Does the transport industry gain from manufacturing internationalization? An empirical investigation on the Italian regions*

Stefano Elia[1], Elena Maggi[2], Ilaria Mariotti[3]

[1] *DIG-Politecnico di Milano, P.zza L. da Vinci, 32 – 20133 Milan (Italy), ph. +39 02 2399 2756, fax +39 02 2399 2710; stefano.elia@polimi.it*
[2] *Università del Molise, Faculty of Economics, SEGeS, via De Sanctis, Campobasso (Italy), ph. +39 0874 404992; elena.maggi@unimol.it*
[3]*DiAP-Politecnico di Milano, P.zza L. da Vinci, 32 – 20133 Milan (Italy), ph. +39 02 2399 3928, fax +39 02 2399 4105; ilaria.mariotti@polimi.it*

Abstract

The present paper deals with the impact of manufacturing internationalisation, in the forms of international trade, cooperation agreements – measured by inward and outward processing trade (IPT and OPT, respectively) - and FDI, on the transport industry employment. Descriptive statistics and econometric analysis are carried out at the "regional-industry" level (20 NUTS2 regions and 8 transport sub-industries) with reference to Italy in the period 1996-2001. Results show that export, FDI and the components of IPT (temporary import and re-export) positively affect the transport employment variation in 1996-2001, while import and the components of OPT (temporary export and re-import) display a negative impact.

Keywords: transport industry, employment, regional-industry, trade, FDI, IPT, OPT.

1. Introduction

The globalisation of the economy, which has been fostered by the trade barriers reduction and the falling transport, communication and co-ordination costs (Krugman *et al.*, 1995; Glaeser and Kohlhase, 2004), has changed the structure of the production processes from being concentrated in one plant to being fragmented in different plants and in different countries. This has fostered a tight increase of exchange flows, which do not only include final goods, but also intermediate and unfinished goods, being transferred from one country to another in order to be processed either by an affiliate or an external firm. The impact of internationalisation of manufacturing activities on the home country is highly debated in literature, both on the internationalised firm and on the national and – in a few cases - regional or local economic systems.

The present paper belongs to this literature focusing on a specific industry (the transport one) at the regional economic unit. Specifically, it aims at adding to this literature in three ways. Firstly, it focuses on the effects of manufacturing internationalisation on the transport

industry, by looking at changes in the labour demand in Italy in the period 1996-2001. The main hypothesis to be tested is that manufacturing internationalisation, inducing a high increase of goods' flows to be moved, implies a reorganization of the supply chain, leading the manufacturing firm to outsource transport and other logistics services to specialised operators.

Secondly, since different forms of internationalisation may give birth to different effects on the labour demand in transport industry, the present paper investigates simultaneously the impact of manufacturing activities in terms of trade, cooperation agreements and FDI. International trade (i), which consists of import and export, is the most common form of internationalisation and the first entry mode adopted by a firm facing the global scenario, because it implies low involvement and risk degree for the internationalised firm. It consists of the exchanges of final and intermediate goods and services through the national borders. Cooperation agreement (ii), a more advanced and risky strategy than international trade, is mainly adopted by small and medium size enterprises (SME) because it does not require capital investment and is of short – medium term. The cooperation agreement is entered into by a firm and a foreign partner operating backward, forward or in the same stage of a value chain (Ietto-Gillies, 2005). This agreement refers to the development, distribution, and/or manufacture of goods to be sold in the foreign market. It is a non-equity strategy because it is developed through agreements (licensing, franchising, alliances, subcontracting) between a firm and one (or more) of its suppliers or distributors in order to supply, manufacture, or distribute goods and/or services without equity sharing. Finally, FDI (iii) represents the most articulated and binding mode to enter the foreign markets, because it requires a significant capital investment through greenfield or mergers and acquisitions and imply a medium-long term obligation. FDI is the main tool adopted by medium and large sized firms, which aim to share the capital of a foreign firm, eventually with one or more partners. FDI give birth not only to intra-firm trade, but also to further exchanges between the host and the home country since the affiliates of the parent company establish economic relationships with home and host countries' suppliers and distributors.

Finally, a third contribution arise from the geographic unit of our analysis. Several authors in the literature (among the others, Cusmano *et al.*, 2009; Illeris, 2005) have stressed that outsourcing has a clear and predominant regional dimension. Italian SME tend, indeed, to organise the supply chain on specific local systems – named industrial districts – allowing the exploitation of agglomerative advantages and the capture of the efficiency of proximity between suppliers and users (Boix and Galletto, 2009; Mariotti *et al.*, 2008). Moreover, the geographical proximity has a strong influence on the selection of the transport providers also for the not-district manufacturing firms (Isfort, 2003; Razzaque and Sheng, 1998; Peters *et al.*, 1998), even because it helps in cutting the logistics costs. Besides, the cooperation between the shipper (manufacturing firm) and the external company (transport provider) is considered as a strategic issue (European Commission, 2000) and this is easier when the two firms are closely located. Therefore, the analysis of the present paper is run at "regional-industry" level, that is 20 NUTS2 regions (from now on "regions") and 8 transport sub-industries. Regional dimension can be considered, indeed, the most appropriate geographical unit taking into account such strategic role of geographical proximity between the manufacturing and the

transport firms. The region is large enough to capture the district dimension, given that industrial districts are frequently located within regions.

The paper is structured into six sections. The introduction is followed by the literature review on the impact of internationalisation on transport employment. Section three focuses on data and methodology. Descriptive statistics and econometric analysis are presented and discussed in sections four and five, respectively. Conclusions and policy recommendations follow.

2. The impact of internationalisation on the home country employment

The issue of the impact of manufacturing internationalisation on the home country employment is highly debated and analysed by several theoretical and empirical studies (among the others, Dunning and Lundan, 2008; Molnar *et al.*, 2007). In contrast with the general public view, the main findings of the works focusing on the OECD countries show that the impact of internationalisation on aggregate labour market is small and the domestic job losses are slight, although particular skill and occupational groups (especially low skill level) have been affected more strongly (Crinò, 2009; Barry and Walsh, 2008).

However, to the best of our knowledge, lack of attention has been devoted to the regional impact as well as to the simultaneous impact of the three above described internationalisation forms. Besides, there is no evidence at regional level on the internationalisation effects on the employment of specific industries supplying services to manufacturers, such as the transport industry.

