XXXV CONFERENZA ITALIANA DI SCIENZE REGIONALI

ITALIAN LOGISTICS PROVIDERS: EFFICIENCY AND PRODUCTIVITY ANALYSIS

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SOMMARIO[4]

L'efficienza delle aziende che forniscono servizi logistici e ad alto valore aggiunto alle imprese manifatturiere risulta un elemento strategico nel possibile sviluppo futuro dell'economia italiana. Secondo numerosi studi (e.g. Confetra, Assologistica) la disparità tra costi "logistici" nazionali ed europei, risulta infatti una delle differenze che negativamente affliggono l'industria e l'export nazionale. Per tale motivo il presente studio ha lo scopo di analizzare l'efficienza delle aziende logistiche italiane, cercando di individuare eventuali criticità e proponendo possibili soluzioni al fine di incrementare la competitività del sistema paese. L'analisi si concentra sul periodo 2006-2011 e utilizza una metodologia d'indagine non parametrica (Data Envelopment Analysis - DEA) allo scopo di individuare i punteggi di efficienza (con valutazione degli indici di Malmquist), le differenziazioni date dalla diversa dimensione aziendale, i rendimenti di scala ed il trend nel tempo di tali elementi. Le informazioni utilizzate sono derivate dai bilanci pubblicati dalle aziende stesse e contenute nel database CEBIL-CERVED. Al termine dell'analisi di efficienza, viene discussa la distribuzione spaziale delle aziende ed il relativo effetto sull'efficienza delle stesse e, quindi, vengono individuate possibili politiche atte a migliorare la situazione.

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1. INTRODUCTION

In accordance with Confetra statistics (2011), currently logistics represents about 7% of the Italian Gross Domestic Product (GDP), this figure should be doubled if the induced effects are taken into account. As for the transport endowment, logistics have a strategic role for the regional competitiveness (Kirby and Brosa, 2011) and it has a peculiar importance for the Italian industrial and trade system, as underlined by Confetra (2009), one of the biggest Italian Associations of Logistics Firms. On this regard, the Italian National Logistics Plan (Consulta per l'Autotrasporto e la Logistica, 2011) highlights the importance of the logistics sector for the Italian port and maritime strategy, for both short sea shipping services and deep sea shipping services, even if Confetra (2009) underlined the current gap between Italian logistics firms and other European Competitors as also shown by International Logistic Indexes.

Nowadays, the introduction of the new Information and Communication Technology (ICT) as well as the development of the synchro-modality appear as ways in which logistics providers are trying to enhance the efficiency of the overall supply chain together with the port performance. On this regard, several studies (e.g. Wilmsmeier, et al. 2006; Bottasso et al., 2013) show how infrastructures and efficient land transport services positively affect regional economies and how the so-called landlocked regions may be negatively affected in the trade and production costs in comparison with similar coastal and well-connected regions. The aim of the present paper is to study the efficiency of logistics companies (at Italian level) in order to discuss possible critical issues that may limit the positive development of advance logistics services. In order to evaluate the performance of the logistics sector, a Data Envelopment Analysis (DEA) has been elaborated aiming at discussing the Italian logistics performance over the last 7 years (2006-2011). DEA has been developed together with a Malmquist index, in order to discuss the productivity evolution during the studied period. The analysis has been implemented starting from the financial characteristics of the main Italian logistics companies.

2. THE MODEL

In literature several contributions focused on the efficiency of the logistics sector applying not parametric methods (e.g. Wanke, 2012 for the Brazilian market) or on the discussion of the effects of the outsourcing on the efficiency of related industries (e.g. Partridge, 2008) or, eventually, on the definition of specific elements of the logistic chain (e.g. Armstrong, 2004). On the Italian side, only few studies have tried to estimate the efficiency of the national logistic sector but some estimation of the social cost induced by the foreseen transport increase has been made by Cappelli (2009), also in connection with the lack of advanced logistics services that currently Italy is experiencing.

Recently, it has been underlined how logistics providers affect the efficiency of the whole supply chain but only a few studies have tried to estimate the efficiency of the logistics sector itself. From the middle of the last decade some studies has been appearing dealing with this goal, mainly focusing on national industries and applying a DEA approach. While Wanke (2012) focused on the Brazilian firms with the aim of highlighting the determinants of the efficiency in the sector, Min e Joo (2006 and 2009) focused on the Chinese market in order to explain the success of specific logistics providers and Dayou (2010) tried to link the performance of the same market together with the performance of the stock exchange. Another interesting recent study has been made by Liu and Fu (2009) in order to evaluate the impact of technology on the efficiency of the logistics firms.

