill upgrading in the production process and pay a skill premium.[18] Further, also the exports of skilled intensive goods to LDC's, following standard HOS predictions, are likely to generate a skill premium, since Italy is relatively skill abundant with respect to the LDC's.

Lastly, the position of Italy with respect to the TE's is less clear. In fact, considering the unskilled intensive sectors, Italy is a net exporter in sectors such as textile and leather and a net importer in sectors such as mining. Considering the skilled sectors Italy is a net exporter in sectors such as paper and machinery-electrical-transport equipment, and a net importer in sectors such as energy-chemicals. This peculiar pattern of trade with respect to the TE's makes it difficult to a priori predict any effect of trade on wages.

[18] They might also be substitute of skilled workers. Here the issue is whether these imports of capital goods concern intermediate goods that are complement to skilled workers (Acemoglu 1998), or if they concern final goods acting as substitutes of skilled workers. Our findings are in line with the first of these possible explanations.

Table 2: International Trade: Net Exports			
SECTORS	**Developed Countries**	**Less Developed Countries**	**Transition Economies**
Mining	-2,150	-11,700	-3,660
Food	-4,140	-1,230	233
Textile	14,600	-1,750	533
Leather	8,130	-977	369
Wood-Rubber-Plastics	11,400	781	720
Paper	-946	78	48
Energy-Chemicals	-10,200	1,070	-403
Minerals	4,540	720	329
Metal	-1,140	-780	-1,120
Machinery-Electrical-Transport Equipment	-146	13,900	4,070
Total	19,948	112	1,119

Notes: Data expressed in millions of euro, constant price, base year 2002.

Source: ISTAT (Coeweb: International Trade Statistics).

5 Econometric Analysis

In this section we analyze the impact of international trade on individual wages and on wage inequality in Italy, using the trade variables classified according to the main groups of origin/destination countries. The aim of the analysis is to test and to provide empirical evidence in favour of the relevance of "local" comparative advantages (Davis, 1996). Therefore, we disentangle the impact of international trade on wage inequality into the component related to the comparative advantages that Italy has within its own *cone of diversification* (local) and the component related to the comparative advantages that Italy has with respect to the other *cones of diversification* (global).

The econometric analysis is carried out in two steps.

In the first step we use the individual level data. We regress the real gross weekly wages, both for all workers and for white collars and blue collars separately, on the trade variables and on a battery of individual, firm and industrial characteristics. We look at the effects of export and import intensity on wages. The importance of this first step is to provide robustness to the aggregate level of the analysis of the second step, by controlling for individual (observed and unobserved) and firm heterogeneity. Further, it allows us to exactly identify the driving forces behind the impact of trade on wage inequality, i.e. how trade separately affects the wage structure of blue collars and white collars.

In the second step the analysis is performed at the regional-sectoral level. We collapse the individual level variables at this level of aggregation and we compute two indexes of inequality (the Gini index and the average wage ratio of white collars to blue collars). Afterwards, we regress the indexes of inequality on the trade variables, in order to investigate the impact of international trade on wage inequality.

5.1 First Step: Econometric Analysis with Individual Level Data

The first step of the econometric analysis is performed at the individual level, using the individual data of the INPS archive matched with the regional-sectoral data provided by ISTAT. As far as we know, this is the first attempt to investigate the relationship between trade and wages in Italy using individual data, while it has been done for other countries (see Attanasio et al. (2004) who study the case of Colombia). Performing an individual level analysis allows us to control for individual and firm heterogeneity and to take into account unobserved time-invariant individual characteristics. Further, we consider the trade variables classified according to the main groups of origin/destination countries (DC's, LDC's and TE's), in order to get a clear understanding of the trade impact on wages.[19] We estimate the following wage equation:

$$w_{i,t} = \alpha + B_1' * I\_Char_{i,t} + \beta_1 * Firmsize_{i,t} + \gamma_1 * ExpDC_{r,s,t} + \gamma_2 * ImpDC_{r,s,t} + \gamma_3 * ExpLDC_{r,s,t,} +$$
$$+ \gamma_4 * ImpLDC_{r,s,t} + \gamma_5 * ExpTE_{r,s,t} + \gamma_6 * ImpTE_{r,s,t} + B_2' * Macrovar_{r,s,t} + \delta_t + u_i + \varepsilon_{it}$$

where subscripts *i* refers to individuals, *t* to time, *r* to regions and *s* to sectors.

