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The links between internationalization, skills and wages. The role of differences across firms and across partner countries.

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Abstract

Using firm level data on Italian manufacturing industry, we examine how trade activities are related to workforce composition and wages. We contribute to empirical research on these issues in three ways. First, we provide novel evidence that is consistent with multi-attribute models on firm heterogeneity and trade. In fact we show that even after controlling for various firm characteristics, including size and capital intensity, exporters still pay higher wages and employ more skilled workers than non exporters. Second, we consider the engagement of firms in international transactions, either by means of exports, imports or a combination of the two. We show that failing to control for the importing activities may bias upward export premia. Third, we look at how the wage and the employment structures of trading firms change with the country of destination and origin of trade flows. We find that wage and skill premia increase for both exporters and importers as they trade with more distant markets. Richer countries are instead associated with higher premia for importers and not for exporters.

JEL codes: F10, F16, J21

Keywords: heterogeneous firms; exports; imports; wage; skills; market heterogeneity

1 Introduction

A growing empirical and theoretical literature emphasises the role of firm heterogeneity in international trade. This literature usually considers either productivity or the ability to produce quality as the key exogenous determinant of firms' differential ability to succeed in foreign markets. A few recent contributions have started modelling heterogeneity in terms of more than a single attribute. This is the case of Hallak and Sivadasan (2009) who propose a model with two dimensions of heterogeneity - productivity and caliber (i.e. the ability to produce quality using few fixed inputs) - and minimum quality requirements for entering foreign markets. Their theory predicts that, conditional on firm size, exporters will produce higher quality and sell at higher prices. Moreover, to the extent that production of quality goods requires more intensive use of skilled labour and capital, exporters will pay higher wages and be more capital intensive.[1]

Building on these recent developments, this paper aims to shed some further light on the links between trade, employment structure and wages. First, using data on Italy's manufacturing firms we shall test whether, even after controlling for various firm characteristics, including size and capital intensity, exporters still pay higher wages and employ more skilled workers than non exporters. Consistent with multi-attribute models, we shall confirm that factors other than productivity, which might well reflect differences in the ability to produce quality, play a role in explaining export behaviour.

Second, as a partial novelty in the empirical literature, we extend the analysis beyond export behaviour, and consider how employment composition and wages vary across firms with different involvement in international trade, that is firms that either export, import or do both (two way traders). While substantial work has been done on firm heterogeneity and export, much less attention has been devoted to the import side. Only recently the relationships between imports and firm characteristics have attracted some consideration in empirical literature (Bernard et al., 2007; Halpern et al., 2005; Muuls and Pisu, 2007; Kasahara and Lapham, 2008; Amiti and Konings, 2007; Castellani et al., 2008). Even less attention has been given to firms that are engaged in a combination of both imports and exports. This is quite surprising given the increasing importance of international fragmentation of production, implying that more and more firms are active in both imports and exports of intermediate and final goods (Feenstra and Hanson, 2004). We shall argue that failing to control for imports may bias upward export premia in terms of skill composition and wages. Moreover both types of premia are higher if the existence of two-way traders is accounted for.

Third, by exploiting the richness of our dataset which identifies destination markets of exports and markets of origin for imports, we examine how trade premia vary according to the characteristics of the country with which a firm trades. We shall show that wage and skill premia increase as firms trade with more distant countries, i.e. with a market characteristic that can be expected to increase the efficiency and quality requirements for both import and export activities. Richer countries will be also found to be associated with higher premia but only in the case of importers. This is consistent with a broad interpretation of the Kugler and Verhoogen (2008) model in which high quality of imported inputs and a skilled (and well paid) workforce are complementary in rising firm competitiveness.

The rest of this paper has the following structure. In Section 2 we briefly sketch the literature related to our study. Section 3 describes the data we use and provides some descriptive statitics. Section 4 examines how differences in Italian firms' involvement in international trade are associated with diversities in their workforce structure and wages. Section 5 illustrates how the whole picture is affected by differences across firms according to the market of origin or destination of their import and export activities. Section 6 will summarize the results and conclude.

[1] All models are discussed in more detail in the next section.

2 Related literature

Starting from the mid-to late 1990s empirical research has been identifying a series of stylized facts regarding the role of firms in international trade (Bernard and Jensen, 1995; Aw and Hwang, 1995; Bernard and Jensen, 1999; Clerides et al., 1998). These studies have found that exporters are larger and exhibit significant productivity premia relatively to non-exporting firms (see The International Study Group on Export and Productivity, 2008, for an international comparison).

The emerging stylized facts have led to a series of new trade models which have made important contributions to understanding the observed intra-industry heterogeneity. One of the main features of these models is that they consider a single exogenous attribute which determines firm's ability to enter foreign markets. In the standard heterogeneous trade models the single attribute is modeled as productivity (Melitz, 2003; Bernard et al., 2003; Chaney, 2008). In Melitz (2003), for instance, the existence of sunk costs induces a self-selection mechanism according to which only the most productive firms are able to overcome these costs and enter the export market. In heterogeneous trade models firms' competition is based on price as more productive firms have lower marginal costs, they can change lower prices, expand foreign sales, and earn larger revenues.

More recent empirical evidence has emphasised that exporters are not only more productive but also more skill intensive than non-exporters and they pay higher wages (Schank et al., 2007; Verhoogen, 2008).[2] Using data from Mexico, Verhoogen (2008) shows that an increase in the incentive to export stimulates firms to upgrade the quality of their products and, as a consequence, to maintain higher quality workforce. Moreover, recent empirical analyses have used firm level data to study the link between unit value prices and export behavior, concluding that exporters tend to charge higher prices than non-exporters (Iacovone and Javorcik, 2008; Kugler and Verhoogen, 2008; Hallak and Sivadasan, 2009). Iacovone and Javorcik (2008), who also use data from Mexico, find a price premium for exporters even some years prior to the entry into foreign market, suggesting that a process of quality upgrading takes place before exporting. Kugler and Verhoogen (2008) use data from Colombian manufacturing plants to demonstrate that output and input prices are positively correlated with plant size and export status. Further, Baldwin and Harrigan (2007) show that U.S. export unit values (measured using the ten-digit Harmonenized System which classifies products in U.S. international trade) and the probability of a zero-export flow increase with distance and decrease with GDP of destination country.

These findings are clearly inconsistent with models in which differences in productivity is the key factor underlying intra-industry heterogeneity and price competition is the basic market selection mechanism. The latter models would in fact predict a negative correlation between unit prices and export status. Since the productivity threshold rises with distance and decreases with destination market size and more productive firms charge lower prices, we should also observe a negative correlation between average export prices and distance and a positive correlation with destination market size.

To rationalize these new stylized facts, a second class of models have introduced product quality heterogeneity as key determinant of entry into export markets. Some studies attribute the differences between exporters and non exporters to workers' heterogeneity in terms of skills (Kugler and Verhoogen, 2008). Some other models incorporate quality differentiation across firms into Melitz (2003)'s framework so that market entry thresholds are defined in terms of quality-adjusted prices, which in turn depend on the ratio of cost to quality (Baldwin and Harrigan, 2007; Johnson, 2007; Kugler and Verhoogen, 2008). More productive firms produce higher quality goods which implies higher costs, and, hence, higher prices. Since consumers care about quality goods, in these models

[2] Also Bernard and Jensen (1995), in their pioneering paper documented that average wages and benefits (per workers, per production worker and per non-production worker) are higher in exporting plants than in non-exporting plants of all sizes. However, this insight has not been incorporated in trade models until recently and empirical research on this aspect of heterogeneity has been largely underdeveloped.

the most competitive firms are those selling high price/high quality products.[3] Hence, in these models only firms with sufficiently high-price/high quality find it worthwhile to sell to distant and small markets.