Within this context, it is possible to identify three different strands of literature analysing separately the impact of trade, cooperation agreements and FDI on labour demand. As concerns the trade literature, many studies focus on the employment and wage impact on a national scale, generally finding changes in the labour composition (high skilled and low skilled workers) and, in some circumstances, a decline in the relative demand for low skilled employees, especially in the industries facing import competition (Krugman *et al.*, 1995, Addison *et al.*, 2000). Nevertheless, recent studies stress that while the effect of increased imports on jobs is generally negative and the impact of increased export is positive, the overall effects of increased trade are positive (Kletzer, 2002). In particular, trade has had no significant effect on the overall unemployment rate of the OECD countries (Hill *et al.*, 2008). Conversely, the few studies on the regional scale highlight that the magnitude of trade's impact on the labour markets remains widely contrasting (Richardson, 1995; Kapstein, 2000). Indeed, the effects of export growth on the employment tend to be mixed, either positive or negative, depending on different regional characteristics and dynamics, such as the regional size, the industrial structure and the trade patterns (Baldwin and Brown, 2004; Leichenko and Silva, 2004; Markusen *et al.*, 1991).

The literature on cooperation agreements stresses the impact on the national employment, mainly focusing on its composition and wage level. For example, a study on two European Countries (Italy and Germany) (Helg and Tajoli, 2005) estimates that, during the 1990s, this strategy has increased the high skilled-to-low skilled labour ratio in Italy, while it has not affected the German demand for high skilled labour. Egger and Egger (2001), by focusing on cooperation agreements between manufacturing industries of EU and non EU-countries

during the period 1995–1997, find that they reduce the skill-to-low-skill ratio in EU exporting industries, while have more ambiguous effects in import-competing industries.

The literature on FDI, instead, has mainly investigated the effects on the employment at firm level (among the others, Castellani *et al.*, 2008 on the Italian case; Head and Ries, 2002 on the Japanese MNE) or at domestic industry level (among the others, Slaughter, 2000 on the USA; Falzoni and Grasseni, 2003 on Italy). Conversely, few studies have focused on the effects on both the internationalised firm and its economic environment, adopting the NUTS2 region or the NUTS3 province as scale of analysis (Mariotti *et al.*, 2003; Elia *et al.*, 2009; Federico and Minerva, 2008). Specifically, Mariotti *et al.* (2003) find that in the period 1985-1995 the Italian FDI have significantly affected the labour intensity of the domestic production at a "regional- industry" scale, defined as the ensemble of firms operating in the same industrial macro-industry – composed of interdependent sectors belonging to the same *filière* – and localised in the same geographical region. In particular, the impact is negative for investments undertaken in less developed countries and positive for market-seeking investments in advanced countries. Elia *et al.* (2009), by adopting the same unit of analysis (regional-industry), investigate the impact of outward FDI upon the demand for high and low skilled workers in Italy throughout the period 1996-2002. It results that all outward FDI - regardless of the country of destination - have significant negative effects on the demand for low skilled workers, while outward FDI towards OECD countries negatively affect the demand for high skilled workers. Federico and Minerva (2008), who assess the impact of Italy's outward FDI on local employment growth in 1996-2001 for 12 manufacturing industries and 103 administrative provinces, find that net effect of FDI on the employment of the whole local area is positive. Employment growth in local areas investing more abroad appears to be stronger than the industry average, especially in some sectors.

At least to our knowledge, only Mariotti and Piscitello (2007) devote attention to the effects on the tertiary sector, by investigating the impact of the manufacturing FDI on the labour demand for services between 1996 and 2003 in the industrial districts of Veneto region in the North-East of Italy. The finding is that the more internationally involved an industrial district, the higher the employment growth in the service sector.

The literature concerning the specific impact of internationalisation of manufacturing activities on the transport industry is even more scanty. The internationalisation of production and the growing global trade rate highly affect the logistics activities, especially transport (Maggi *et al.*, 2008). Transport plays a key role in connecting the different import and export markets and the vertically disaggregated components of production system, which are widespread in the world (Yieming *et al.*, 2002). Besides, the increasing large share of goods flows, fostered by internationalisation, must be managed by transport functions at the level of both the manufacturing firm and the transport providers. In the first case, when transport is carried out by the manufacturing firm (insourcing), there is a rise of the labour demand for workers specialised in planning, managing and controlling the transport activities (Blomström *et al.*, 1997). In the second case, that is when transport is outsourced, the transport operators restructure themselves becoming larger and changing into the so-called Third-Party Logistics (3PLs) or Fourth Party Logistics (4PLs) Providers, by modifying their supply from single

based services into an increasing number of high value-added services (for example, transport, storage, inventory management, tracking and tracing, packaging, labelling and secondary assembly of products) (Brewer *et al.*, 2001).

Only in the second case it is possible to observe an increase of labour demand in the transport industry, which is the object of analysis of the present paper. In fact, while the rate of outsourcing of integrated logistics as a whole is very low within the Italian boundaries (13% in 1997 and 16% in 2004 - Commission Européenne, 2001 on data AT Kearney-ELA), the transportation is outsourced by the majority of the Italian manufacturing firms that go international through one of the three forms identified above, i.e. trade, cooperation agreements and FDI (Confetra, 2002).

In literature it is possible - at least to our knowledge - to identify only two papers providing some evidences on the impact of internationalisation on transport services. The first one (Savona and Schiattarella, 2004) investigates the impact of cooperation agreements, measured by a specific index based on trade data, on different services' labour demand within the Italian NUTS3 provinces over the period 1991-1996. The authors conclude that internationalisation towards low wage countries shows a positive significant impact on the more traditional services' employment, such as transport.

The second (Maggi *et al.,* 2008) provides evidence on the relationship between FDI, undertaken by the industrial district firms located in Veneto region, and the employment change in the transport and other logistics industries, occurred in the same industrial districts between 1996 and 2003. Results show that, although all the internationalised industrial districts exhibit an increase in the logistics labour demand, only in a few of them an internationalisation degree above the average is positively correlated to a logistics' employment growth.

3. Data and methodology

Data

The impact of internationalisation on the labour demand in transport industry has been investigated in the present paper by using the employment variation in the 8 transport sub-industries of each Italian region as dependent variable (Table 1). Data about the employees are provided by the Manufacturing and Services Activities' (MSA) Census of the Italian Statistical Institute (ISTAT) at six digit level and refer to the category "I – Transport, warehousing, communications"[1]. The sub-industries considered in the analysis concern the different transport modes (rail, road, sea and air[2]) and their supplying and supporting transport activities (i.e. goods loading and unloading and stevedoring) (Table 1). The employment variation is computed between the years 2001 and 1996, which correspond to the last two MSA Census provided by ISTAT.

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[1] Data on the MSA national Census for the years 1996 and 2001 are classified following the NACE REV 1. The NACE six digit structure allows to distinguish the share of employees working in the freight transport activities from the share involved in passengers transport, with the exception of rail, maritime and air transport modes. For these three sub-industries, the rate of freight employees has been estimated by using the Amadeus database. The authors thank Aleid Brouwer of the University of Groningen for the cooperation in collecting the data.

[2] The scheduled air transport industry (62100) has been excluded from the analysis because it mainly concerns passenger air transport.