The heterogeneity of the actors involved in the logistics market pushed the academics to apply non parametric methods in order to avoid misleading approximation of the production function. In fact, all the main studies use DEA approaches or similar methodologies (such as the Full Disposal Hull – FDH analysis). DEA is a linear optimization methods aiming at comparing the performance of each firm (called Decisional Making Units - DMUs) starting from the optimization of the input(s)/output(s) ratio and then individuating the best practices, drawing the production efficient frontier. Thus, DEA measures the relative efficiencies of firms using multiple inputs and outputs. The optimization process (resumed in the formulas below) may be both input oriented (minimizing the input consumption in order to achieve a certain value of output) or output oriented (maximizing the output production in order to use a certain input mix). For instance, given K=1,2,…,k DMUs and $X^k = x_1^k, x_2^k, \dots, x_m^k$ as the input set and $Y^k = y_1^k, y_2^k, \dots, y_n^k$ as the output set and with a matrix $\boldsymbol{\lambda}$ of all non-negative elements λ_j, we find the efficient score of each DMU as scalar score (θ), solving the following linear program:

$$min\ \theta$$

$$subject\ to$$

$$\theta x^k - X\boldsymbol{\lambda} \geq 0$$

$$Y\boldsymbol{\lambda} \geq y^k$$

$$\sum_{j=1}^{k} \lambda_j = 1$$

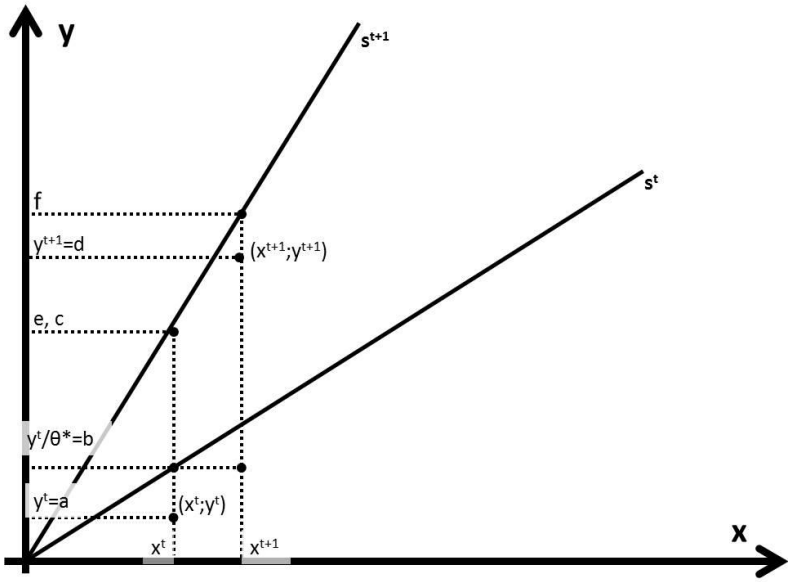
$$\lambda_j \geq 0$$

At the end of the analysis each firm obtains an efficiency score and therefore it is possible to rank the firms investigated and to discuss policy interventions in order to increase the efficiency of the analysed industry.

The DEA model above described, is based on the Koopmans (1951) and Farrel (1957) intuition, lately updated by Banker et al. (1984) in order to take into account the Variable Return to Scale (VRS), generally called BCC model, and often used in the transport sector in order to estimate the efficiency of different DMUs (e.g. the port sector Barros and Athanassiou, 2004; Basta and Ferrari, 2009; or the urban transport, Sanguineti and Tei, 2012) or the logistics firms, as for the abovementioned studies. An interesting development of DEA is its application to financial and accounting variables other than to physical ones, but a limitation is due to the possibility that sometimes they assume negative values. This problem is discussed in Pastor (1996) that demonstrates the possibility to use negative input in the VRS input oriented model through a suitable translation thanks to the invariance of the model. After the translation, ranking among the firms cannot be easily elaborated but the efficiency score of the sector can be compared through the time (in our case comparing the efficiency sector score during the 7-years studied period). In fact, one output in our model is the Added Value elaborated on the official balance data. The calculation approach can lead to negative values in case of a bad management, and these values will be used in a second DEA model elaborated in order to test the consistency of the main model results.

The results of the DEA model are used to calculate the Malmquist index in order to better understand the productivity trend within the studied period. This index was developed starting from the work of Malmquist (1953) by Caves et al. (1982) and then applied by different researchers to several markets (e.g. Pires and Fernandes, 2012; Thore et al., 1994). As discussed by Fare et al. (1994) and Lovell (2003), the Malmquist index can be easily used also to decompose the technical shift from the efficiency change. The difference lies in the different reason related to an increase (decrease) of efficiency for a certain DMU: from the period *t* to the period t+1, the change in efficiency can be either due to a progress in the relative efficiency (*catch up effect*) or to the progress in the terms of productivity of the specific DMU (*frontier shift*). Figure 1 represents the case of a CRS situation.