Both types of heterogeneous trade models, where competition is based either on diversities in productivity or on quality differentiation, share the assumption that firms' behaviour will vary according to a single exogenous attribute which uniquely predicts export status and firm's revenues. A few recent contributions have moved away from these approaches to heterogeneity and proposed international trade models with more than one source of firm diversity.

Perhaps the most comprehensive of these models is proposed by Hallak and Sivadasan (2009) who introduce two dimensions of heterogeneity - productivity and caliber (i.e. the ability to produce quality using few fixed inputs) - and a minimum quality requirements for entering the export market. Modelling heterogeneity along two dimensions allows to make additional predictions consistent with the observed empirical facts. First, it allows to explain the empirical fact that, even conditional on firm size, exporters sell at higher prices, pay higher wages and employ more skilled workers than non-exporters. In fact, a given level of revenues can be the result of different combinations of productivity and caliber, where it is the latter that most directly affects quality decisions, and hence determines firms' export status. [4] Second, since the export quality requirements are likely to increase with distance and income per capita, in this model firms exporting to remote and rich countries should exhibit high prices and quality premia.

3 Data Description and summary statistics

This paper relies upon a firm level data panel which combines two different datasets developed by Italy's Bureau of Statistics (ISTAT), namely MICRO1 and COE.[5]

MICRO1 contains longitudinal data on a panel of 38.771 firms representing the entire universe of Italian manufacturing companies with 20 employees and it covers the years between 1989-97. Over the period covered by the data there are missing values partly due to the fact that some firms may exit from the database as they either die or reduce their size and fall below the 20 employees threshold. The existence of missing values makes MICRO1 an unbalanced panel data-set, containing information for an average of around 20.000 firms per year. As documented by Bottazzi and Grazzi (2007), who employ the same database, despite the unbalanced nature, the validity of the database is largely supported by its census nature, which avoids possible biases in the data collection process, and by the fact that there are no particular trends or changes in the structure and performance of firms that do not appear for some years (i.e. firms that exit and re-appear again in the database). In addition, as reported in Bartelsman and Scarpetta (2004), though manufacturing firms with less than 20 employees account for about 88% of the total Italian firm population, firms with more than 20 employees cover almost 70% of the total employment.

Firms are classified according to their principal activity, as identified by ISTAT's standard codes for sectoral classification of business (Ateco), which correspond, to a large extent, to Eurostat's NACE 1.1 taxonomy. The database contains information on a number of variables appearing in a firm's balance sheet. We utilize the following pieces of information: number of employees, type of occupation of employees, labor costs, wages, capital, industry and geographical location (Italian regions). Capital is proxied by tangible fixed assets at historical costs. All the nominal variables are measured in millions of 1995 Italian liras and they are deflated using various 2 digit industry-level price

[3]This is true as far as the elasticity of marginal costs with respect to quality is sufficiently high, so that unit prices, which depend on cost, are negatively correlated with quality-adjusted price.

[4]On the contrary, these empirical facts would contradict models characterized by one dimension of heterogeneity. In these models, firms whose productivity is higher than a given threshold or producing goods beyond a given quality level are expected to be able to sell outside national markets and hence expand their sales. This implies that the coefficient associated to the export dummy should be zero once size is controlled for.

[5]The databases have been made available under the mandatory condition of censorship of any individual information.

Table 1: Number of firms

Years	Micro1	Micro1-COE merged
1989	19922	
1990	21208	
1991	19740	
1992	21301	
1993	22076	21938
1994	21720	21549
1995	20004	19851
1996	17231	17103
1997	15532	14795

indices provided by ISTAT.[6] As regards the workforce composition, separate pieces of information are available for production workers and non-production workers.[7] For the purpose of this paper we consider the juxtaposition between these two worker categories as a proxy of the distinction between unskilled and skilled workers, respectively.[8] For each of these two groups we have access to labor cost data, distinguishing between the wage paid to the worker (salary and severance-pay) and the total cost paid by the firm (salary, corporate income taxation and severance-pay).

The Micro.1 database has been merged with ISTAT's external trade register (COE), which provides firm-level information on exports and imports over the 1993-1997 period. All incoming (imports) and outgoing (exports) invoices are registered in COE so it is possible to keep track of all transactions. Note that due to the way COE is built and updated - that is by registering transactions at the border - the link of Micro.1 and data in COE does not introduce any selection bias in the dataset.[9] The COE database supplies data on firms' trade status and their volume of trade. Moreover, data are available on the destination of exports and the origin of imports for some geographical areas. A table reporting all the areas for which we have detailed information is reported in Appendix 1. Table 1 presents the number of firms active in the manufacturing sector, respectively for the original Micro.1 database and for the database obtained after the merge with the foreign dataset (Micro.1-COE).

In Table 2 we list the variables used throughout our empirical analysis. From the MICRO1 database we obtain the following variables: number of employees, wage, wage of non-production workers, wage of production workers, skilled labor intensity, capital intensity and foreign ownership. The skilled labor intensity measured by the percentage of non-production workers over the total number of employees. The capital intensity variable is defined as the capital stock over the total number of employees. A firm is defined as foreign owned when the majority of its capital assets is controlled by foreign shareholders. From the COE database, which provides information on firms' international activities, we derive the following dummies: "non-traders", which takes value one for firms serving the national market only, "exporters" and "importers", which assume value one for

[6] Wages are deflated by the consumer price index. Labor cost are deflated using value added index.

[7] Production workers include blue collars, assistants, trainees and home-based workers corresponding respectively to the terms: *operai*, *commessi*, *apprendisti* and *lavoratori a domicilio*. Non production workers comprise managers and clerks, corresponding respectively to the terms: *dirigenti* and *impiegati*. Unfortunately no detailed data are available for these sub-categories included in the two main classes of production and non production workers.

[8] See Berman et al. (1994) for a discussion on this categorization.

[9] Though the 20 employees threshold does not allow us to consider the totality of firms involved in international trade and prevent us from analyzing the behavior and the performances of smaller units, the representativeness of Micro.1 is endorsed by the fact that a large amount of the aggregate Italian trade is generated by large firms. As reported by the Italian Statistical Office (www.coeweb.istat.it), for instance in 2005 firms with less than 20 employees accounted for 10% of the total manufacturing export while nearly 90% of the aggregate value was generated by firms with more than 20 employees.

Table 2: Variables

Variable Name	Abbreviation	Type of variable	Source	Years covered
Number of employees	N.Empl	Continuous	MICRO1	89-97
Wage	Wage	Continuous	MICRO1	89-97
Wage non-production workers	Wage NPW	Continuous	MICRO1	89-97
Wage production workers	Wage PW	Continuous	MICRO1	89-97
Foreign ownership	FO	Dummy	MICRO1	89-97
Skilled labour intensity	SLI	Continuous	MICRO1	89-97
Capital intensity	CI	Continuous	MICRO1	89-97
Non-traders	NT	Dummy	COE	93-97
Importers - D^{imp}	I	Dummy	COE	93-97
Exporters - D^{exp}	E	Dummy	COE	93-97
Two-Way traders - $D^{exp*imp}$	T	Dummy	COE	93-97

Note: Monetary values (Wage, Wage NPW, Wage PW) are expressed in millions of 1995 Italian liras.

firms engaged into export or import respectively, and "two-way traders", which is equal to one for firms involved in both import and export activities.