The dependent variable is the logarithm of the real gross weekly wage. The term $I\_Char_{i,t}$ is a battery of individual characteristics (gender, age, age squared, blue collar dummy). $ExpDC_{r,s,t}$ and $ImpDC_{r,s,t}$ stand for the DC's share of exports and imports over value added, $ExpLDC_{r,s,t}$ and $ImpLDC_{r,s,t}$ stand for the LDC's share of exports and imports over value added, while $ExpTE_{r,s,t}$ and $ImpTE_{r,s,t}$ stand for the TE's share of exports and imports over value added. The term $Macro\ var_{r,s,t}$ stands for a battery of macroeconomic variables (the value added over effective units of labour - $Va/Eul_{r,s,t}$ -, the unemployment rate -$Unrate_{r,t}$ -, sectoral and area dummies used to control for regional-sectoral differences). $Firmsize_{i,t}$ is used to control for firm heterogeneity, u_i is an individual effect (in panel estimates) proxy for unobserved ability/skills, and δ_t is a time effect, capturing the business cycle. Since all the variables of interest are in logarithms, we estimate elasticities.

We present OLS and Fixed Effects estimates.[20] In Table 3 the OLS estimates are presented.

Column (1) clearly shows that exports and imports from DC's have a positive impact on wages, and that the impact is higher for exports. Further, the impact of export towards LDC's is positive, while that of imports is negative and not significant. On the contrary, the impact of imports from TE's is negative, while that of exports is not significant.

[19] Furthermore, our data are available until 2002, providing an update of previous analysis for Italy.

[20] We correct the standard errors for regional-sectoral clusters (as suggested in Moulton, 1990). We also carry out the same estimates with the lagged values of our variables of interest, in order to control for possible endogeneity problems arising from simultaneous determination of wages and trade variables. Further, using lagged variables, we can capture some time lags in the adjustment of the wages with respect to trade. Results do not change significantly and therefore we report the estimates with the contemporaneous values. The estimates with the lagged values of our variables of interest are available upon request.

Table 3: OLS Estimates. Dependent Variable: log of Real Weekly Wage			
	ALL	**BC**	**WC**
	(1)	**(2)**	**(3)**
Developed Countries			
- Export	0.026	0.033	-0.000
	(2.27)**	(2.46)**	(-0.02)
- Import	0.019	0.017	0.031
	(2.82)***	(2.33)**	(3.92)***
Less Developed Countries			
- Export	0.011	0.012	0.011
	(2.60)***	(2.63)***	(1.81)*
- Import	-0.003	-0.004	-0.005
	(-0.90)	(-0.87)	(-1.07)
Transition Economies			
- Export	-0.004	0.012	-0.009
	(-0.76)	(2.63)***	(-1.33)
- Import	-0.012	-0.012	-0.009
	(-2.23)**	(-1.95)*	(-1.91)*
Sex	-0.218	-0.171	-0.263
	(-39.20)***	(-29.13)***	(-40.89)***
Age	0.024	0.024	0.044
	(17.21)***	(15.00)***	(20.63)***
Age^2	-0.000	-0.000	-0.000
	(-13.40)***	(-12.84)***	(-11.26)***
Bc	-0.379		
	(-54.42)***		
Firm Size	0.036	0.035	0.037
	(9.69)***	(9.56)***	(9.39)***
Va/Eul	0.143	0.141	0.165
	(6.51)***	(6.31)***	(5.69)***
Unempl. Rate	-0.001	-0.001	-0.001
	(-0.50)	(-0.53)	(-0.47)
Constant	4.291	3.979	3.483
	(17.52)***	(15.88)***	(10.57)***
Area, Time and Sector dummies	yes	yes	yes
N. Observations	546762	405996	140766
N. Individuals	104253	80974	27068
R^2	0.52	0.39	0.44
Method	Ols	Ols	Ols

Notes: T-statistics in parenthesis with ***, ** and * respectively denoting significance at 1%, 5% and 10% levels. Standard errors are clustered by region-sector.