Figure 1 – DEA and Malmquist index



The optimal frontier built through the DEA analysis (s^t and s^{t+1}) for the periods *t* and *t+1*, can be used in order to see the progress of a DMU *i* - in respect to the two frontiers - from the starting ratio of inputs and outputs (x^t,y^t) to the ratio of the following period (x^{t+1},y^{t+1}). The Malmquist index (*M*) discusses by Fare et al. (1994) will be the ratio from the distances (*D*) among the initial ratios and those that allow the DMU to achieve the frontier:

$$M = \frac{D^{t+1}(x^{t+1}, y^{t+1})}{D^t(x^t, y^t)} * \left[\frac{D^t(x^{t+1}, y^{t+1})}{D^{t+1}(x^{t+1}, y^{t+1})} * \frac{D^t(x^t, y^t)}{D^{t+1}(x^t, y^t)} \right]^{1/2}$$

In the index, the term outside the parenthesis will determine the efficiency change while the term included in the parenthesis will determine the technical change (*frontier shift*). If the values are greater than 1, there is a progress in terms of productivity (M), efficiency change or technical change; if they are equal to 1, that DMU does not register a progress while if the values are smaller than 1 a decrease in the specific performance is registered.

3. THE ANALYSIS

Our model is a classic DEA model elaborated using VRS – assumptions already used in several DEA application to transport and logistics services (e.g. Dayou, 2010; Barros and Athanassiou, 2004) – following the prescriptions contained in Banker et al. (1984).

The selection of outputs and inputs may differ in accordance to the specific aims of the survey - e.g. Dayou (2010) used the market share value while Wanke used (2012) the firms' production revenue. However, the majority of transport and logistics studies exploits revenues as a proxy for firms' production, in correspondence of financial input insertion (e.g. Basta and Ferrari, 2009). Following this framework, our main model selected output are the firms' revenues, while a two outputs second model is elaborated, by exploiting also the added value in order to test the robustness of results. This second output takes into account the logistics role in the complex transport network consisting in offering added value services.

3.1 Variables Characteristics

According to the Italian Logistics Firms Association (Confetra, 2011), logistics firms usually operate with flexible structures. Taking this into account, we choose as inputs the value of logistics firms' tangible assets (e.g., warehouses, etc.), and then the costs directly related to the goods distribution and to the related information flows (labour costs, service costs, and material costs).

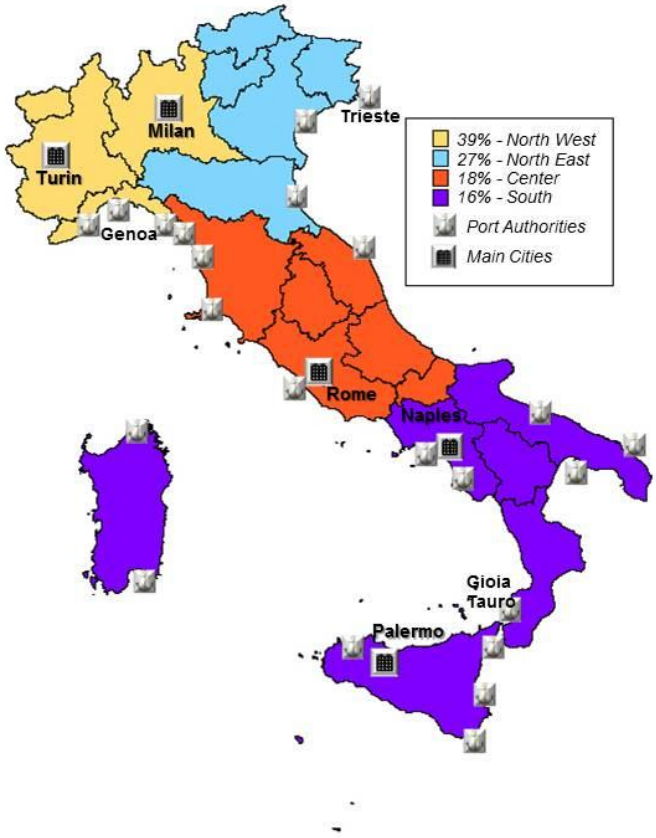
For both input and output, we use financial measures drawn from balance sheets, considering the unavailability of detailed information for unit and non financial values (value of goods handled, etc.). The period of observation is 6 years, from 2006 to 2011. Data are extrapolated by the Chamber of Commerce database (Cebil-Cerved), focusing and assuming as main logistic providers the firms registered under the ATECO[5] statistical sub-group n. 522922: "Transport intermediaries and Logistic service providers" of the Italian national statistical institute (ISTAT, 2009).