Table 3 presents summary statistics on our panel, differentiating firms according to their participation into international markets. The first column illustrates the propensity to trade in the Italian manufacturing industry. Approximately two thirds of manufacturing firms are internationalized: on average, over the 1993-1997 period, 67% were exporting goods, and 62% were importing. While the distinction between exporters and importers is relevant, it is also interesting to observe that the two sides of trade are strongly interconnected. In fact, a large fraction of importers are at the same time also exporters (and viceversa). As a consequence, two-way traders which represent 56% of the overall sample are by far the largest share of internationalized firms. These firms are the most engaged in international trade activities and we may speculate that a large fraction of their import-export activity is linked to international fragmentation of production both within and across firm boundaries.[10]

Consistent with other studies, we find a remarkable heterogeneity across sub-samples of firms. In particular, substantial differences exist between traders and non-traders in terms of size, wages, and workforce composition. Internationalized firms are, on average, bigger, pay higher salaries for both production and non production workers and they are more skill intensive than their domestic counterparts. It is worth also noting that the average values for exporters are quite similar to those reported for importers. As emerged from the participation rate, this result is mainly driven by the fact that a large majority of importers are also exporters and vice versa. In other words, the two groups are largely overlapping and only about 5% of all firms are engaged in either only export or only import activities, respectively. Firms partially involved in international trade, either via import or via export activities, rank between non internationalized firms and two-way traders in terms of size, wage levels, skill composition (not shown, but available from the authors). Hence, there is a strong interconnection between import and export and results in Table 3 show that a higher global engagement of firms is associated with better performances. All together these summary statistics reveal a high degree of heterogeneity in terms of wages and workforce composition not only between traders and non-traders but also among firms with a different degree of international involvement.

[10]Unfortunately, we have no data that allow to single out these firms from the group of two-way traders.

Table 3: Differences between non-traders and other trading categories (average values 1993-1997)

	% of firms		Employ	Wage	Wage NPW	Wage PW	SLI
Non traders	27	mean	61	30.7	38.3	29.8	16.2
		sd	(204)	(11.5)	(50.2)	(14.3)	(16.8)
Exporter	67.3	mean	120	35.4	47.4	32.6	25.4
		sd	(809)	(11.0)	(32.5)	(14.7)	(17.8)
Importer	62.1	mean	122	35.7	47.9	32.8	25.8
		sd	(823)	(11.2)	(32.4)	(14.9)	(18.2)
Two-way traders	56.4	mean	127	35.8	48.1	32.8	26.2
		sd	(861)	(11.0)	(31.5)	(15.0)	(18.0)

4 Testing the links between trade and wages

The descriptive statistics in the previous section suggest that the employment and wage structure heterogeneity among Italian manufacturing firms can be partly accounted for by considering their different international trade involvement. In this section we deeply investigate this source of heterogeneity: 1) by controlling parametrically for additional (observed and unobserved) sources of heterogeneity; 2) by simultaneously controlling for the import and export status.

4.1 Export premia in terms of wages and skills

As recalled earlier, the literature has long analyzed the links between trade, employment and wages almost exclusively by focusing on the role of exports. In these contributions, exporters are predicted to be systematically different from non exporters and export premia are traditionally expressed as the coefficient associated with an exporter status dummy. While in the single attribute models the export dummy coefficient should be zero once size is controlled for, in the multi-attribute models, as the one suggested by Hallak and Sivadasan (2009), this is no more true. In fact exporters are predicted to be systematically different from non-exporters conditional on firm size. In order to test for the existence of differences between traders and non-traders we first estimate a simple regression model with wages and employment structure information as dependent variables and an exporter status dummy as independent variable. Second, following the intuition behind the multi-attribute models we then investigate if the export premia persists after controlling for size and other firms' characteristics. Third, exploiting the panel data structure of our dataset we employ a fixed effect model which allow us to eliminate firm heterogeneity that is constant over time.

Our basic regression takes the following form

$$y_{it} = \alpha_A + \beta_A D_{it}^{exp} + \theta_A Controls_{it} + \upsilon_{it}. \quad (1)$$

Coefficient β_A captures how exporters differ with respect to the baseline category of non internationalized firms. As dependent variable we consider: the average wage of all workers, the percentage of non-production workers, the average wage of non production workers and the average wage of production workers.[11]. Our set of firm level controls includes the log of the capital intensity, a dummy indicating whether the firm is foreign owned and three-digit industries, regional and year dummies. As a further control we include firms' size differences.

Columns a of Table 4 reports the export premia after controlling for some firms' characteristics but not size. As shown in the first column of Table 4, we estimate very significant premia in terms of

[11] For all these variables, except the share of non production workers, we use log values. When the percentage of non production workers is the dependent variable, we use absolute values. Hence, the coefficients for the regression with share of non production workers as dependent variable are in percentage values while the ones for wage are scaled to unit values.

Table 4: Employment, wage structure and export status. Pooled OLS regressions (1993-1997)

	Wage		SLI		Wage NPW		Wage PW	
	(*a*)	(*b*)	(*a*)	(*b*)	(*a*)	(*b*)	(*a*)	(*b*)
D^{exp}	0.071***	0.045***	5.878***	5.12***	0.057***	0.029***	0.033***	0.022***
	(0.003)	(0.003)	(0.161)	(0.162)	(0.004)	(0.004)	(0.003)	(0.003)
Size		0.066***		7.180***		0.042***		0.031***
		(0.007)		(0.588)		(0.009)		(0.007)
FO	0.180***	0.053***	10.482***	1.491***	0.177***	0.045***	0.076***	0.045***
	(0.007)	(0.001)	(0.574)	(0.083)	(0.008)	(0.002)	(0.007)	(0.001)
CI	0.066***	0.091***	1.849***	2.620***	0.060***	0.108***	0.050***	0.036***
	(0.002)	(0.002)	(0.083)	(0.119)	(0.002)	(0.002)	(0.001)	(0.002)
Sectoral dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	94772	94772	94776	94776	89019	89019	93746	93746
R-squared	0.42	0.46	0.41	0.42	0.18	0.22	0.29	0.3

Note: Dependent variables are in log values except the share of non production workers. Standard Errors in parenthesis below the coefficients. Asterisks denote significance levels (***: p<1%; **: p<5%; *: p<10%).

average wage for exporting firms which are on average 7% higher than those of non-exporters in the same industry and location and with the same ownership structure and capital intensity. However, as shown in Table 3, exporting firms are larger than non-exporters and this could bias upward the exporter premia we observe in column *a* in Table 4. In order to control for this possible confounder we estimate in column *b* equation (1) including as additional control firm's size. In line with previous empirical results and consistently with the predictions of multi-attribute models, our result suggests that, even controlling for size there is a residual and positive effect of exports on average wage (around 5%).

The results on average wages could be determined, *inter alia*, by the fact that internationalized firms have a higher share of non production workers with respect to "domestic" firms. This suggest to look for a possible explanation by explicitly taking into consideration differences in workforce composition at the firm level between exporters and non-exporters. As shown in Table 4, we first test if the proportion of the two categories of workers varies with the export status. We estimate very significant premia in terms of skill intensity, around 5%, even controlling for the usual sources of heterogeneity, confirming that being involved in exporting activities is associated with a different composition of employment in terms of white and blue collars (Verhoogen, 2008). We then separately consider the average wage of non-production workers and the average wage of production workers as additional dependent variables. Consistent with the empirical findings reported by Bernard and Jensen (1995), coefficients in Table 4 show that the export status has a positive and statistically significant impact on the earnings of both categories of workers. When controlling for firm size(columns *b*), we obtain a wage premia of 3% and 2% for non-production and production workers, respectively.[12]

[12] The heterogeneity we observe in terms of wages, for both production and non-production workers, is not in contrast with the centralized system of wage bargaining characterizing the labor market in Italy as well as in other European countries. It is true that this system drives to wage equalization across firms and industries for any given level of qualification. However, in spite of this collective bargaining system, which is the main determinant of wages, variation in wages across firms in the same industry can happen also through a different positioning of workers in the rank-ladder as emphasized in the hierarchical theories of the firm (Simon, 1957). In other words, within each worker category - production and non-production - there is room for a large variety of tasks and occupational levels and, therefore, for different wage levels.