Table 1: Italian NUTS2 regions and the NACE REV. 1 transport sub-industries

Regions	Transport sub-industries	NACE Codes
Abruzzo	**Land transport; transport via pipelines**	**60**
Basilicata	Transport via railway	60.10.1
Calabria	Auxiliary activities to transport via railway	60.10.2
Campania	Transport by road	60.25.0
Emilia Romagna	**Water tran sport**	**61**
Friuli Venezia Giulia	Sea transport	61.11.0
Lazio	**Air Transport**	**62**
Liguria	Non-scheduled air transport	62.20.0
Lombardy	**Supporting and auxiliary transport activities; activities of travel agencies**	**63**
Marche	Cargo handling– Air transport	63.11.1
Molise	Cargo handling– Water Transport	63.11.2
Piedmont	Cargo handling– Land Transport	63.11.3
Puglia		
Sardinia		
Sicily		
Tuscany		
Trentino Alto Adige		
Umbria		
Valle d'Aosta		
Veneto		

As explained in the previous sections, the three forms of internationalisation taken into account are trade, cooperation agreements and FDI. Data on trade come from the dataset on the Italian Trade (Coeweb) provided by ISTAT and are expressed in terms of kilograms by transportation modes. Data refer to the years 1996 and 2001 and are expressed in terms of difference (Δ_{96}^{01}) (further details are provided in Appendix 1).

Cooperation agreements are difficult to measure: several papers use, as proxy, imports of intermediate inputs, estimated by combining Input–Output tables and final import data (among the others, Feenstra and Hanson, 1996; Minondo and Rubert, 2006); few papers use the data on processing trade (PT) (Helg and Tajoli, 2005; Egger and Egger, 2001). Because of data availability, in the present paper cooperation agreements are measured in terms of PT, which is trade in goods being exported (or imported) for reason of processing abroad and subsequently re-imported (or re-exported) with favorable tariff treatment. PT is composed by four elements: (a) temporary exports of goods exported by a EU country to be processed in a non-EU member and (b) re-imports by the EU of the processed goods, on the one hand; (c) temporary imports of goods to be processed in the EU and (d) re-exports of those goods to the country of origin outside the EU, on the other hand. The first two flows measure the so-called OPT; the last two measure IPT (Baldone *et al.*, 2006). Data about the four PT components are provided by ISTAT as total amount of kg but not by transport mode. Therefore, they have been distributed among the 8 transport sub-industries by employing the ratios of trade for each transport mode. Data refer to the years 1996 and 2001, and are expressed in terms of differences (Δ_{96}^{01})[3]. Therefore, the final dataset appears as a cross section where each

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[3] The components of IPT and OPT have been analysed separately because each component may involve different transport operators located either in the domestic or in the foreign country, with different effects on labour demand in the Italian transport industry. Furthermore, both IPT and OPT typically require between six months and more than one year to be completed, since the processed goods need first to be temporary imported (or temporary exported), then to be transformed and finally re-exported (or re-imported). The data of the present paper refer to two single years (1996 and 2001) and are distributed among different months. As a consequence,

observation refers to a specific combination of a NUTS 2 regions and a transport sub-industry, for a total of 160 observations (20 regions*8 transport sub-industries) (further details are provided in Appendix 1).

Outward FDI undertaken by the Italian manufacturing MNE, are measured as the cumulated sum of the employees in their foreign affiliates from 1994 to 2000. The lag between FDI and employment stands on the hypothesis that foreign affiliates need one-two years time to fully work and this delay is necessary to the transport suppliers to reorganise their activities in order to satisfy the new customers' demand. Since the goods related to FDI are transported by the different transport modes, FDI data have been distributed across the 8 transport sub-industries by using the same percentages of export and import. The data source for the Italian outward FDI is Reprint dataset, which is developed by the Department of Management, Economics and Industrial Engineering of the Politecnico di Milano and is sponsored by the Italian Institute for Foreign Trade – ICE (further details are provided in Appendix 1).

Finally, the production of manufacturing firms has been considered as explicative variable that may also affect the transport industries' employment. Indeed, a higher production is likely to imply a higher demand for transport. The production of manufacturing firms is measured in terms of value added (Berman *et al.*, 1994), which is expressed at current prices for the years 1996 and 2001 and comes from ISTAT. Besides, data about value added have been distributed among the eight transportation sub-industries according to the same percentages calculated for the components of IPT and OPT. Finally, value added has been expressed in terms of Balassa index for each pair of industry/region in order to account for the relative amount of manufacturing goods transported by each transportation sub-industry in each region with respect to the other transport sub-industries and to the other regions. (further details are provided in Appendix 1).

Methodology

The methodology employed to test the impact of internationalisation on the transport employment consists of an econometric analysis, which aims at estimating the following equation:

$$\Delta_{96}^{01} Emp_{r,s} = \alpha_{s,r} + \beta_1 \Delta_{96}^{01} Y_{r,s}^m + \beta_2 \sum_{t=94}^{00} FDI_{r,s}^m + \beta_3 \Delta_{96}^{01} I_{r,s}^m + \beta_4 \Delta_{96}^{01} X_{r,s}^m + \beta_5 \Delta_{96}^{01} T\_I_{r,s}^m + \beta_6 \Delta_{96}^{01} R\_X_{r,s}^m +$$

$$\beta_7 \Delta_{96}^{01} T\_X_{r,s}^m + \beta_8 \Delta_{96}^{01} R\_I_{r,s}^m + \varepsilon_{r,s}$$

where *s* are the 8 transport sub-industries, *r* the 20 NUTS2 regions, *m* the whole manufacturing industry[4].

$\Delta_{96}^{01} Emp_{s,r}$: is the variation of the number of employees between 2001 and 1996, in each sub-industry *s* and region *r*;

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most of data concerning re-import and re-export of 1996 and 2001 are likely to refer to processes that have started in 1995 and 2000, respectively, while data on temporary export and temporary import are likely to refer to processes that have started in 1996 and 2001 and have finished in 1997 and 2001, respectively.
[4]The manufacturing industry is identified by the NACE codes from 15 to 45.