In order to assure the comparisons among years, a time window DEA analysis is proposed (Zhu, 2003). This analysis can include only firms with available data covering the whole period. This methodological issue reduces our sample from over 600 units (number of the Italian logistic firms registered in Cebil-Cerved at the end of the period) to 167 units: this "closed sample" represents almost a quarter of the total firms population. Over the years, indeed, the number of firms in Cebil-Cerved varies not only as a consequence of the birth-death rates of firms (a high turnover characterized the recent gloomy years) but also as a result of incomplete communication of all financial data. In order to have an idea about the trend of the efficiency scores and the regional distribution of the efficient companies, a third model is tested using all the firms (about 670 in the 2011) in the sample, year by years ("open sample"). The absence of several firms in different years limits any kind of comparison over the time period but it can help to the general discussion of the results.

The 167 analysed companies well represent a snapshot of Italian logistics providers' structure. Taking into consideration firms' size, while the big firms are generally located in the Northern part of the country (close to the main Italian production sites and to the biggest Italian gateway ports, such as Genoa, La Spezia, Venice and Trieste), medium size firms are located in the Central-Southern regions, as shown in the figure below.

[5] ATECO (ATtività ECOnomiche) is the Italian classification code for the economic activities.

Figure 2 – Logistics providers distribution



Firms distribution is quite unbalanced: for instance in the "closed sample" the 39% of the firms is located in the North West, the 27% in the North East regions, and only 16% are located in the South. The abovementioned distribution is partially due to the Italian unbalanced production and consumption markets and it is also connected to the transport facilities endowment.

Table 1 shows the main statistical figures for the "closed sample" with the exception of the Added Value, excluded from the discussion (in the model we used only a translation of this variable). The average value of the revenues registers a general increase during the studied period and despite the Italian economic crisis started in 2008 as in many other countries (even if it lasted longer). The main concern is connected to the trend of the main cost features (i.e. Labour and Service costs) increased a little bit more, in proportion, of the increase in revenues and, moreover, to the value of tangible assets that almost doubled the average value of 2006. This last issue may be explained with a general spread investment policy that may bring unbalance in the long run: in fact, the percentage increase for this figure is almost double (+50%) of the increase for the average revenues (+30%).

Table 1 – Descriptive Statistics

Average	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**Mean (2006-2011)**
Tangible Assets	1.476	1.638	2.594	2.564	2.616	2.241	2.188
Labour Costs	1.777	1.939	2.074	2.044	2.173	2.227	2.039
Material Costs	716	778	748	616	692	980	755
Service Costs	7.338	7.811	8.493	7.875	8.984	9.596	8.350
Revenues	9.981	10.796	11.602	10.910	12.249	13.080	11.436
Max	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**Max (2006-2011)**
Tangible Assets	25.160	29.484	61.446	62.013	63.416	35.254	63.416
Labour Costs	65.624	65.349	66.792	62.811	86.033	80.660	86.033
Material Costs	34.033	37.942	40.430	25.749	16.199	43.587	43.587
Service Costs	347.413	332.200	367.000	325.298	481.524	500.015	500.015
Revenues	406.088	401.836	442.597	403.745	587.597	589.516	589.516
Min	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**Min (2006-2011)**
Tangible Assets	1	1	1	1	1	1	1
Labour Costs	2	5	2	1	1	2	1
Material Costs	1	1	1	1	1	1	1
Service Costs	5	9	11	12	11	9	5
Revenues	42	75	74	76	94	83	42
St. Dev.	**2006**	**2007**	**2008**	**2009**	**2010**	**2011**	**St. Dev (2006-2011)**
Tangible Assets	4.216	4.793	7.758	7.936	8.088	6.432	1.691
Labour Costs	6.045	6.285	6.534	6.341	7.869	7.820	812
Material Costs	3.201	3.478	3.389	2.282	1.947	3.820	737
Service Costs	28.240	27.408	30.339	27.224	38.834	40.442	5.979
Revenues	33.950	34.263	37.647	34.552	47.697	48.332	6.801

Source: Own elaboration on Cebil-Cerved data, 2013.

As depicted in table 1, our variables exhibit high variance, especially as regards Service Costs and Revenues. This high variance – that is directly linked with the heterogeneity of our logistics firms sample – will be taken into account in the final section because – together with the high increase in the Tangible Assets – may explain possible discrepancies in the results.

3.2 DEA results

In order to empirically run the model, we used the free software DEA-Frontier Solver. Due to some constraints characterising this software, we used also a special package of the R software to estimate the DEA analysis for the "open sample".