Table 5: Employment, wage structure and export status. Fixed Effect regressions (1993-1997)

	Wage	SLI	Wage NPW	Wage PW
	(1)	(2)	(3)	(4)
D^{exp}	0.010***	0.086	0.018***	0.007**
	(0.002)	(0.076)	(0.004)	(0.003)
Size	-0.236***	-4.080***	-0.164***	-0.267***
	(0.008)	(0.321)	(0.011)	(0.010)
FO	-0.009	0.055	-0.014	-0.002
	(0.006)	(0.255)	(0.009)	(0.009)
CI	0.014***	0.044	0.008**	0.011***
	(0.002)	(0.075)	(0.005)	(0.003)
Observations	94772	94776	89019	93746
R-squared	0.08	0.02	0.02	0.04
Number of firms	30101	30102	28060	29899
Hausman test [p-value]	[0.000]	[0.000]	[0.000]	[0.000]
Breush-Pagan test [p-value]	[0.000]	[0.000]	[0.000]	[0.000]

Note: Dependent variables are in log values except the share of non production workers. Standard Errors in parenthesis below the coefficients. Asterisks denote significance levels (***: p<1%; **: p<5%; *: p<10%).

Indeed, our finding that wage premia persist after controlling for size, together with the evidence of a higher ratio of white vs. blue collars for exporters, could reflect the fact that quality, rather than or at least in addition to productivity, plays a key role in explaining exporting behavior. In fact, to the extent that the production of quality goods requires more intense use of skilled labour and firms serving foreign markets have to satisfy more binding quality constraints, exporters will employ more non production workers and pay higher wages than non exporters conditional on size (Hallak and Sivadasan, 2009).

As a third step we employ a fixed effect model which allows us to eliminate firm heterogeneity that is constant in time.[13] A model that takes into account firm fixed effects estimates a correlation between a change in the trade status and a change of the dependent variables under analysis. Controlling for fixed effects is likely to polish off firm specificities accounting inter alia for self selection, hence making it possible to appreciate what remains in terms of "ex post effects". Nevertheless, we should be careful when giving such a causal interpretation of the coefficients estimated with the fixed effects model. For example, it might well be that a shock at a firm level contemporaneously determines a switching into exporting and a variation in the dependent variable under analysis. Keeping this caveat into account, we estimate equation (1) using the within transformation.

As before we employ as controls the log of the number of employees, the log of the capital intensity, the foreign-ownership dummy and year dummies. Once we apply the fixed effect model (Table 5) some of the coefficients turn out to be non significant, while others remain significant but their values substantially drop. Columns 1, 3 and 4 of Table 5 reports the results for the fixed effect model for the export premia in terms of wages, for all workers, for non-production and for production workers, respectively. Though the magnitude is reduced the coefficient remains positive and statistically significant meaning that exporting activities may have a positive effect in terms of wage premia. The coefficient for the percentage of white collars variable (column 2) is instead insignificantly different

[13] We perform both the Breusch/Pagan test for the relevance of firm specific effects to be incorporated in a panel model and the Hausman test for the orthogonality of the individual specific effects and the regressors (Table 5 and Table 7). The Breusch/Pagan test reject the null hypothesis of no unobserved heterogeneity, while the Hausman test reject the null hypothesis that the individual effects are uncorrelated with the other regressors. Hence, based on these two tests we conclude that the fixed effects, rather than the random effects estimator, has to be implemented.

from zero. Assuming that selection into exporting is due only to firm specific fixed effects, this last result could indicate that being more skill intensive than average is possibly only a precondition for being exporters not a consequence of international activities. This result is consistent with the hypothesis that firms invest in quality and, therefore, employ more skilled workers, before entering the export markets, as documented in the empirical work of Iacovone and Javorcik (2008).

4.2 Export and Import premia

In this section we look at the relationship between wage, employment structure and trade by simultaneously controlling for the import and export status. This is per se a partial novelty in the empirical literature, as most international trade contributions normally concentrate on exports. By contrast, we argue that on the one hand, imports may have additional implications in terms of skill requirements and knowledge accumulation, as compared to exports. On the other hand, firms involved in both export and import activities (two-way traders) are even more exposed to international competition than firms that either export or import, and this makes this category of firms particularly interesting when considering employment composition and distributional patterns.

We estimate the relationship between internationalization status and firm heterogeneity in performance by running the following regression

$$y_{it} = \alpha_B + \beta_B D_{it}^{exp} + \gamma_B D_{it}^{imp} + \theta_B Controls_{it} + \upsilon_{it} \qquad (2)$$

where we add a dummy indicating if a firm is an importer (D^{imp}). As before we include a set of controls: the log of the number of employees, the log of capital intensity, a dummy indicating whether the firm is foreign owned and three-digit industries, regional and year dummies.

The results are presented in Table 6. In columns *a* we report our baseline results with only the exporter dummy while in columns *b* we include the import status dummy. Looking at columns *b* we observe that also importing activity is positively and significantly correlated with wages and with the share of white collars. On average, importers pay higher wages to both non-production and production workers and employ more skilled workers than non-importers. Although the bulk of the theoretical models do not explicitly take into account the import behavior, one might suppose that there may be some similarities between mechanisms underlying the choice of importing and those explaining the choice of exporting. That is, much like exporters, importers may need to be more productive, employ a higher number of qualified workers and pay higher wages than non-importers because they also need to overcome some extra-cost associated to being active in foreign (import) markets. More specifically, it has been suggested that importers need to invest in complementary assets (or absorptive capacity) in order to be able to effectively use imported inputs in their production process (Castellani et al., 2008). Pushing the above argument further, it is possible that this complementarity mechanism especially applies when importers purchase abroad higher quality and/or more complex inputs compared to those domestically available. Similarly, in Kugler and Verhoogen (2008) the complementarity between input quality and firm productivity is the key mechanism in generating output quality. Assuming that input quality and productivity are complementary to obtain higher-quality output, and that importing allows to choose among a wide variety of inputs, one can obtain that more productive firms, that are endowed with more skilled workers, have more incentives to exploit the opportunity to buy higher-quality inputs from abroad, thus they would self-select into importing. Another explanation of this evidence relates to the information asymmetries that importers face in the monitoring of the quality level of imported goods (Altomonte and Bekes, 2008). Although our results do not allow discriminating between self-selection or post-entry effects, they reveal that imports play an important role in explaining firms' heterogeneity.[14]

[14] To test the direction of causality in the relationship between trade and firm level changes in skills and wages one should implement various econometric techniques required to control for endogeneity problems. This is beyond the scope of our paper, though we partially tackle this issue by implementing a fixed effect model which will allow us to control for time constant unobserved characteristics of firms.