$\Delta_{96}^{01} Y_{r,s}^{m}$: is the difference between 2001 and 1996 of the value added of manufacturing production (m) transported in each sub-industry s of each region r (computed as Balassa Index);

$\sum_{t=94}^{00} FDI_{r,s}^{m}$: is the sum of FDIs cumulated between 1994 and 2000 in manufacturing industries (m), distributed among the sub-industries s of each region r;

$\Delta_{96}^{01} I_{r,s}^{m}$: is the difference between 2001 and 1996 of the manufacturing goods' import flows (m) transported in each sub-industry s of each region r;

$\Delta_{96}^{01} X_{r,s}^{m}$: is the difference between 2001 and 1996 of the manufacturing goods' export flows (m) transported in each sub-industry s of each region r;

$\Delta_{96}^{01} T\_I_{r,s}^{m}$: is the difference between 2001 and 1996 of the manufacturing goods' temporary import flows (m) transported in each sub-industry s of each region r;

$\Delta_{96}^{01} R\_X_{r,s}^{m}$: is the difference between 2001 and 1996 of the manufacturing goods' re-export flows (m) transported in each sub-industry s of each region r;

$\Delta_{96}^{01} T\_X_{r,s}^{m}$: is the difference between 2001 and 1996 of manufacturing goods' temporary export flows (m) transported in each sub-industry s of each region r;

$\Delta_{96}^{01} R\_I_{r,s}^{m}$: is the difference between 2001 and 1996 of the manufacturing goods' re-import flows (m) transported in each sub-industry s of each region r.

The equation suggests that the variation of the demand for transport workers between 2001 and 1996 within a region, is related to: (i) the change of the manufacturing industries' value added, (ii) the cumulated sum of the manufacturing FDI undertaken in 1994-2000, (iii) import and export change, and (iv) change in the components of IPT and OPT. Finally, region and industry dummies have been included in order to control for fixed effects.

4. Descriptive statistics on the transport industry employment growth

Between 1996 and 2001, the employees in the transport sub-industries grew of 22.32%, which corresponds to an absolute increase of 78,785 units (see Table 2). All the transport sub-industries increased in terms of employment, with the exception of rail and air transport supporting activities, which are the less used because of the low speed and reliability of the Italian railway transport network, and because of the high cost of air with respect to the other transport modes. Furthermore, the non-scheduled air transport also presents a growth (2%), even if smaller than the other sectors.

The highest increase has occurred in the cargo handling for land transport sub-industry (63113), which displays both the highest percentage (+109.97%) and absolute employment variation (+47,885). Given that the railway sectors show negative values (-44.10% and -8,768 in 60101; -56.91%; and -707 in 60102), the employees' increase in the cargo handling for land transport (63113), which is vertically integrated with both railway and road transport, must be linked to the positive performance of road transport (60250), which displays an increment of +39,240 employees, corresponding to +14.58%.

Table 2: Employment change in terms of percentages and absolute values in the transport sub-industries (1996-2001)

Transport sub-industries	NACE codes	Growth rate 96-01 (%)	Absolute variation
Transport via railway	60.10.1	-44.10	-8,768
Auxiliary activities to transport via railway	60.10.2	-56.91	-707
Transport by road	60.25.0	14.58	39,240
Sea transport	61.11.0	37.53	2,091
Non-scheduled air transport	62.20.0	2.08	5
Cargo handling– Air transport	63.11.1	-62.41	-2,240
Cargo handling– Water Transport	63.11.2	13.14	1,279
Cargo handling– Land Transport	63.11.3	109.97	47,885
Total	(All)	22.32	78,785

The predominance of road transport is due to the fact that more than 50% of the manufacturing activities' internationalisation (with the exception of re-export) occurs towards Europe (Table 6 in the Appendix 2). As a consequence, since the Italian railway system is less efficient for goods transport, most of the land freight flows are moved by road. According to Confetra (2004), in 2002 about the 70% of export towards Europe has been managed by road transport. On the other hand, when internationalisation is addressed towards non-EU destinations, the most preferred mode becomes the maritime transport, which involves the sea transport (61110) and cargo handling for water transport (63112). These sub-industries exhibit a positive performance in terms of employment growth and absolute variation (+37.53% and +2,091 employees in 61110; +13.14% and +1,279 employees in 63112). Conversely, air transport is less used to support internationalisation: non-scheduled air transport (62200) shows a very low relative and absolute variations (2.08% and +5, respectively), and cargo handling for air transport (63111) even shows a strong employment reduction (-62.41%, which corresponds to -2,240 workers).

Summarizing, descriptive statistics on employment change in transport sub-industries provide a contrasting picture. While water and road transport have strongly increased their employees, the opposite is true for air and railway transport. This picture does not help to formulate any insights on the relationship between internationalisation of manufacturing activities and the employment in transport industry. Therefore, some further descriptive statistics, taking into account the geographical dimension of transport employment, follow.

Table 3 shows the employment change in terms of percentage and absolute variation across the 20 different Italian regions, while Table 6 in the Appendix 2 shows the distribution of each internationalisation form among the 20 Italian regions. In both tables, the Italian regions have been grouped into four macro-areas (North-West, North-East, Centre, and South and Islands), according to their economic characteristics. Figure 1 in the Appendix provides a visualization of the total employment change of the transport sub-industries, which has occurred between 1996 and 2001 in each Italian region.

Table 3 shows that the north-western regions report the best performance in terms of employment growth: Lombardy (the Italian leading economic region) displays the highest absolute variation (+22,790) and the second highest percentage variation (+37.54%), while Piedmont presents a noticeable increase, especially in terms of percentages (+20.86). The significant transport employment increase in the North-West, and specifically in Lombardy, is strictly related to the regional dimension of outsourcing and to the significant internationalisation degree of the area. A recent firm level study on Lombardy (Cusmano *et al.*, 2009) has, indeed, shown that, on average, more than 40% of the firms refer to a regional supplier for some of the functions they have decided to contract out. Besides, the 53.46% of outward FDI originates in the North-West, with 34.71% in Lombardy, and 17.94% in Piedmont (Table 6). The North-West is also the most active as regards export and import, even if the gap with respect to the other three areas is low. Besides, most of the internationalisation originating in the North-West is undertaken in Europe (63.45% of FDI, 78.61% of export and 73.25% of import), and this may explain the high increase of transport by road displayed by Table 2.

As concerns the north-eastern regions a high employment increase occurs in Veneto, Emilia Romagna and Trentino Alto Adige (+29.44%, +15.90% and +20.85%, respectively), with Veneto exhibiting the second highest absolute variation (+10,825) (Table 3). Indeed, the North-East is highly internationalised, being placed in the second position as regards FDI, export, import and temporary export and in the first position as concerns re-import (Table 6). The significant internationalisation degree and the high employment increase in this area can be explained by the presence of about one third of the Italian industrial districts, which are specialised in the made in Italy sectors (fashion, home furniture and furnishing, food and traditional mechanical engineering products), and which have started a strong internationalisation process since the middle of the '80's. Furthermore, most of these flows occurs towards (or from) Europe, especially as regard re-import (84.99 %) (Table 6), and this trend may contribute to explain the land transport employment increase (Table 2).

The Centre displays high employment growth in terms of percentages (Abruzzo +37.61%, Lazio +29.75%, Tuscany +25.01% and Marche 16.16%) (Table 3). However, the absolute variations are, on average, lower than those of the north-western and north-eastern regions. Specifically, Lazio exhibits a high performance in absolute value (+7,813) probably because it hosts the Italian capital city Rome, where several transport firms choose to locate their headquarters. Firms from the Centre, which are mainly SME, show low levels of internationalisation, since they are always placed in the third or fourth positions in all the internationalisation modes (Table 6). Therefore, in this case low levels of internationalisation are associated to middle-low employment increase.