The elaboration of the first model (one output: firms' revenues) drives to interesting results (Table 2). First of all, the effect of the economic crisis can be clearly seen from the fall in the efficiency score between 2008 and 2009 and from the fact that the value in 2011 didn't reach yet the 2006-2007-2008 scores even if the growth may be due to an adaptation of the logistics providers to the new market features together with an improvement in the macro-economic scenario. As Table 2 shows, VRS efficiency scores are a little bit higher than CRS scores, depending on the model specifications (the downward trend for efficiency is however confirmed). Working out VRS and CRS values allowed us to estimate also the return to scale

values. On this regard, during the first three years the share of firms characterized by "Increasing RTS" grew reaching over 40 per cent of the sample in the year 2008: this means that output increased proportionally more than inputs, perhaps thanks to a correct and balanced firm organization together with appropriate market conditions that influenced the production function. After 2008, the "Decreasing RTS" share became the strict majority (above 60%), highlighting an unbalanced organization (for instance due to a tangible assets increase that may directly have influenced the production function) and the effects of the demand fall due to the crisis.

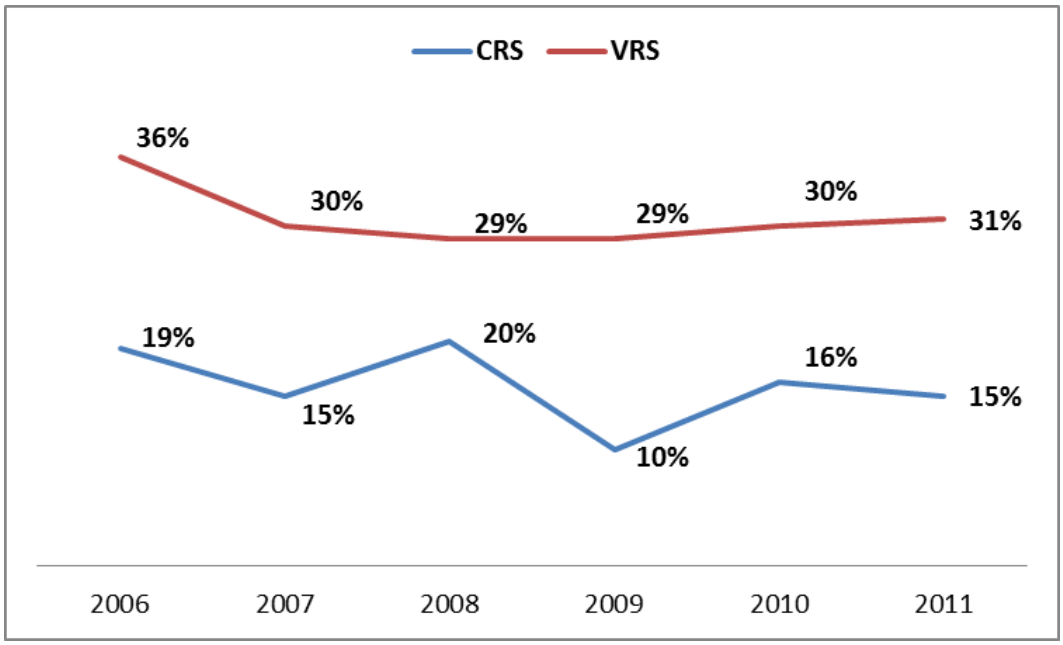
Table 2 – DEA Results of one output model

Efficiency score	2006	2007	2008	2009	2010	2011
CRS	0,87	0,88	0,90	0,78	0,83	0,85
VRS	0,92	0,91	0,92	0,85	0,89	0,89
RTS - Increasing	29%	41%	43%	36%	20%	18%
RTS - Decreasing	50%	41%	35%	53%	63%	65%
RTS - Constant	21%	18%	22%	11%	17%	17%

Source: Own elaboration.

The abovementioned results impacted also on the number of efficient firms, scoring 1 in the DEA model and determining the production frontier. Figure 3 shows the trend for the number of efficient DMUs. While in the case of VRS the number of efficient DMUs appears constant over the period (with a small reduction from 2006 to 2007), in the CRS the decrease between the first three years and the second ones is more stressed with a great reduction between 2008 and 2009.

Figure 3 – Efficient Units Results



Source: Own elaboration.

The efficiency scores highlight how the economic crisis impacted mostly on the set of inefficient firms which became even more inefficient, while the effect on efficient firms revealed to be quite negligible. This issue is also confirmed by the fact that more than 30% of efficient firms keeps efficient scores over the whole period (this percentage is even higher in the case of the CRS model).

Concerning the geographical distribution of the efficient firms, every year a half (more precisely, 45%) of efficient DMUs is located in the North West regions, while another 25% is located in the North East. If we compare these figures with the general distribution of the Italian logistics providers, the North East value is proportional to the overall distribution, while the North-West value is higher (confirming, as expected, that this area is logistically more efficient than the whole Country). On the contrary the presence of efficient firms in the Central Italy and in the South is less proportional than the share of logistics firms there located and included in the sample.