Table 6: Employment, wage structure and internationalization status. Pooled OLS regressions (1993-1997)

	Wage			SLI			Wage NPW			Wage PW		
	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)	(a)	(b)	(c)
D^{exp}	0.045***	0.022***	0.026***	5.121***	3.478***	3.484***	0.029***	0.012**	0.012**	0.022***	0.008**	0.015***
	(0.003)	(0.003)	(0.004)	(0.162)	(0.172)	(0.197)	(0.004)	(0.005)	(0.006)	(0.003)	(0.003)	(0.004)
D^{imp}		0.039***	0.045***		2.673***	2.683***		0.028***	0.029***		0.024***	0.035***
		(0.003)	(0.005)		(0.172)	(0.269)		(0.004)	(0.007)		(0.003)	(0.005)
$D^{exp*imp}$			-0.010*			-0.015			-0.002			-0.017***
			(0.006)			(0.323)			(0.009)			(0.006)
Size	0.066***	0.089***	0.089***	7.180***	2.504***	2.504***	0.042***	0.107***	0.107***	0.031***	0.035***	0.035***
	(0.007)	(0.002)	(0.002)	(0.588)	(0.119)	(0.120)	(0.009)	(0.002)	(0.002)	(0.007)	(0.002)	(0.002)
FO	0.053***	0.069***	0.069***	1.491***	7.368***	7.368***	0.045***	0.044***	0.044***	0.045***	0.032***	0.033***
	(0.001)	(0.007)	(0.007)	(0.083)	(0.589)	(0.589)	(0.002)	(0.009)	(0.009)	(0.001)	(0.007)	(0.007)
CI	0.091***	0.052***	0.052***	2.620***	1.401***	1.401***	0.108***	0.044***	0.044***	0.036***	0.044***	0.044***
	(0.002)	(0.001)	(0.001)	(0.119)	(0.083)	(0.083)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.001)
Sectoral dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Regional dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	94772	94772	94772	94776	94776	94776	89019	89019	89019	93746	93746	93746
R-squared	0.46	0.47	0.47	0.42	0.42	0.42	0.22	0.22	0.22	0.30	0.30	0.30

Note: Dependent variables are in log values except the share of non production workers. Standard Errors in parenthesis below the coefficients. Asterisks denote significance levels (***: p<1%; **: p<5%; *: p<10%).

Table 7: Employment, wage structure and internationalization status. Fixed Effect regressions (1993-1997)

	Wage	SLI	Wage NPW	Wage PW
	(1)	(2)	(3)	(4)
D^{exp}	0.006**	0.086	0.012**	0.005
	(0.003)	(0.094)	(0.006)	(0.004)
D^{imp}	0.007**	0.035	0.009*	0.003
	(0.003)	(0.005)	(0.004)	(0.127)
$D^{exp*imp}$	0.002	-0.020	0.005	0.003
	(0.004)	(0.155)	(0.008)	(0.006)
Size	-0.236***	-4.081***	-0.164***	-0.267***
	(0.008)	(0.011)	(0.010)	(0.321)
FO	-0.009	0.056	-0.014	-0.002
	(0.006)	(0.009)	(0.009)	(0.255)
CI	0.014***	0.044***	0.0087*	0.011***
	(0.002)	(0.075)	(0.005)	(0.003)
Observations	94772	94776	89019	93746
R-squared	0.08	0.02	0.02	0.04
Number of firms	30101	30102	28060	29899
Hausman test [p-value]	[0.000]	[0.000]	[0.000]	[0.000]
Breush-Pagan test [p-value]	[0.000]	[0.000]	[0.000]	[0.000]

Note: Dependent variables are in log values except the share of non production workers. Standard Errors in parenthesis below the coefficients. Asterisks denote significance levels (***: p<1%; **: p<5%; *: p<10%).

Indeed, we observe that by including the import dummy, the coefficients for exporters drop substantially and become lower than those observed for importers. This result suggests that much of the export premia found in the empirical literature may be driven by imports. In other words, part of export premia observed in the data may indeed reflect the skill intensity of imported inputs used to produce goods for foreign markets. Export premia can thus be expected to be biased upward if firms' import status is not controlled for. This effect is likely to be particularly relevant in the examined case, as a large majority of exporters are also importers in our dataset (see Table 3). Moreover, to check for a possible interdependence between importing and exporting status we include in the regression an interaction dummy as follows

$$y_{it} = \alpha_C + \beta_C D_{it}^{exp} + \gamma_C D_{it}^{imp} + \phi_C D_{it}^{exp*imp} + \theta_C Controls_{it} + \upsilon_{it}. \quad (3)$$

where $D^{exp*imp}$ takes value one if a firm exports and imports and zero otherwise. Hence, the trade premia for firms involved in both export and import is given by $\beta_C + \gamma_C + \phi_C$ while coefficients β_C and γ_C respectively capture how firms that only export and only import differ with respect to the baseline category of non internationalized firms. Results are shown in columns c of Table 6. We observe that the magnitude of the premia for two-way traders is much higher than that detected for only exporters or only importers. Being involved both in importing and exporting is associated with the highest premium in term of firm's average wages, for both non-production and production workers, followed by only importers and only exporters. This ordering conforms with what found by Bernard et al. (2007) for the US, by Muuls and Pisu (2007) for Belgium and by Altomonte and Bekes (2008) for Hungary. The estimated coefficients for the skill intensity variable confirm that two-way traders exhibit a 6% premium, that is about twice as much as the premia observed for the one way traders categories.

In Table 7 we will estimate equation (3) controlling for individual fixed effects, which wipe out

Table 8: Number of firms exporting to and importing from different group of countries: average value 1993-1997

	Exporters to				**Importers from**			
Panel A 90%	EU	HMI	LI	MC	EU	HMI	LI	MC
N.firms	2842	1485	398	8100	4612	1338	390	5498
Panel B 70%	EU	HMI	LI	MC	EU	HMI	LI	MC
N.firms	5341	2288	590	4605	6208	1984	665	2866
Panel C 50%	EU	HMI	LI	MC	EU	HMI	LI	MC
N.firms	7390	3461	853	1121	7352	2973	975	537

Note: EU= Trading with European countries; HMI= Trading with High Medium Income countries; LI= Trading with Low Income countries; MC= Trading with more than one group of countries.

all the time invariant firm heterogeneity (FE model). Again, to the extent that firm specific (time invariant) fixed effects are the main driver of the decision to enter international markets (i.e. of possible self-selection phenomena), results from Table 7 may have a "more causal" interpretation of the estimated coefficients. In terms of average wages for all workers (column 1) and for white collars (column 3) we observe that the estimated coefficients remain positive and statistically significant for all the three categories of traders. However, in the case of blue collars the within firm change from non-traders to traders does not seem to have a significant effect on average wages. The results are slightly different when we consider only the export status, as before in Table 5, and when we include also the import side. While in the previous case all employees - both non production and production workers - take advantage of firm's changes in production structure following the entry into foreign markets, in this case switching the trade status leads to an increase in the wage premium paid to the most skilled (non production) workers but not to less skilled ones.

5 Trade premia across markets

The results of the previous sections show that a fraction of the observed intra industry heterogeneity in employment and wage structure is related to the international activities of Italian firms. We have emphasized that excluding the import behavior, as largely done by the empirical literature insofar, may lead to misleading results. Moreover, while the literature has mainly considered one source of heterogeneity, either productivity or quality differentiation, our analysis is by and large consistent with a multi-dimensional approach. In this section we move forward by assessing whether trade premia are influenced by the characteristics of partner countries. As discussed in section 2, the quality heterogeneous trade model (Baldwin and Harrigan, 2007; Johnson, 2007) allows to explain why firms that sell high priced goods abroad enter more distant and smaller markets. Similarly, Hallak and Sivadasan (2009) predict that export quality requirements could be related to the income per capita and distance of destination markets. In other words, we may expect that firms exporting to rich and remote countries have higher prices and wage premia.

To investigate how firms' characteristics hinge on heterogeneity of target foreign countries, we first group traders according to the type of market served. As shown in Table 8 we distinguish between three macro geographical areas: *European countries* (EU); *High-Medium Income* countries (HMI) including Efta, US and Canada, Other developed countries, NICs and OPECs; and *Low Income* countries (LIC), consisting of ACP, CEECs, PECs and Other non developed countries. While the majority of firms trade with more than one macro-area, there is a small number of firms exporting to (or importing from) just one group of countries. In order to identify if a firm trades within a certain macro area we look at how much of its total export (or import) is directed towards (or originates from) that area. In Panel A (upper part of Table 8), for instance, we define as *EU exporters* those firms that sell to Europe more than 90% of their total exports. Similarly, *HMI exporters* and *LI exporters* are those directing more than 90% of their foreign sales to high income and low income countries, respectively. The category *MC exporters* is given by firms that trade with more than one group of countries, i.e. those firms that export less that 90% of their total volume to one specific macro area. Following this procedure we are able to identify four mutually exclusive dummies, one for each macro area served by the firm. In the same way we built importers' categories.