Finally, the regions from the South and Islands display high transport employment growths in terms of percentage, but low increases in terms of the absolute variations, with the exception of Campania (+5,829) (Table 3). Southern regions have a limited manufacturing economic activity with respect to the rest of the country and are specialized in primary industries. The main internationalisation forms are export (especially of primary goods), whose percentage (25.49%) is similar to that of north-eastern regions (27.78%), and IPT,

whose components display the highest percentages in the country (36.45% for temporary import and 69.41% for re-export) (Table 6).

Summarizing, the descriptive statistics underlines that, on average, the most internationalised geographical areas (i.e. North-West and North-East) and regions (i.e. Lombardy and Veneto), report the highest employment growth, especially as regards transport by road because the majority of the flows are addressed (or come from) Europe (Tables 2, 3 and 6). However, also geographic areas (e.g. Centre) and regions (e.g. Campania) that display a lower level of internationalization exhibit a middle increase of employees. At the same time, it is possible to observe some regions with middle levels of some internationalization forms (e.g. export of Sicily and Sardinia) that show low employment increase or even a decrease.

However, given that employment growth may be (is) the result of the variation of all internationalization forms, an econometric analysis is required in order to understand more punctually the relationship between each form of internationalisation and the variation of employment in transport industry.

Table 3: Employment change in transport sub-industries in terms of percentage and absolute values in the Italian regions (1996 and 2001)

Regions	Employment Growth Rate	Employment Absolute Variation
Centre	**24.91**	**18,210**
ABRUZZO	37.61	2,347
LAZIO	29.75	7,813
MARCHE	16.16	1,742
TUSCANY	25.01	5,845
UMBRIA	7.19	463
North-East	**20.80**	**20,227**
EMILIA ROMAGNA	15.90	6,966
FRIULI VENEZIA GIULIA	9.81	917
TRENTINO ALTO ADIGE	20.85	1,519
VENETO	29.44	10,825
North-West	**28.27**	**29,996**
LIGURIA	6.02	892
LOMBARDY	37.54	22,790
PIEDMONT	20.86	6,253
VALLE AOSTA	6.27	32
South and islands	**13.54**	**10,382**
BASILICATA	28.36	564
CALABRIA	20.47	1,327
CAMPANIA	24.65	5,829
MOLISE	25.45	316
PUGLIA	9.85	1,663
SARDINIA	9.65	887
SICILY	-1.18	-204
Total	**22.32**	**78,785**

5. Econometric findings

This section aims at verifying whether there is a positive relationship between the transport employment and the internationalisation process, in all its forms, undertaken by the Italian regions. In order to reach this goal, the equation presented in section 4 has been estimated through econometric regressions. Table 5 of the Appendix 2 provides the descriptive statistics

and correlations of the explanatory variables that have been employed in the econometric analysis[5].

Results are reported in Table 4, which displays four columns corresponding to four different models: (i) without dummies, (ii) with regional dummies, (iii) with industrial dummies, (iv) with both regional and industrial dummies. Given that the Breusch-Pagan test displays that OLS regressions, which are not reported in this paper, is affected by heteroskedasticity, Weighted Least Square regressions have been used in order to assign a lower weight to those observations with high variance.

WLS regressions show that manufacturing production is not significant for the transport industries' labour demand. This might be due to the fact that most of Italian firms are SME, which mainly produce for local market. As a consequence, they are more likely to manage transportation inside (insourcing), since they have to transfer small-medium volumes of freight and have to cover short-medium distances (Confetra, 2002).

Conversely, firms that internationalise are typically larger than domestic uni-national firms (Barba Navaretti and Venables, 2004) and need to cover longer distances and to deal with customs and duties issues. Therefore, as the empirical literature stresses, internationalised firms are more likely to outsource transport (Confetra, 2002). This is the reason why FDI and export turn out to be positively and strongly correlated with the transport industries' employment in all the four models. Transport is needed both to reach the final market, especially in case of export of final goods, and to reach the other affiliates or the suppliers or distributors, especially in case of FDI.

Besides, a negative relationship between import and employment in transport industry occurs (Table 4); this may be related to the fact that the imports of goods towards Italy are mainly managed by foreign suppliers (Confetra, 2002), thus generating a substitution effect. In other words, the increase of import may be partially related to a substitution of national goods with foreign goods. Considering that national goods are mainly transported by national firms while foreign goods are transported by foreign firms, the substitution of national goods with foreign goods is likely to generate a decrease of labour demand in national transport industry and an increase of labour demand in foreign transport industries.

As regards the IPT and OPT components, the econometric analysis finds that temporary import and re-export show a positive impact on the labour demand, while temporary export and re-import exhibit a negative coefficient, even if very weak and often not significant. Given that the former are the components of IPT and the latter of OPT, it seems to emerge a complementary impact of this internationalisation forms on the labour demand. Indeed, as concerns the IPT, the positive sign reveals that transportation of intermediate and unfinished goods is mainly undertaken by Italian firms, which temporary import raw material and/or semi-components to be processed in Italy and later re-export the processed goods abroad. The opposite is true when the Italian firms send the intermediate goods abroad to be processed, i.e. in case of OPT. Indeed, the negative signs of temporary export and re-import suggest that transportation is still managed by the firms of the country where the intermediate goods are processed. The final impact of OPT is, however, not very significant probably because there is

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[5] In the econometric analysis all the variables have been standardized because they are expressed in different units of measure.

not a substitution effect. Indeed, when firms do not internationalise through OPT, goods are entirely produced by the Italian firms and, hence, transport of intermediate goods abroad are not required. Conversely, when the OPT process starts, the production is fragmented generating a new flow of goods (managed by foreign firms) that did not exist before. Therefore, the final impact on the transport industry employment is not (or not very much) significant. The same consideration holds for the strong positive impact of IPT: after starting IPT, a new flow of goods that did not exist before takes place by generating a labour demand in national transport industry.

Besides, the analysis has been run at regional-industry level because, as stated in the introduction, the assumption is that the logistics activities in Italy are mainly carried out at the regional scale. As shown in Table 4, the results are confirmed both without and with industrial and regional dummies, meaning that the relationship between internationalization and employment growth produces effects both at national and regional/industry levels. However, some differences arise in terms of intensity and significance of coefficients when considering data without and with dummies, meaning that the relationship between each form of internationalization and the labor demand in transport industry may loose or gain intensity when regional and industrial dimensions are taken into account.