Turning to the separate specifications for blue collars and white collars, columns (2) and (3), we show that, for blue collars, the estimates for the export variable are positive and significant with respect to all groups of countries considered. However, the impact is significantly higher

for exports towards DC's. On the contrary, for white collars, the effect of exports is negligible and not significant, but for exports towards LDC's. Considering the import variable, the coefficient for imports from DC's is positive and significant for both categories of workers, but higher for white collars. The impact of imports from LDC's is slightly negative and not significant for both white collars and blue collars, while that of imports from TE's is negative, significant and slightly higher in magnitude for blue collars.

Therefore the OLS estimates point out that the effect of trade variables on wages strongly depends on the groups of countries considered and that trade with DC's has the strongest impact on wages.[21]

However the OLS estimates could be biased, because they do not control for unobserved heterogeneity. It could be argued that skilled individuals are more likely to work in regions-sectors which export more, thus entailing biased estimates of the impact of trade on wages. Indeed, the correlation between the individual unobserved effect and the explanatory variables affects the estimates of the impact of the trade variables on wages. Therefore, we consider the Fixed Effects estimates that allow us to get an estimation of the effects of the trade variables on wages, controlling for the influence of the individual time-invariant unobserved heterogeneity. These estimates are also useful as a robustness check for the second step of the analysis, where we cannot control in the same way for individual heterogeneity.[22]

Table 4 shows the Fixed Effects estimates.

The coefficients related to our variables of interest are quite reduced compared with the OLS estimates, as expected. This means that skilled workers are sorted in the sector-region dimension and that taking into account individual unobserved effects dampen simple OLS results. However, even if reduced in magnitude, the impact of the trade variables on wages is still significant and goes in the same direction as in the OLS estimates (but for exports towards LDC's). In particular, as for blue collars (column (2)), the coefficient for the export variable towards DC's is still positive and significant, while the effect of exports towards LDC's is negative and significant.[23] Further, the impact of imports from TE's is negative and significant. As for white collars, (column (3)), only the coefficient for imports from DC's is still significant and positive.

[21] The other variables in the regressions have the expected signs: wages are positively correlated with age, but negatively with age squared, and the effect is stronger for white collars. There is evidence of gender gap, more accentuated for white collars. The coefficients for firm size are positive and significant. Finally, the coefficients for the ratio of value added to effective units of labour (an index of average sectoral productivity) are positive, while those for the unemployment rate are negative and not significant.

[22] We also perform a Hausman test in order to discriminate between the Random and Fixed Effect model and, as expected, the test does not accept the null hypothesis of the validity of the Random Effect model.

[23] Moreover, these two effects seem to offset each other. This highlights the importance of distinguishing the trade variables according to the groups of origin/destination countries to get a clear understanding of the effects of trade on wages.

Table 4: Fixed Effects Estimations. Dependent Variable: log of Real Weekly Wage			
	ALL	**BC**	**WC**
	(1)	**(2)**	**(3)**
Developed Countries			
- Export	0.012	0.012	-0.002
	(2.11)**	(2.02)**	(0.36)
- Import	0.010	0.005	0.012
	(2.58)**	(1.45)	(3.07)***
Less Developed Countries			
- Export	-0.009	-0.010	0.000
	(-2.32)**	(-2.37)**	(0.02)
- Import	0.003	0.004	0.003
	(1.28)	(1.40)	(1.00)
Transition Economies			
- Export	-0.005	-0.003	-0.002
	(1.63)	(1.04)	(-0.61)
- Import	-0.004	-0.005	-0.000
	(-1.99)**	(-2.10)**	(-0.16)
Age	0.014	0.013	0.039
	(2.93)***	(2.62)***	(15.25)***
Age^2	-0.000	-0.000	-0.000
	(-11.29)***	(-10.81)***	(-11.05)***
Bc	-0.118		
	(-19.78)***		
Firm Size	0.023	0.026	0.012
	(15.34)***	(21.41)***	(5.22)***
Va/Eul	0.023	0.015	0.038
	(1.93)*	(1.21)	(3.01)***
Unempl. Rate	-0.004	-0.003	-0.001
	(-3.11)***	(-2.81)***	(-1.59)
Constant	5.392	5.332	4.788
	(25.42)***	(25.34)***	(27.06)***
Area, Time and Sector dummies	yes	yes	yes
N.Observations	546762	405996	140766
N. Individuals	104253	80974	27068
R^2	0.27	0.13	0.31
Method	Fixed Effects	Fixed Effects	Fixed Effects