To check the consistency of our results we take into account different definitions of macro-areas using threshold shares of 70% and 50% of total export (import), as shown in Panel B and Panel C, respectively. Obviously, the number of firms that falls in the EU, HMI and LI category increases as the trade share decreases, while the opposite is true for the MC macro area.

We estimate the following expression

$$\begin{aligned} y_{it} &= \alpha + \beta_1 E_{it}^{EU} + \beta_2 E_{it}^{HMI} + \beta_3 E_{it}^{LI} + \beta_4 E_{it}^{MC} + \\ &+ \gamma_1 I_{it}^{EU} + \gamma_2 I_{it}^{HMI} + \gamma_3 I_{it}^{LI} + \gamma_4 I_{it}^{MC} + \theta Controls + \upsilon_{it} \quad , \end{aligned} \tag{4}$$

where y_{it} denotes the logarithm of average wage and the percentage of skilled workers. Es and Is denote the dummies for exporters and importers, trading with European countries (EU), high medium income countries (*HMI*), low income countries (LI) and more than one group of countries (MC). As usual, $controls$ is a vector including the size variable, the foreign ownership dummies, the capital intensity indicator and sectoral, region and year dummies. Hence the β_i and γ_i coefficients represent the percentage premia for firms exporting to and importing from the various markets, with respect to the baseline category of non-internationalized firms.

In Table 9 we will estimate equation (4) using a Pooled OLS model. Econometric exercises were carried out using all three panels (A, B and C). While there are differences in estimated coefficients, the hierarchy of results by country categories is substantially the same. For all the regressions we run the F-tests for the statistical difference between firms exporting to (importing from) the three macro areas. The p-values of the test are shown in the lower part of Table 9.

Overall Table 9 suggests that, as expected, traders' characteristics crucially hinge on heterogeneity of target foreign markets. Both for export and import we observe that firms trading with more than one group of countries (MC category) appear to pay higher wages and to be more skill intensive.[15] The result is consistent with the idea that firms' performance increase with the number of countries with which firms trade (Bernard et al., 2007; Castellani et al., 2008).

Looking closer at the export side we observe that firms selling goods to European countries pay lower average wages and employ less skilled workers than exporters to high-medium and low income countries. The estimated coefficients for the HMI and LI countries are instead economically very similar and, often, also statistically equivalent. These results seem to suggest that distance is one of the main country characteristics influencing trade premia differences across exporters.

A more blurred picture emerges from the import side. As far as the wage premia are concerned there does not seem to be much differences across firms according to the countries from which they import. The analysis for the skill intensity variable shows instead that firms importing from low income countries are those exhibiting the highest percentage of non-production workers.

While the previous exercise suggests us that some heterogeneity exists between firms trading with different markets, it does not help to understand which are the underlying sources that make trade premia market specific. To tackle this task more directly, we explicitly take into account some country characteristics which, as discussed in the previous sections, are likely to influence firm's decision to operate in one market rather than another. In particular we consider distance (DIST), gross domestic

[15] Similar results are obtained when using the average wage of production and non-production workers as dependent variable. Results are not shown but are available from the authors.

Table 9: Trade premia by country. Pooled OLS regressions (1993-1997)

	Wage			**SLI**		
	90%	70%	50%	90%	70%	50%
E^{EU}	0.019***	0.023***	0.026***	1.754***	2.565***	2.974***
	(0.004)	(0.004)	(0.003)	(0.214)	(0.200)	(0.195)
E^{HMI}	0.038***	0.037***	0.038***	3.615***	3.736***	4.005***
	(0.004)	(0.004)	(0.004)	(0.248)	(0.226)	(0.209)
E^{LI}	0.033***	0.040***	0.045***	3.727***	4.558***	4.851***
	(0.007)	(0.006)	(0.005)	(0.419)	(0.375)	(0.335)
E^{MC}	0.033***	0.039***	0.047***	4.555***	5.019***	6.525***
	(0.004)	(0.004)	(0.005)	(0.209)	(0.228)	(0.356)
I^{EU}	0.044***	0.050***	0.052***	1.888***	2.405***	2.742***
	(0.003)	(0.003)	(0.003)	(0.192)	(0.186)	(0.184)
I^{HMI}	0.034***	0.044***	0.049***	1.801***	2.597***	3.182***
	(0.004)	(0.004)	(0.004)	(0.255)	(0.237)	(0.223)
I^{LI}	0.030***	0.043***	0.056***	2.589***	3.661***	4.777***
	(0.008)	(0.007)	(0.006)	(0.446)	(0.412)	(0.397)
I^{MC}	0.070***	0.067***	0.066***	4.333***	4.694***	4.881***
	(0.004)	(0.004)	(0.007)	(0.224)	(0.252)	(0.470)
Observations	95231	95231	93692	95236	95236	93697
R-squared	0.44	0.44	0.44	0.42	0.42	0.42
	F-tests for equality between coefficients					
$\beta_{EU} = \beta_{HMI}$	0.000	0.000	0.000	0.000	0.000	0.000
$\beta_{EU} = \beta_{LI}$	0.046	0.005	0.000	0.000	0.000	0.000
$\beta_{HMI} = \beta_{LI}$	0.452	0.561	0.186	0.805	0.039	0.013
$\gamma_{EU} = \gamma_{HMI}$	0.010	0.099	0.346	0.739	0.406	0.031
$\gamma_{EU} = \gamma_{LI}$	0.067	0.270	0.476	0.119	0.002	0.000
$\gamma_{HMI} = \gamma_{LI}$	0.645	0.855	0.241	0.099	0.013	0.000

Note: Standard Errors in parenthesis below the coefficients. Asterisks denote significance levels (***: p<1%; **: p<5%; *: p<10%). All regressions include the log of employment, the log of capital intensity, as well as the foreign-ownership dummy,region and year dummies as controls. EU= Trading with European countries; HMI= Trading with High Medium Income countries; LI= Trading with Low Income countries; MC= Trading with more than one group of countries

product per capita (GDP) and population (POP). [16] For each of these three variables (X) we build a firm level index, for exporters and importers. The methodology employed in computing these indexes follows two steps.

First, we calculate, for each variable X, an indicator that aggregates country level information into geographical areas. This is necessary because, in our dataset, we have access to information on firm's export and import by geographical areas (of destination or origin) rather than by single countries (see Appendix1).[17] For each geographical area g, we assign a weight to the characteristics of each country belonging to area g according to Italy's sectoral share of exports to country c.[18] On the export side the indicator $EX_{g,s}$ is given by

$$EX_{g,s} = \sum_{c \in g} X_c \frac{EXP_{c,s}}{EXP_s} \quad X \in \{GDP, DIST, POP\} \quad ,$$

[16]Data on GDP and population are from the Penn World Table 6.2 while data on distance are from the CEPII database.

[17]This first step is not necessary in the case of European countries for which we have information on firm's export and import at the level of singe countries (See Appendix 1).

[18]Sectoral level information at 3-digit on Italian' export and import by country are obtained by the Italian Statistical Office.

where X_c is the characteristics X of country c, $EXP_{c,s}$ is the Italian total export to country c in sector s, while EXP_s is the total export of Italy in sector s.[19] We follow the same procedure to compute the indicator on the import side $(IX_{g,s})$.