Checking the consistency of the results with the other two DEA models elaborated, the previous trends are confirmed. Table 3 shows the result of the two output model (revenues and translated added value). On average, efficiency scores are a little bit higher (also due to the use of the new translated output), but trends and RTS shares patterns are confirmed.

Table 3 – DEA results of two output model

Efficiency score	2006	2007	2008	2009	2010	2011
CRS	0,88	0,89	0,90	0,80	0,84	0,86
VRS	0,92	0,91	0,92	0,87	0,89	0,89
RTS - Increasing	22%	32%	38%	16%	15%	13%
RTS - Decreasing	50%	42%	36%	65%	63%	66%
RTS - Constant	28%	26%	26%	19%	22%	21%

Source: Own elaboration.

Similar results can be found concerning the geographical distribution; however, no comparisons can be made for the share of efficient DMUs, since we use different frontier specifications. The third model (applied to the "open sample" using revenues as single output), drives to similar results; as recalled, no comparisons over the time can be made, due to the different data and number of firms included year by year in this case: on average, efficiency values are a little bit lower (about -20%) due to the introduction of new DMUs in the panel[6].

3.3 Malmquist results

The analysis of the Malmquist indexes along the period can help to better understand the reason of a certain efficiency score development. Malmquist indexes have been calculated for Model 1 (one output), year by year and for the whole period. As shown in table 4, the average value of M is always close to one with a general decrease only for the period 2010-2011. In general the index appears quite stable over time for the whole sample even if a general decrease in firms having an index above 1 can be observed in the second part of the table 4.

Table 4 – Malmquist results and decomposition

2006-07	*M*	*Technical Eff.*	*Frontier shift*	**2007-08**	*M*	*Technical Eff.*	*Frontier shift*
Avg	1,001	1,007	0,994	*Avg*	1,001	1,032	0,967
Max	1,494	1,394	1,372	*Max*	2,205	1,667	2,205
Min	0,530	0,756	0,567	*Min*	0,150	0,432	0,348
St. Dev.	0,118	0,087	0,074	*St. Dev.*	0,169	0,121	0,121
2008-09	*M*	*Technical Eff.*	*Frontier shift*	**2009-10**	*M*	*Technical Eff.*	*Frontier shift*
Avg	1,004	0,952	1,025	*Avg*	1,053	1,105	0,971
Max	2,205	2,205	2,204	*Max*	2,589	2,595	2,589
Min	0,348	0,348	0,423	*Min*	0,319	0,565	0,319
St. Dev.	0,133	0,161	0,222	*St. Dev.*	0,240	0,268	0,195
2010-11	*M*	*Technical Eff.*	*Frontier shift*	**2006-11**	*M*	*Technical Eff.*	*Frontier shift*
Avg	0,996	1,029	0,967	*Avg*	1,010	0,989	1,017
Max	2,483	1,750	2,127	*Max*	3,178	2,241	1,608

[6] Results are not included in this paper but they are available from the authors.

Min	0,451	0,639	0,630	*Min*	0,328	0,551	0,340
St. Dev.	0,178	0,121	0,124	*St. Dev.*	0,263	0,182	0,113

Productivity values

	2006-07	*2007-08*	*2008-09*	*2009-10*	*2010-11*	*2006-11*
M>1	86	63	90	101	77	77
M=1	0	0	0	0	0	0
M<1	81	104	77	66	90	90

Evolution of Tech. Eff and Frontier shift values

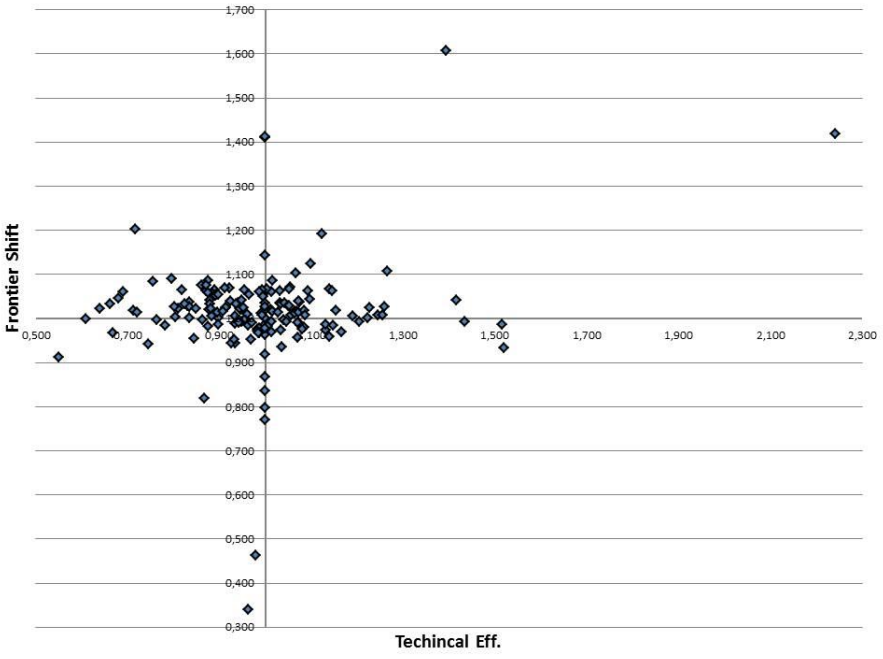
	2006-07	*2007-08*	*2008-09*	*2009-10*	*2010-11*	*2006-11*
I	29	9	13	21	7	45
II	46	7	142	37	13	63
III	43	66	10	25	52	36
IV	49	85	2	84	95	23