Notes: T-statistics in parenthesis with ***, ** and * respectively denoting significance at 1%, 5% and 10% levels. Standard errors are clustered by region-sector.

To sum up, the results of the first step of the analysis show that trade with DC's has the strongest impact on wages. Exports towards DC's positively affect blue collars' wages because of Italian "local" comparative advantages in the production of unskilled intensive goods (within the DC's *cone of diversification*). At the same time, imports of medium-high capital

goods from DC's positively impact white collars' wages. This finding seems to suggest that there is evidence of capital-skill complementarity in line with Acemoglu (1998), who argues that capital goods are complement to skilled workers (rather than substitute) and hence, the adoption of new technologies contributes to generate a skill premium.

As for the impact of trade with the other *cones of diversification,* this is smaller and not always significant. Nonetheless, exports towards LDC's and imports from TE's negatively affect blue collars' wages, because of Italian "global" comparative advantages in the production of skilled intensive goods.

5.2 Second Step: Regional-Sectoral Level of Analysis

The second part of the econometric analysis is performed at the regional-sectoral level in order to investigate the impact of the trade variables on wage inequality. We compute two inequality indexes, the Gini index and the average wage ratio of white collars to blue collars for any cell (sector*region).[24] We also aggregate by cell the individual level characteristics (age, sex, firm size) in order to generate the related variables both for all workers and by occupational categories: average age, ratio of male to female and average firm size. Lastly, we add previous aggregate variables (exports and imports by groups of origin/destination countries divided by the value added, unemployment rate and value added over effective unit of labour) to estimate the following regression:[25]

$$INEQ_{r,s,t} = \alpha + \beta_1 * Fem/Male_{r,s,t} + \beta_2 * Age_{r,s,t} + \beta_3 * Firmsize_{r,s,t} + \gamma_1 * ExpDC_{r,s,t} + + \gamma_2 * ImpDC_{r,s,t} +$$

$$\gamma_3 * ExpLDC_{r,s,t} + \gamma_4 * ImpLDC_{r,s,t} + \gamma_5 * ExpTE_{r,s,t} + \gamma_6 * ImpTE_{r,s,t} + B'_1 * MacroVar_{r,s,t} + \delta_t + u_{r,s} + \varepsilon_{r,s,t}$$

where subscript *s* refers to sectors, *r* to regions and *t* to time.

The dependent variable $INEQ_{r,s,t}$ stands for the logarithm of the Gini index and for the logarithm of the average wage ratio of white collars to blue collars. $Fem/Male_{r,s,t}$ is the percentage of females on males, $Age_{r,s,t}$ is the average age, $Firmsize_{r,s,t}$ is the average firm size and $u_{r,s}$ is a regional-sectoral effect. All the other variables ($ExpDC/Va_{r,s,t}$, $ImpDC/Va_{r,s,t}$, $ExpLDC/Va_{r,s,t}$, $ImpLDC/Va_{r,s,t}$, $ExpTE/Va_{r,s,t}$, $ImpTE/Va_{r,s,t}$, $MacroVar_{r,s,t}$, δ_t) are exactly the same as in the individual level specification. Since all the variables of interest are in logarithms, we estimate elasticities.

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[24] We also compute the 90th-10th percentile ratio and we estimate the same regressions in order to successfully check the robustness of the results. We do not report these estimates, which are close to those for the Gini index, for sake of synthesis. They are available upon request.