Table 4: Results of the WLS estimations

	$\Delta_{96}^{01}Emp_{s,r}$	p-value	$\Delta_{96}^{01}Emp_{s,r}$	p-value	$\Delta_{96}^{01}Emp_{s,r}$	p-value	$\Delta_{96}^{01}Emp_{s,r}$	p-value
	(1)		**(2)**		**(3)**		**(4)**	
$\Delta_{96}^{01}Y_{r,s}^{m}$	0.010	0.529	0.012	0.738	-0.030	0.207	-0.027	0.439
	(0.63)		(0.33)		(-1.26)		(-0.77)	
$\sum_{t=94}^{00}FDI_{r,s}^{m}$	1.273	0.000	1.400	0.000	1.018	0.000	1.177	0.000
	(17.23)		(8.51)		(12.33)		(7.16)	
$\Delta_{96}^{01}I_{r,s}^{m}$	-0.252	0.000	-0.561	0.000	-0.211	0.001	-0.269	0.005
	(-4.73)		(-5.97)		(-3.35)		(-2.78)	
$\Delta_{96}^{01}X_{r,s}^{m}$	0.993	0.000	0.911	0.000	0.688	0.000	0.780	0.000
	(18.43)		(7.86)		(9.90)		(6.99)	
$\Delta_{96}^{01}T\_I_{r,s}^{m}$	0.667	0.000	0.583	0.000	0.413	0.000	0.424	0.001
	(8.41)		(4.35)		(4.90)		(3.31)	
$\Delta_{96}^{01}R\_X_{r,s}^{m}$	-0.030	0.634	0.410	0.000	0.186	0.005	0.243	0.005
	(-0.48)		(4.59)		(2.81)		(2.79)	
$\Delta_{96}^{01}T\_X_{r,s}^{m}$	-0.168	0.000	-0.120	0.241	-0.239	0.000	-0.306	0.003
	(-3.50)		(-1.17)		(-4.08)		(-3.02)	
$\Delta_{96}^{01}R\_I_{r,s}^{m}$	-0.225	0.002	-0.005	0.966	-0.101	0.159	-0.088	0.452
	(-3.06)		(-0.04)		(-1.41)		(-0.75)	
_cons	0.561	0.000	0.488	0.000	-0.057	0.314	-0.001	0.994
	(19.02)		(3.66)		(-1.01)		(-0.01)	
DummyIndustry	No		No		Yes		Yes	
DummyRegion	No		Yes		No		Yes	
n. obs.	160		160		160		160	
Chi2	5183.62	0.000	638.29	0.000	1117.03	0.000	478.52	0.000

Note: Z-statistics between brackets

6. Conclusions

In an era where internationalisation has become a strategic challenge that firms have to face in order to remain competitive, the analysis of the effects of this phenomenon has assumed a key role. It is widely acknowledged that the impact of internationalisation highly differs, according to the industry and the geographical context, which is taken into consideration. The present paper enriches the literature by focusing on the impact of manufacturing internationalisation on the transport industry labour demand, an industry which manages the growing flows at international scale. This is the first empirical work, at least to our knowledge, considering all the three internationalisation strategies (trade, cooperation agreements, in the form of IPT and OPT, and FDI), undertaken by the manufacturing industry, and testing their specific impact on transport employment both through a descriptive statistics and an econometric analysis at the regional scale.

Our analysis shows that FDI and export are the main responsible for the increase of labor demand in transport industries, while IPT components have a weaker positive impact. Conversely, import and OPT have a negative (but weaker in terms of coefficients) effect. These results are very interesting also in terms of policy implications: internationalisation, at least as concerns export and FDI, fosters the growth of the transport services' demand and, therefore, an increase of the logistics providers' potential market. This means that when transport becomes more complex and strategic, as it happens within the internationalisation process, manufacturing firms tend to outsource the freight movements to specialised suppliers which can reach economies of scale and scope. Therefore, the industry gains in terms of employment and competitiveness. As a consequence, in order to satisfy the growing transport demand, there is a strong need to develop policies able to remove the existing obstacles that limit the development of the transport industry in Italy. We refer, in particular, to the inefficient and insufficient transport networks and the lack of culture about logistics within the Italian SME.

Investments in transport labour training, particularly at the scholar level, may be useful in order to improve the transport firms' competitiveness. Furthermore, policies aiming at increasing the rate of transport outsourcing, like the recent edition of the "Piano Nazionale della Logistica" (National Logistics Plan by the Italian Minister of Infrastructure and Transport - *Ministero delle Infrastrutture e dei Trasporti*, 2011) suggests, may be able to better exploit the opportunities offered by the manufacturing internationalisation process to the transport labour market. Transport outsourcing might be encouraged by policies aiming at reducing the transport providers' labour cost by fiscal or social security relief, and aiming at stimulating the development of the "network contracts" (*contratto di rete*), in order to aggregate the demand and supply, therefore overcoming the transport providers' small size and more easily gaining economies of scale and scope.

However, since the growth of the road transport produces significant negative externalities affecting the environment, specific policies aiming, from one side, to reduce those externalities and on the other side, to promote environmentally friendly transport modes and logistics organisation, are advocated. For example, in order to gain competitiveness, the reliability of rail and road-rail combined transport should be improved by eliminating the

bottle-necks and investing in infrastructure (railways and terminal); also the maritime transport, should be promoted, by improving the efficiency of ports, reducing the length of the duty controls and the level of bureaucracy.

Further research is needed to investigate these issues, providing an answer to the following questions. Firstly, in countries where the foreign logistics MNE own a high share of the logistics market, such as Italy, does the employment growth concern both the domestic and foreign firms or mainly the last ones, which are larger and more competitive and offer integrated and high value added services?[6] Secondly, if a part of the internationalised manufacturing firms insource transport or other logistics activities inside, an investigation on the impact of internationalisation even on the manufacturing employment is advocated. Finally, given that industries are sometimes vertically integrated and display different characteristics, it would be interesting to distinguish the impact of internationalisation of different groups of manufacturing sectors on the transport industries' labour demand.

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[6] See, among the others, Brouwer and Mariotti (2009).

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Appendix 1: Data and variables

Export and import:

Coeweb database provides data on import and export (in kg and euro) by transport modes (rail, road, sea and air) for both 1996 and 2001. We decided to employ kg rather than Euros for the following reasons. First, a higher amount of kilograms implies a higher amount of freight to be transferred, while a higher amount of Euros may simply imply that the freight is more valuable or that it is strongly demanded by the market. A second reason is that the value in Euros may be subject to fluctuations of the exchange rate when the freight is imported (or re-imported or temporary imported) by countries that do not adopt the Euro currency. Finally, considering that exchanges may occur intra-firm, values in Euros may be subject to transfer pricing and, hence, they would not reflect the real amount of freight transferred by transportation firms

As regards the distribution of the kg of export and import of each transport mode (rail, road, sea and air) among the 8 transport sub-industries, the following strategy has been employed. The kg of export and import rail has been adopted for both railway transport (60101) and its auxiliary activities (60102), given that the two sub-industries are vertically integrated. The sum of kg of rail and road has been attributed to land transport cargo handling (63113), because of the vertical integration between this sub-industry and both railway transport (60101) and road transport (60250). For the same reason, the kg of sea have been attributed to both water transport (61110) and its cargo handling (63112); similarly, the kg of air have been attributed to both air transport (62200) and its cargo handling (63113)

IPT and OPT:

Data on IPT and OPT are collected since 1988 at the EU Member country level. The reason for data collection about this special type of trade is that goods re-imported and re-exported after processing abroad are subject to customs treatment particularly advantageous to final imports and exports (Egger and Egger, 2001). Actually, the data on these flows are underestimated mainly because firms are not obliged to declare the processing trade.