The second step consists in computing the final firm level index for each country characteristic by weighting the $EX_{g,s}$ according to the firm's export share towards each geographical area g

$$Xe_i = \sum_g EX_{g,s} * \frac{EXP_{i,g}}{EXP_i} \quad X \in \{DIST, GDP, POP\} \quad .$$

Hence, we obtain a firm level index for each country characteristic ($DIST_e$, GDP_e,POP_e for export and $DIST_i$, GDP_i, POP_i for import). Each index equals 0 if, in a given year, the firm does not export or import, respectively. However, in order to give flexibility to our specification and to take into account for a possible non linear relationship between our dependent variable and the indexes described above, we divide the distribution of each index into quartiles, at the sectoral (two digit) level. In this way we also account for the sectoral heterogeneity in the geographical distribution of trade flows. Therefore, we obtain for each index four quartile dummy variables

$$Xeq_{itj} \quad \text{with} \quad j = 1, 2, 3, 4 \quad \text{and} \quad X \in \{DIST, GDP, POP\}$$

where Xeq_{itj} equals one if exporter i belongs to the jth quartile of the two-digit sectoral distribution of the index Xe in year t, zero otherwise. The same holds for import (Xiq_{itj}).

Then, we regress the (log) value of firm's characteristics on the above described dummies that summarize the characteristics of the geographical areas a firms trades with at time t. Among the four dummies for each index we use as reference category the dummy representing the first quartile of the index distribution. We are thus enabled to test whether the average trade premia increase or decrease as firms trade with more distant, richer or bigger countries. In our regression we also include exporter, importer and two-way trader dummies and we control for size, capital intensity, foreign ownership, industry, geographical location and aggregate time effects.

$$\begin{aligned} y_{it} &= \alpha + \beta D_{it}^{exp} + \gamma D_{it}^{imp} + \phi D_{it}^{exp*imp} + \qquad (5) \\ &+ \sum_{j=2}^{4} \omega_j DISTeq_{itj} + \sum_{j=2}^{4} \sigma_j GDPeq_{itj} + \sum_{j=2}^{4} \lambda_j POPeq_{itj} + \\ &+ \sum_{j=2}^{4} \tau_j DISTiq_{itj} + \sum_{j=2}^{4} \chi_j GDPiq_{itj} + \sum_{j=2}^{4} \psi_j POPiq_{itj} + \\ &+ \theta Controls_{it} + \upsilon_{it}. \end{aligned}$$

Table 10 and Table 11 show the results for seven different specifications. In the first three columns we consider only the export side while in the subsequent three columns we include only the import side. We introduce progressively, from column 1 to 3 and from 4 to 6, the three dummies for each index considered (distance, gdp per capita and population). In the last column we present the results of the most comprehensive specification in which we include all country characteristics and we simultaneously control for the export and the import side.

The results for the market characteristics are qualitatively similar across the two dependent variables, wage and skill intensity.[20] We start by instigating, on the export side, the relationship between our two dependent variables and distance (column 1 of Table 10 and Table 11). We observe

[19] For instance, we obtain for the characteristic GDP an indicator for the sector "Textile" and the geographical area "Usa-Canada" which is given by Italy's share of export to Usa in the textile industry multiplied by the Usa'GDP plus Italy's share of export to Canada in the textile industry multiplied by Canada's GDP.

[20] Similar results are obtained when using the average wage of production and non-production workers as dependent variable. Results are not shown but are available from the authors.

Table 10: Wage and countries characteristics. Pooled OLS regressions (1993-1997)

	Wage						
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
D^{exp}	0.028***	0.033***	0.029***				0.017***
	(0.003)	(0.004)	(0.005)				(0.005)
D^{imp}				0.036***	0.021***	0.021***	0.017***
				(0.003)	(0.004)	(0.004)	(0.006)
$D^{exp*imp}$							-0.012**
							(0.006)
$DISTeq2$	0.018***	0.017***	0.016***				0.013***
	(0.003)	(0.003)	(0.003)				(0.003)
$DISTeq3$	0.028***	0.026***	0.023***				0.018***
	(0.004)	(0.004)	(0.004)				(0.004)
$DISTeq4$	0.029***	0.026***	0.023***				0.021***
	(0.004)	(0.004)	(0.004)				(0.004)
$GDPeq2$		-0.005	-0.007**				-0.011***
		(0.003)	(0.003)				(0.003)
$GDPeq3$		-0.005	-0.009**				-0.014***
		(0.004)	(0.004)				(0.004)
$GDPeq4$		-0.007*	-0.011***				-0.014***
		(0.004)	(0.004)				(0.004)
$POPeq2$			0.007**				0.004
			(0.003)				(0.003)
$POPeq3$			0.017***				0.014***
			(0.003)				(0.003)
$POPee4$			0.012***				0.010***
			(0.004)				(0.004)
$DISTiq2$				0.011***	0.009***	0.009***	0.008**
				(0.003)	(0.003)	(0.003)	(0.003)
$DISTiq3$				0.031***	0.032***	0.032***	0.029***
				(0.003)	(0.003)	(0.004)	(0.004)
$DISTiq4$				0.021***	0.027***	0.027***	0.024***
				(0.004)	(0.004)	(0.004)	(0.004)
$GDPiq2$					0.018***	0.018***	0.019***
					(0.003)	(0.003)	(0.003)
$GDPiq3$					0.019***	0.020***	0.022***
					(0.004)	(0.004)	(0.004)
$GDPiq4$					0.018***	0.018***	0.021***
					(0.004)	(0.004)	(0.004)
$POPiq2$						0.001	0.001
						(0.003)	(0.003)
$POPiq3$						-0.003	-0.003
						(0.004)	(0.004)
$POPiq4$						-0.001	-0.002
						(0.004)	(0.004)
Observations	94772	94772	94772	94772	94772	94772	94772
R-squared	0.464	0.464	0.465	0.466	0.466	0.466	0.467

Note: Standard Errors in parenthesis below the coefficients. Asterisks denote significance levels (***: p<1%; **: p<5%; *: p<10%). All regressions include the log of employment, the log of capital intensity, as well as the foreign-ownership dummy,region and year dummies as controls.

Table 11: Skilled Labour Intensity and countries characteristics.Pooled OLS regressions (1993-1997)

	SLI						
	(1)	*(2)*	*(3)*	*(4)*	*(5)*	*(6)*	*(7)*
D^{exp}	2.723***	3.888***	3.796***				2.946***
	(0.195)	(0.267)	(0.280)				(0.294)
D^{imp}				2.493***	2.233***	2.219***	0.633*
				(0.195)	(0.260)	(0.275)	(0.356)
$D^{exp*imp}$							-0.448
							(0.321)
$DISTeq2$	2.455***	1.918***	1.871***				1.514***
	(0.209)	(0.214)	(0.216)				(0.213)
$DISTeq3$	3.976***	3.203***	3.088***				2.477***
	(0.234)	(0.246)	(0.248)				(0.245)
$DISTeq4$	3.791***	3.085***	2.919***				2.530***
	(0.240)	(0.253)	(0.262)				(0.261)
$GDPeq2$		-0.024	-0.083				-0.400*
		(0.217)	(0.219)				(0.217)
$GDPeq3$		-0.887***	-1.047***				-1.354***
		(0.239)	(0.246)				(0.244)
$GDPeq4$		-1.786***	-1.930***				-2.043***
		(0.249)	(0.261)				(0.259)
$POPeq2$			0.163				-0.066
			(0.211)				(0.208)
$POPeq3$			0.469**				0.219
			(0.227)				(0.225)
$POPeq4$			0.459*				0.072
			(0.246)				(0.243)
$DISTiq2$				1.109***	1.070***	0.949***	0.766***
				(0.205)	(0.209)	(0.210)	(0.208)
$DISTiq3$				3.541***	3.505***	3.305***	2.884***
				(0.231)	(0.235)	(0.236)	(0.233)
$DISTiq4$				4.274***	4.345***	3.664***	3.128***
				(0.265)	(0.271)	(0.287)	(0.285)
$GDPiq2$					0.534**	0.572**	0.748***
					(0.228)	(0.229)	(0.228)
$GDPiq3$					0.283	0.194	0.535**
					(0.246)	(0.252)	(0.251)
$GDPiq4$					0.236	0.067	0.555**
					(0.253)	(0.257)	(0.257)
$POPiq2$						0.092	0.135
						(0.213)	(0.210)
$POPiq3$						0.084	0.100
						(0.233)	(0.231)
$POPiq4$						1.126***	1.151***
						(0.274)	(0.271)
Observations	94776	94776	94776	94776	94776	94776	94776
R-squared	0.422	0.423	0.423	0.421	0.421	0.421	0.43