[25] Because of missing values for workers in some sectors and/or regions the original sample is formed by 194 units and 2196 observations for the Gini index and by a sample of 188 units and 2065 observations for the average wage ratio of white collars to blue collars. Moreover, we define a minimum threshold value of workers in each cell (>10), in order to consider the inequality indexes computed over a reliable number of workers. In this way we end up with a sample of 152 units and 1636 observations for both the analysis. We also carry out the same estimates using other threshold values to check the robustness of the results. These estimates are available upon request. Lastly, we apply analytical weights in regression analysis in order to give more weight to those observations that are more accurate, i.e. where the wages and the individual variables are computed over a relatively greater number of workers (the weights are the proportion of workers in each cell over the total number of workers and sum up to one).

We perform OLS (with robust standard error clustered by the unit of the analysis region-sector), Random and Fixed Effects estimates. We actually perform a Hausman test in order to discriminate between the Random and the Fixed Effects model. The test does not reject the null hypothesis of the validity of the Random Effects model. Therefore, we rely on the Random Effects estimates that are more efficient.

Column (1) of Table 5 and 6 show OLS estimates of the average wage ratio of white collars to blue collars and the Gini index on trade variables. From the tables it is clear that trade with DC's has the strongest impact on wage inequality, i.e. both exports and imports impact wage inequality. Exports towards DC's decrease wage inequality because of Italian "local" comparative advantages in the production of unskilled intensive goods within the DC's *cone of diversification*. Imports from DC's increase wage inequality due to the complementarity between skills and imports in medium-high capital goods, already detected in the first step of the analysis.

As for trade with the other *cones of diversification*, only trade with LDC's impacts wage inequality. In particular, exports towards LDC's increase wage inequality, because of Italian "global" comparative advantages in the production of skilled intensive goods, while the impact of imports from LDC's is significant only in the estimates related to the Gini coefficient and seems to decrease wage inequality. The estimates concerning trade with TE's are not significant.

Columns (2) of Table 5 and 6 show the Random Effects estimates. These estimates are quite similar to the previous one for what concerns trade with DC's and exports towards LDC's. Nonetheless, the impact of imports from LDC's is not more significant in the estimation related to the Gini index, while the coefficients of trade with TE's turn out to be significant in both estimations: exports towards TE's decrease wage inequality, while imports increase it. These findings are in line with the Italian pattern of comparative advantages towards this group of countries observed in the descriptive section. In fact, Italy is a net exporter towards TE's of some unskilled intensive goods in which Italy is highly specialized. At the same time, Italy suffers import competition in other unskilled intensive goods from TE's.

We also carry out the Random Effects estimates on the 2-lagged values of our variables of interest[26] (column (3)), in order to control for possible endogeneity problems arising from simultaneous determination of wages and trade variables and/or to consider some time lags in the adjustment of the wages with respect to trade (as in Attanasio et al., 2004). In this case, the only estimates that remain significant are the trade variables with respect to DC's and the exports towards LDC's.

[26] We also carry out the same estimates using 1-lagged values of our variables of interest. Results do not change significantly. We show the estimates for 2-lagged values of our variables of interest. We do not go further with lagged values of our variables of interest in order not to lose too many observations. The estimates on 1-lagged values are available upon request.

Table 5: Ols and Random Effects Estimates. Dependent Variable: log of Average Wage Ratio of White Collars to Blue Collars