Source: Own elaboration.

The decrease in the number of firms registering a good performance among the periods can be related to the same structural problems that Italian logistics providers are currently facing.

Table 4 shows also the ratio between the two decomposed part of the M index, together with their descriptive characteristics. Figure 4 shows the ratio for the whole period 2006-2011.

Figure 4 – Ratio distribution



Source: Own elaboration.

In particular it is interesting to observe how the majority of the firms remains in the second quadrant (with frontier shift above 1 but technical efficiency below 1), underlining how the

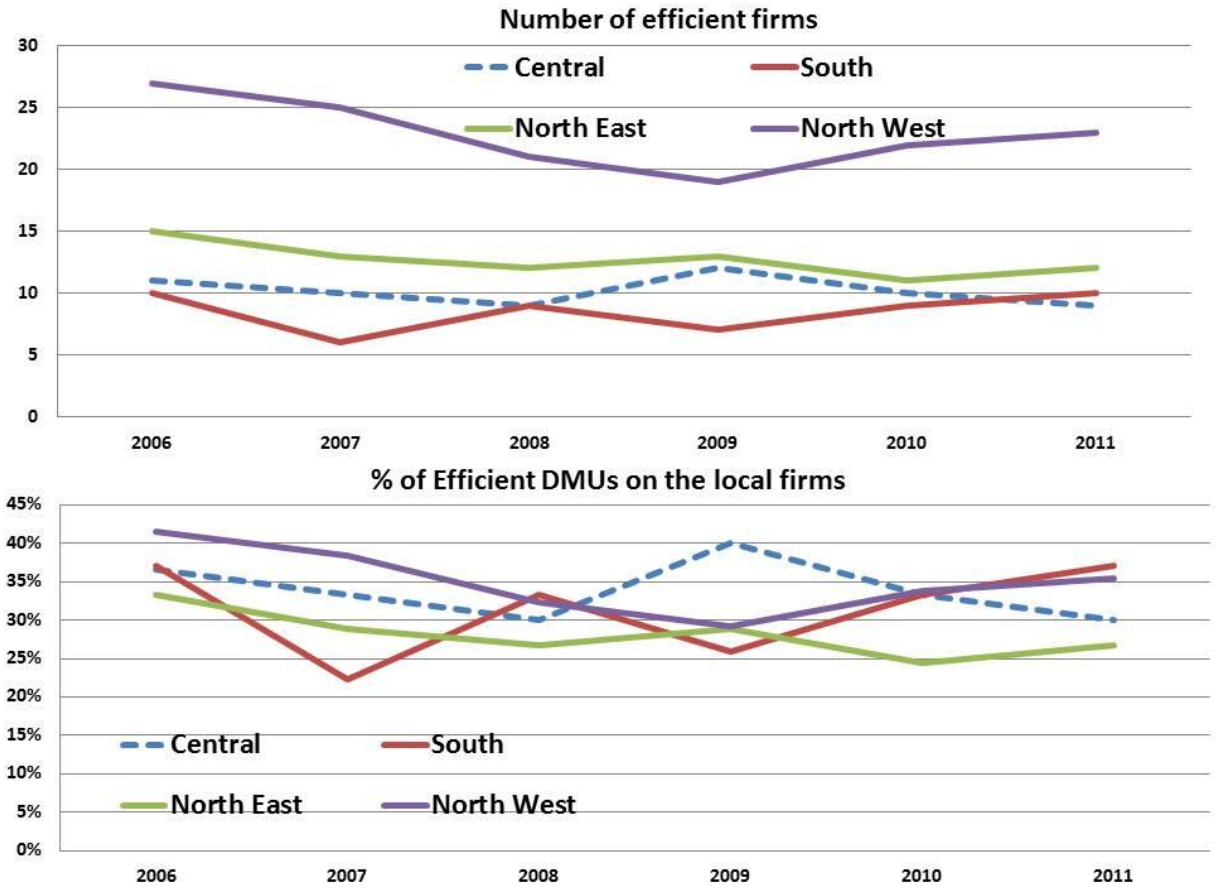
market is currently characterised by a technological development that is affecting the different firms even if the progress in the relative efficiency of the DMUs is negative. Moreover, as shown in table 4, in three time periods, almost 50% of the DMUs register both values smaller than 1, highlighting a critical situation for these firms. The relatively small standard deviation seems to confirm a general trend within the market.