Note: Standard Errors in parenthesis below the coefficients. Asterisks denote significance levels (***: p<1%; **: p<5%; *: p<10%). All regressions include the log of employment, the log of capital intensity, as well as the foreign-ownership dummy,region and year dummies as controls.

that the estimated coefficients for the three dummies are all positive and statistically significant, both for wage and skill intensity. Moreover, since the estimated coefficients are higher for the dummies of the $3th$ and $4th$ quartile, we can infer that exporting to more distant markets is associated to relatively higher average wage and skill intensity. If we include the three dummies for GPD per capita (column 2) we observe that distance still plays a relevant role in determining both wage and skill premia. However, in contrast with the aggregate evidence of Hallak and Sivadasan (2009) we find a negative correlation between wages/skill intensity and the level of development of destination markets. This result could be explained, at least in part, with the lens of the Italian specialization patterns. Italian firms are in fact more likely to export relatively low skill-intensive goods to developed countries (e.g., traditional sectors such as textile, clothing and footwear)(Di Maio and Tamagni, 2008; Onida, 1999; DeBenedictis, 2005). A positive relationship is instead detected between wage/skill intensity and country size (column 3). Trade premia are increasing in the size of destination markets.

Although there are not enough data to completely test the product quality theory, our results seem to suggest that both quality and efficiency play a relevant role in determining export behavior. In fact, our results suggest that export requirements, in terms of efficiency and/or quality, are greater in bigger and more distant markets (Melitz and Ottaviano, 2008; Hallak and Sivadasan, 2009). According to the quality heterogeneous firms trade models (Baldwin and Harrigan, 2007; Johnson, 2007) only firms with sufficiently high-price/high quality find it worthwhile to sell to distant and small markets. Similarly, following Hallak and Sivadasan (2009)'s reasoning, since the export quality requirements tend to increase with distance one would expect firms exporting to distant countries to produce higher quality goods, and hence set higher prices as well. To the extent that production of quality goods requires workers with higher ability, the skill intensity premia for firms exporting to more distant countries could be interpreted as revealing that they produce higher quality goods than non-exporters.

Let us now turn to investigate the results for heterogeneity across importers. Some important regularities emerge from the data here too. As in the case of exporters, we observe that in all the three different specifications (from column 4 to 6), average wages and percentage of non-production workers are positively correlated with distance. Contrary to exporters, the GDP per capita estimated coefficients are positive in the case of importers and, almost in all specification, statistically significant. The size of the countries of origin of imports instead turned out to be not statistically significant.

The higher trade premia for firms importing from more distant and richer countries can be generated by various mechanisms, ranging from differences in quality of imported products to higher firm's efficiency. Kasahara and Lapham (2008) develop a model where heterogeneous final good producers simultaneously decide whether to export and whether to import. Both importing and exporting activities require paying a fixed cost in any period and in any market they choose to be active. Hence, one can argue that importing from more distant countries, given the information asymmetries and the cultural/institutional differences, requires relatively more skilled workers in order to deal with such legal and informational frictions (fixed trade costs). In a similar vein, firms buying from rich countries are more likely to import technologies (capital goods) or high-quality intermediate inputs. Hence, import from these countries may require firms to invest in some complementary assets (or absorptive capacity) in order to be able to effectively use the imported goods in their production process. From a similar perspective, if we assume that GDP per capita of the countries of origin is a satisfactory proxy for the quality of the imported inputs, our results are consistent with a broad interpretation of the (Kugler and Verhoogen, 2008) model in which high quality imported inputs and a skilled workforce are complementary in rising firm competitiveness.

Overall our results seem to confirm that differences among firms in terms of employment and wage structure can be partially explained by the variety of destinations and of countries of origin with which firms trade. The exact mechanisms underlying these results are not testable given the data at hand. For instance, we do not have firm specific information on prices which could allow us to separate out the quality and the efficiency effects and to evaluate their relative importance across countries of origin and destination of trade flows. However, our results are consistent with a multi-attribute model in which both quality and efficiency levels play a key role and in which country characteristics affect the relevant thresholds of these variables, beyond which trade can take place.

6 Conclusion

This paper has contributed to the existing literature on firms heterogeneity in international trade, highlighting several issues only marginally tackled by previous empirical studies. Our analysis yields a set of results, some of which deserve further consideration in future research.

First, we find that conditional on various firm characteristics, such as firm size and capital intensity, exporters pay higher wages and employ more skilled workers than non-exporters. The finding of a wage premium conditional on size together with the evidence of a higher white vs. blue collars ratio for exporters is consistent with a model in which both dimensions of heterogeneity - productivity and ability to produce quality - help explain differences in firm performances. Although we can not separate out trade premia into a cost and quality effect, our results suggest that trade models based only on one source of firm heterogeneity fail to explain some trade patterns.

Second, our empirical investigation moves forward by considering the engagement of firms in international transactions, either by means of exports, imports or a combination of the two. We find that also import is positively and significantly correlated with wages and with the share of white collars. More importantly, we observe that by including imports the coefficients for exporters drop substantially and become lower than those observed for importers. This result suggests that much of the export premia found in the data may be driven by the import side. This is particularly true when the exports and imports are correlated within firms, as it is the case in our dataset where a large majority of importers are also exporters and vice versa. The result we obtain in this respect might have to do with the input composition of exported goods. To the extent that a large fraction of imported inputs used to produce export goods are skill intensive, this will translate into upward biased export premia if imports are not controlled for. Moreover, we observe that the magnitude of the premia for two-way traders is much higher than that detected for only exporters or only importers. Being involved both in importing and exporting is associated with the highest premium in terms of firm's wages, for both non-production and production workers, followed by only importers and only exporters.

Third, by exploiting the richness of our dataset which identifies markets of destination and origin of trade flows for each firms, we show that some further heterogeneity exists across internationalized firms. Differences among traders in terms of employment and wage structure seem to be related also to the type of markets served (sourced from) by these firms. Importers and exporters have a different sensitivity to various country characteristics. However, a common trait is that both importers and exporters trading with more distant countries appear to be the most skill intensive and to pay highest wages. This result is consistent with the idea put forward by recent quality trade models (single or multi attribute) in which only firms with sufficiently high efficiency and quality of production find it profitable to sell to distant markets.

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Appendix

Destination of export and Origin of import

List of countries (or group of countries)
Developed Countries (total)
European Countries
European Free Trade Association (EFTA)
US and Canada
Other developed countries
Non-Developed Countries (total)
Associated EC
African, Caribbean and Pacific (ACP)
Organization of Petroleum Exporting Countries (OPEC)
Newly Industrialized Countries (NICs)
Other non-developed countries
Other countries
Central and Eastern European Countries (CEECs)
Planned economies countries (PECs)
Other countries
Disaggregated information on European countries
France
Belgium and Luxembourg
Netherlands
Germany
UK
Ireland
Denmark
Greece
Portugal
Spain