	(1)	(2)	(3)	(4)
Developed Countries				
- Export	-0.044	-0.030	-0.028	-0.025
	(-3.41)***	(-3.05)***	(-2.63)***	(-2.37)**
- Import	0.021	0.021	0.020	0.018
	(1.84)*	(2.20)**	(2.02)**	(1.89)*
Less Developed Countries				
- Export	0.020	0.029	0.038	0.030
	(2.44)**	(4.64)***	(5.76)***	(4.56)***
- Import	-0.008	-0.002	-0.004	-0.003
	(-1.10)	(-0.43)	(-0.81)	(-0.59)
Transition Economies				
- Export	-0.005	-0.008	-0.007	-0.010
	(-0.70)	(-1.89)*	(-1.60)	(-2.21)**
- Import	0.008	0.010	0.004	0.004
	(1.16)	(2.62)***	(1.00)	(1.04)
Fem/Male Bc	0.017	0.014	0.018	0.024
	(1.79)*	(1.95)*	(2.36)**	(3.23)***
Fem/Male Wc	-0.040	-0.033	-0.036	-0.033
	(-4.14)***	(-5.90)***	(-6.21)***	(-5.82)***
Age Wc/Bc	0.617	0.708	0.702	0.701
	(7.15)***	(15.28)***	(14.00)***	(14.11)***
Firm Size	0.016	0.014	0.016	0.011
	(3.32)***	(5.39)***	(5.66)***	(3.64)***
Va/Eul	0.123	0.087	0.018	-0.002
	(2.98)***	(3.46)***	(0.67)	(-0.08)
Unempl. Rate	0.002	0.001	0.002	0.002
	(0.89)	(0.90)	(1.40)	(1.05)
Constant	-1.680	-1.263	-0.439	-0.278
	(-3.70)***	(-4.24)***	(-1.34)	(-0.87)
Average Skills	no	no	no	0.366
				(5.64)***
Time dummies	yes	yes	yes	yes
Sector/Area dummies	yes	yes	yes	yes
N. of observations	1636	1636	1355	1351
N. of groups	152	152	152	151
R^2	0.46	0.44	0.47	0.49
Method	Ols	Random Effects	Random Effects (2-lags)	Random Effects (2-lags)

Notes: T-statistics in parenthesis with ***, ** and * respectively denoting significance at 1%, 5% and 10% levels. Ols standard errors are clustered by region-sector.

Table 6: Ols and Random Effects Estimates. Dependent Variable: log of Gini Index				
	(1)	**(2)**	**(3)**	**(4)**
Developed Countries				
- Export	-0.076	-0.035	-0.026	-0.024
	(-3.47)***	(-2.61)***	(-1.77)*	(-1.70)*
- Import	0.091	0.061	0.042	0.034
	(4.88)***	(4.80)***	(3.05)***	(2.57)**
Less Developed Countries				
- Export	0.037	0.041	0.048	0.038
	(2.67)**	(4.88)***	(5.48)***	(4.39)***
- Import	-0.028	-0.002	0.005	0.007
	(-2.69)**	(-0.38)	(0.66)	(0.97)
Transition Economies				
- Export	-0.009	-0.018	-0.003	-0.008
	(-0.66)	(-3.03)***	(-0.49)	(-1.41)
- Import	0.003	0.012	0.002	0.004
	(0.29)	(3.68)***	(0.31)	(0.83)
Fem/Male	-0.029	-0.019	-0.012	-0.002
	(-1.50)	(-1.55)	(-1.00)	(-0.19)
Age	0.017	0.012	0.016	0.003
	(2.84)**	(3.90)***	(4.60)***	(0.83)
Firm Size	0.011	0.012	0.008	0.005
	(1.35)	(3.26***	(2.03)**	(1.29)
Va/Eul	0.197	0.124	0.079	0.044
	(3.18)***	(3.68)***	(2.15)**	(1.21)
Unempl. Rate	0.004	-0.007	-0.009	-0.009
	(1.45)	(-3.56)***	(-4.19)***	(-4.40)***
Constant	-4.587	-3.367	-2.813	-0.208
	(-6.44)***	(-8.10)***	(-6.32)***	(-4.61)***
Average Skills	no	no	no	0.735
				(7.77)***
Time dummies	yes	yes	yes	yes
Sector/Area dummies	yes	yes	yes	yes
N. of observations	1637	1637	1356	1352
N. of groups	152	152	152	151
R^2	0.56	0.52	0.52	0.57
Method	Ols	Random Effects	Random Effects (2-lags)	Random Effects (2-lags)

Notes: T-statistics in parenthesis with ***, ** and * respectively denoting significance at 1%, 5% and 10% levels. Ols standard errors are clustered by region-sector.