Also data concerning IPT and OPT components have been expressed in kg. In order to distribute the kg of each IPT and OPT component among the different transport modes, the rates of export and import of each transport mode (rail, road, sea and air) over total trade have been employed. Specifically, the kg of export and import have been summed both in 1996 and in 2001. Then, the amount of export + import transported by each transport mode, with respect to the total amount of export + import transported by all transport modes, has been computed for each year. The resulting percentages have been employed to distribute the kg of the four components of IPT and OPT among the four transport modes (i.e. railway, road, water and air). The allocation of the four resulting values across the eight transport sub-industries has been implemented according to the guidelines described above for export and import.

FDI:

Outward FDI undertaken by the Italian manufacturing MNE, are measured as the cumulated sum of the employees in their foreign affiliates from 1994 to 2000. FDI have been included as cumulated sum instead of flows because their effect on the employment is continuous along the time, given that investments occurred in the past need transport services also at the present time. The same does not hold for export, import and IPT and OPT components, which manifest and exhaust their effect in the moment they occur

The workers of the foreign affiliates of each MNE have been distributed among the NUTS2 regions where one or more MNE's plants are located. The share of foreign affiliates' workers has been attributed to the NUTS2 regions where the MNE's plants are located proportionally to the plants' size in terms of number of employees. This method makes it possible to look at the impact of outward FDI not only on the employment of the region the MNE's headquarter belongs to, but also on the employment of all the regions where the firm is present with its plants (Elia *et al.*, 2009)

In order to distribute FDI among the four different transport modes (rail, road, sea and air), we employed the rates computed for IPT and OPT (see above). However, given that data about FDI are expressed as cumulated sum, i.e. they are expressed as a single value rather than as a difference between 2001 and 1996, we employed, for each transport mode, the mean between the rate of 1996 and the rate of 2001. The values of each transport modes have been then distributed across the eight transport sub-industries according to the guidelines discussed for export and import.

Production of manufacturing firms

The Balassa index of the value added ($y_{r,s}^{B}$) has been computed as the ratio between the share of value added transported by the transport sub-industry s in region r ($y_{r,s}$) over the value added transported by sub-industry s in all regions ($\sum_{r} y_{r,s}$) and the share of value added transported by all transport s in region r ($\sum_{s} y_{r,s}$) over the total value added transported by all transport s of all regions r ($\sum_{r,s} y_{r,s}$), according to the following formula:

$$y_{r,s}^{B} = \dfrac{\dfrac{y_{r,s}}{\sum_{r} y_{r,s}}}{\dfrac{\sum_{s} y_{r,s}}{\sum_{r,s} y_{r,s}}}$$

.

Appendix 2
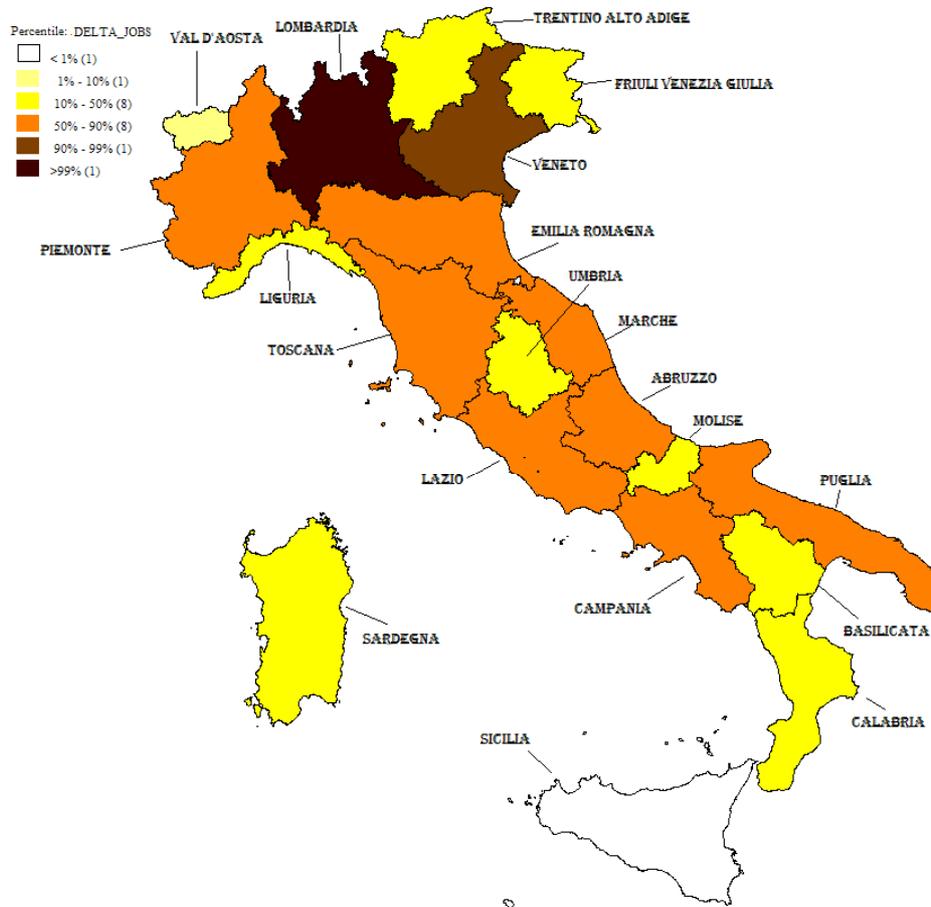
Percentile	Observations	Value of Delta Jobs
<1%	1	N<0
1% - 10%	1	0<=N<200
10% - 50%	8	200<=N<1,600
50 % – 90 %	8	1,600<=N<8,000
90 %- 99 %	1	8,000<=N<15,000
> 99%	1	N>15,000

Figure 1: Distribution of total employment variation of the 8 transport sub-industries occurred between 1996 and 2001 in Italian regions

Table 5: Correlation matrix and descriptive statistics of the explicative variables