4. POLICY IMPLICATIONS

The analysis developed above highlights several critical issue concerning the Italian logistics system. A decrease in the general efficiency level and in the number of efficient firms is confirmed from the productivity analysis that highlights a potential threat in the frontier shift patterns. Moreover, the RTS analysis underlines some critical aspects also connected to the firm's production size.

Despite this, some positive remarks can be also pointed out. The first one relates to the geographical distribution of the efficient firms (Figure 5). Even if the majority of the efficient firms is located in the industrialised North of Italy, the number of efficient firms in the South and partially in the Central part of the country is stable determining a smaller effect of the economic crisis on the logistics supply in the most critical part of Italy. Moreover, the percentage of efficient DMUs on the local population of logistics providers is stable over the analysed period, demonstrating a strong possibility to be durable over the time and despite possible economic drawdown. Nevertheless, the Central part of Italy seems still affected by the consequences of the last economic period, as demonstrated by the low number of efficient units and percentage of efficient firms in comparison with the local logistic providers' population. Similar results may be found considering the geographical distribution of the Malmquist index.

Figure 5 – Efficiency trends in different Italian macro-regions



Source: Own elaboration.

Thus, even if the South of Italy seems characterised by a worse initial scenario and the economic crisis is affecting this part of Italy more than the northern regions, the substantial stability in relative terms may be a first step for a future recover.

In a period of economic difficulty, the role of logistics as facilitator of economic growth is crucial for the competitiveness and development of the country. The lack in the infrastructural endowment and the extra-costs due to an inefficient logistics systems has been deeply discussed at both academic and political level. At political level it is important to underline how the National Logistics Plan (Consulta per l'Autotrasporto e la Logistica, 2011) foresees special policies focused on aiding the logistics development in order to increase the efficiency of the national transport networks instead of simply investing in the physical capacity (i.e. moving part of the investments from the physical infrastructures to the advanced logistics networks).

In this respect the analysis of the Malmquist index and of the RTS give us interesting policy elements: first of all efficiency seems to be moved more by technological drivers than by firm efficiency operations; secondly, the size of the firms seem to be inadequate to the current market characteristics. These two elements should drive future policies in order to incentivise

an expansion in size and potential market innovations that may strongly affect the overall logistics performance.

5. CONCLUSION

A modern logistics system properly structured in order to encounter the industry requests is a key factor for the national and local competitiveness. The research described above focused on the discussion of the current performance level of the Italian logistics providers. In order to do so we introduced a DEA model based to financial data and we discussed the efficiency level using also a Malmquist index.

As stated by the Council of Logistics Management (1998), logistics is a heterogenic group of activities generally connected to the efficient management of the raw materials, goods, and information flows from the production sites to the point of consumption. These activities are directly connected to the regional transport services, affecting the competitiveness and the accessibility of the each region. Moreover, the development of Value Added Services (VAS) stresses the importance of coordination among logistics providers (e.g. third party logistics operators and multimodal transport operators) within complex international supply chains. As discussed by several authors, advanced logistics services may also be a strategic issue even partially reducing the infrastructural needs.

The current study highlights the effect of the economic crisis on the Italian logistics industry with a substantial difference between Northern regions and the rest of the country. In fact, the majority of the efficient firms are located in the North West regions as well as the biggest logistics firms. The remaining part of Italy is characterised by underperforming companies, smaller in size, whose economic and financial results were strongly affected by the economic crisis.

The picture resulting from the study confirms that a great part of Italian regions faces logistics firms that underperform in respect to their potential. Nevertheless the models highlight that there is a core of firms resulting efficient during the all six-years period of analysis; on the other hand the economic crisis seems to have worsened the efficiency scores of those firms that were already underperforming. Eventually, the analysis of Malmquist index decomposition underlines how the increases in productivity are mainly connected to a frontier shift better than a progress in the technical efficiency of firms.

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SUMMARY

The efficiency of the national logistics providers and their capability of assuring high quality value added services is a key factor for the Italian economic growth. Several studies and reports (e.g. Confetra, National Logistics Plan) highlight a gap between the national logistics cost and the European ones that is creating a gap in competitiveness, negatively affecting the export oriented activities and the industrial production. For this reason the paper studies the efficiency level of the Italian logistics firms and their productivity over the period 2006-2011 using a non parametric analysis (i.e. Data Envelopment Analysis and Malmquist indexes) on financial data. A brief discussion on the geographical distribution of main logistics providers and on their general characteristics is provided in order to better understand the results of the analysis.