Lastly, in column (4) of table 5 and 6, we add to the estimation of column (3) a proxy for the average skill level of each region-sector. This proxy has been computed averaging the individual fixed effects derived in the first step of the analysis at the region-sector level. As we can see, results almost do not change. The only difference concerns trade with the TE's, where

the export coefficient is now significant in the estimation of the average wage ratio of white collars to blue collars. [27]

These results largely confirm the outcomes of the first step of the analysis, especially with respect to the impact of trade within the DC's *cone*. Further, trade with the other *cones of diversification* entails less important impacts on wage inequality and take place through the channel of exports.

According to the findings of the first and second step of the analysis we claim that the impact of international trade on both wages and wage inequality strongly depends on the groups of countries with which Italy trades and on the channels of trade considered (exports/imports).

6 Conclusions

In this paper we underline the relevance of "local" comparative advantages in determining the effects of trade on wage inequality. More specifically and in accordance with Davis (1996), we point out the importance of the relative comparative advantages of a country within its own *cone of diversification,* together with the relative comparative advantages with respect to other *cones of diversification*.

We focus on Italy that represents, in our opinion, an interesting case study because of its peculiar pattern of comparative advantages with respect to its own and the other *cones of diversification*. We point out that trade with Developed Countries has the strongest impact on wage inequality in Italy. More specifically, exports towards Developed Countries decrease wage inequality, due to Italian "local" comparative advantages in the production of unskilled intensive goods that positively affect blue collars' wages. On the contrary, import competition from Developed Countries increases wage inequality, due to a positive effect of imports on white collars' wages. The latter outcome might be related to the fact that Italy imports medium-high capital goods from Developed Countries that, according to our findings, act as complement to skilled workers. This contributes to generate a skill premium.

Trade with Less Developed Countries and Transition Economies has a less relevant impact on both wages and wage inequality. Nonetheless, trade with Less Developed Countries seems to increase wage inequality, through the impact of exports, while trade with Transition Economies has a "mixed" effect.

[27] As for the control variables, the inequality indexes increase with the average age and decrease with the percentage of female. The effect of firm size is positive. Further, the specific productivity of the sector tends to raise inequality, while for the unemployment rate the evidence is less clear.

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APPENDIX 1: Descriptive Statistics of the Variables in the Dataset 1991-2002

Variable	Observations	Mean	Std. Dev.	Min	Max
Log Real Weekly Wage	551224	5.91	0.39	4.30	8.07
Age	551224	36.26	10.43	15	71
Age^2	551224	1423.36	801.50	225	5041
Sex	551224	1.31	0.46	1	2
Log Firm Size	547531	4.31	2.30	0	11.57
Bc	551224	0.74	0.44	0	1
Wc	551224	0.26	0.44	0	1
Log (ExpDC/Va)	551216	-0.51	0.78	-15.27	2.40
Log (ImpDC/Va)	551224	-0.86	0.89	-5.85	5.23
Log (ExpLDC/Va)	550992	-2.40	1.01	-9.55	0.79
Log (ImpLDC/Va)	551112	-2.80	1.09	-11.26	3.89
Log (ExpTE/Va)	551057	-3.09	1.11	-11.02	0.68
Log (ImpTE/Va)	550731	-3.47	1.20	-11.21	2.79
Log (Va/Eul)	551203	10.65	0.28	9.29	12.64
Unemployment Rate	551224	7.71	4.87	2.61	28.26
dNorth West	551224	0.41	0.49	0	1
dNorth East	551224	0.28	0.45	0	1
dCentre	551224	0.16	0.36	0	1
dSouth	551224	0.12	0.32	0	1
dIsland	551224	0.03	0.18	0	1
Sectors	551224	6.78	2.91	1	10

Notes: ExpDC and ImpDc stand respectively for exports and imports towards Developed Economies; ExpLDC and ImpLDC stand respectively for exports and imports towards Less Developed Countries; ExpTE and ImpTE stand respectively for exports and imports towards Transition Economies; Va stands for value added; Eul stands for effective units of labour. See the Appendix 2 for a definition of Developed Economies, Less Developed Countries and Transition Economies.

Source: Panel ISFOL on INPS data and Istat (Coeweb) data.