	$\Delta_{96}^{01} Y_{r,s}^{m}$	$\sum\limits_{t=94}^{00} FDI_{r,s}^{m}$	$\Delta_{96}^{01} I_{r,s}^{m}$	$\Delta_{96}^{01} X_{r,s}^{m}$	$\Delta_{96}^{01} T\_I_{r,s}^{m}$	$\Delta_{96}^{01} R\_X_{r,s}^{m}$	$\Delta_{96}^{01} T\_X_{r,s}^{m}$	$\Delta_{96}^{01} R\_I_{r,s}^{m}$
Mean	0.0121	4396	419000000	189000000	-6838989	-10400000	1009981	6468925
Std. Dev.	0.6334	10559	1470000000	734000000	124000000	91800000	4399682	27900000
Min	-1.1177	0	-4610000000	-740000000	-1040000000	-764000000	-12300000	-3858230
Max	5.0890	66584	7200000000	5450000000	320000000	69700000	22500000	191000000
Obs	160	160	160	160	160	160	160	160
$\Delta_{96}^{01} Y_{r,s}^{m}$	1							
$\sum\limits_{t=94}^{00} FDI_{r,s}^{m}$	-0.0298	1						
$\Delta_{96}^{01} I_{r,s}^{m}$	0.0059	0.4688	1					
$\Delta_{96}^{01} X_{r,s}^{m}$	0.0047	0.3512	0.4584	1				
$\Delta_{96}^{01} T\_I_{r,s}^{m}$	0.0038	0.0519	-0.3643	-0.6957	1			
$\Delta_{96}^{01} R\_X_{r,s}^{m}$	0.0214	0.1193	0.2379	-0.0755	-0.2012	1		
$\Delta_{96}^{01} T\_X_{r,s}^{m}$	0.0087	-0.0425	0.2374	0.5195	-0.5189	0.1521	1	
$\Delta_{96}^{01} R\_I_{r,s}^{m}$	-0.0160	0.3811	0.2274	0.1816	0.0036	0.0614	0.0522	1

Table 6: Contribution of the Italian regions to the internationalization forms(*) and percentage of flows undertaken towards EU

| | FDI | | Export | | Import | | IPT | | | | OPT | | | |
| | | | | | | | Temp. Import | | Re-export | | Temp. Export | | Re-import | |
Regions	% of total	% to EU	% of total	% to EU	% of total	% from EU	% of total	% from EU	% of total	% to EU	% of total	% to EU	% of total	% from EU
Centre	**12.17**	**66.52**	**11.47**	**60.99**	**16.64**	**58.63**	**12.32**	**79.04**	**7.96**	**11.30**	**14.79**	**46.47**	**6.60**	**58.57**
ABRUZZO	1.09	37.52	1.16	75.64	0.91	75.19	0.28	76.81	0.43	2.74	1.93	62.09	1.14	58.86
LAZIO	3.66	52.40	2.03	70.03	7.09	48.05	2.43	48.96	0.74	40.75	1.39	54.30	1.39	71.29
MARCHE	2.67	71.46	1.81	57.24	1.19	64.01	0.42	73.89	0.20	43.73	3.29	50.33	1.91	56.63
TUSCANY	4.37	82.16	5.49	55.29	6.56	66.03	7.80	87.39	6.34	4.46	7.03	40.81	1.50	56.19
UMBRIA	0.38	71.10	0.98	63.72	0.88	64.21	1.39	86.80	0.25	84.98	1.15	34.28	0.66	42.27
North-East	**24.45**	**49.72**	**27.78**	**67.06**	**28.45**	**65.73**	**18.33**	**58.34**	**10.98**	**24.39**	**28.25**	**44.46**	**57.75**	**84.99**
EMILIA R.	13.59	39.12	12.16	64.20	10.90	63.60	3.81	69.95	1.88	44.45	8.49	49.19	46.05	95.42
FRIULI V. G.	1.80	76.37	3.63	66.45	4.56	61.94	2.83	62.91	2.53	15.82	2.15	82.61	1.07	80.30
TRENTINO A.A.	1.09	64.98	1.41	85.64	1.82	83.23	0.93	96.94	0.15	80.57	1.83	88.29	0.94	86.15
VENETO	7.97	59.69	10.58	68.07	11.16	66.50	10.75	49.68	6.42	20.57	15.78	31.64	9.69	35.81
North-West	**53.46**	**63.45**	**35.27**	**78.61**	**36.53**	**73.25**	**32.90**	**61.04**	**11.64**	**49.86**	**44.40**	**48.76**	**30.96**	**60.58**
LIGURIA	0.80	47.41	7.70	90.05	3.29	52.03	2.76	36.67	0.43	9.75	1.48	76.43	0.27	52.97
LOMBARDY	34.71	65.32	18.97	73.40	26.22	74.09	17.53	67.88	5.24	45.04	27.53	45.57	20.91	58.98
PIEDMONT	17.94	60.56	8.49	79.77	6.94	80.03	12.61	56.83	5.97	56.99	13.84	46.41	9.02	61.28
VALLE AOSTA	0.01	23.02	0.11	86.41	0.08	80.35	0.01	100.00	0.01	100.00	1.55	100.00	0.75	99.34
South and Islands	**9.92**	**46.00**	**25.49**	**51.07**	**18.38**	**55.89**	**36.45**	**28.16**	**69.41**	**12.08**	**12.56**	**88.01**	**4.69**	**68.97**
BASILICATA	1.13	25.61	0.20	71.88	0.15	86.24	1.70	99.76	0.15	90.17	0.76	98.19	0.09	20.33
CALABRIA	0.43	24.91	0.09	65.48	0.21	87.73	0.02	72.54	0.01	6.91	0.03	75.26	0.02	96.05
CAMPANIA	4.06	49.02	2.77	59.76	3.49	59.01	9.47	14.37	3.09	8.38	1.86	87.30	0.64	77.45
MOLISE	0.43	44.19	0.17	78.89	0.14	74.55	0.16	76.55	0.10	21.25	0.22	89.93	0.16	88.31
PUGLIA	2.50	55.41	6.14	59.98	3.73	47.94	7.96	19.17	1.44	3.62	4.38	77.65	2.91	80.27
SARDINIA	0.23	68.36	11.05	41.65	6.96	59.84	10.82	50.94	16.88	0.27	5.15	95.23	0.26	43.55
SICILY	1.14	39.14	5.06	54.05	3.70	49.75	6.32	0.59	47.75	16.50	0.16	98.65	0.61	18.23
Total	**100.00**	**58.74**	**100.00**	**66.36**	**100.00**	**65.48**	**100.00**	**50.78**	**100.00**	**17.77**	**100.00**	**52.13**	**100.00**	**74.94**

(+) Average between the years 1996 and 2001 for all internationalization modes with the exception of FDI, which has been computed by considering the cumulated sum between 1996

and 2001