APPENDIX 2: Definition of Countries Groups

Istat definitions (Coeweb)

DC: Developed Countries

European Union, Iceland, Norway, Liechtenstein, Switzerland, Andorra, Holy See, United States, Canada, Mexico, Israel, Singapore, South Korea, Japan, Taiwan, Hong Kong, Australia, New Zealand.

LDC: Less Developed Countries

Middle Eastern countries and Europe: Faeroe Islands, Gibraltar, Malta, Turkey, Lybian Arab Jamahiriya, Egypt, Cyprus, Lebanon, Syrian Arab Republic, Iraq, Iran, Occupied Palestinian Territory, East Timor, Jordan, Saudi Arabia, Kuwait, Bahrain, Qatar, United Arab Emirates, Oman, Yemen.

Asia: Afghanistan, Pakistan, India, Bangladesh, Maldives, Sri Lanka, Nepal, Bhutan, Myanmar, Thailand, Lao, Viet Nam, Cambodia, Indonesia, Malaysia, Brunei, Philippines, China, Korea, Macao, Papua New Guinea, Solomon Islands, Kiribati, Fiji Islands, Vanuatu, Tonga, Samoa, Micronesia, Marshall Islands.

South America: Bermuda, Guatemala, Belize, Honduras, El Salvador, Nicaragua, Costa Rica, Panama, Anguilla, Cuba, St Kitts and Nevis, Haiti, Bahamas, Turks and Caicos Islands, Dominican Republic, US Virgin Islands, Antigua and Barbuda, Dominica, Cayman Islands, Jamaica, St Lucia, St Vincent and the Grenadines, British Virgin Islands, Barbados, Montserrat, Trinidad and Tobago, Grenada, Aruba, Netherlands Antilles, Colombia, Venezuela, Guyana, Suriname, Ecuador, Peru, Brazil, Chile, Bolivia, Paraguay, Uruguay, Argentina, Falkland Islands.

Africa: All African countries, excluded Egypt and Lybian Arab Jamahiriya.

Others: Greenland, St Pierre and Miquelon, Nauru, Tuvalu, New Caledonia, Wallis and Futuna Islands, Pitcairn, Northern Mariana Islands, French Polynesia, Palau, American Samoa, Guam, US Minor Outlying Islands, Cocos Islands, Christmas Island, Heard Island and McDonald Islands Norfolk Island, Cook Islands, Niue Island, Tokelau Island, Antarctica, Bouvet Island, South Georgia and South Sandwich Islands, French Southern Territories.

TE: Transition Economies

Central and Eastern Europe: Estonia, Latvia, Lithuania, Poland, Czech Republic, Slovakia, Hungary, Romania, Bulgaria, Albania, Ukraine, Belarus, Republic of Moldova, Russian Federation, Slovenia, Croatia, Bosnia-Herzegovina, Yugoslavia, Former Yugoslav Republic of Macedonia.

Central and Transcaucasian Asia: Georgia, Armenia, Azerbaijan, Kazakhstan, Turkmenistan, Uzbekistan, Tajikistan, Kyrgyzstan, Mongolia.

APPENDIX 3: Sectors Description (Nace Classification)

Sectors	Description	Relative Skill Intensity	Abbreviation
C	Mining and Quarrying	Low skilled (unskilled)	Mining
DA	Food products, beverages and tobacco	Medium skilled	Food
DB	Textiles and textile products	Low skilled (unskilled)	Textile
DC	Leather and leather products	Low skilled (unskilled)	Leather
DD+DH+DN	Wood, rubber, plastic products and other manufactured goods	Medium skilled	Wood-rubber-plastic
DE	Pulp, paper and paper products	High skilled (skilled)	Paper
DF+DG	Coke, refined petroleum products and nuclear fuel, chemicals and chemical products	High skilled (skilled)	Energy-chemicals
DI	Non metallic mineral products	Medium skilled	Mineral
DJ	Basic metals and fabricated metal products	Medium skilled	Metal
DK+DL+DM	Machinery and equipment n.e.c, electrical and optical equipment, transport equipment	High skilled (skilled)	Machinery-electrical-transport equipment

Notes: The relative skill intensity for each sector is calculated from the INPS data and it refers to the relative employment ratio of white collars to blue collars.