

CLAUDIO FERRARI, D.Sc.  
Università degli Studi di Genova  
Dipartimento di Economia e Metodi Quantitativi (D.I.E.M.)  
Via Vivaldi 2, I-16126 Genova, Italy  
E-mail: ferrari@economia.unige.it

Technology and Management of Traffic  
Review  
U. D. C.: 656.02:656.615(234.3)(450)  
Accepted: Mar. 14, 2003  
Approved: May 19, 2003

## ALPINE CROSSING AND ITALIAN PORTS MARKET AREAS

### ABSTRACT

*The future of the Alps depends on the human ability in realizing an effective sustainable development, able to preserve the environmental features without being detrimental to economic development. The present paper tries to analyze the role of the Alps in determining Italian foreign trade and in particular flows related to the presence of some of the greater ports of Southern Europe.*

### KEYWORDS

*port market areas, transalpine transport flows*

### 1. TRANSPORT AND TRADE

Transport infrastructure is an essential element for the economic development (see, for example, Bougheas *et al.* 1999) since it enlarges the market areas and operators supply areas. In this way it allows higher volume of trade that in the presence of market competition reduces the prices and therefore increases the consumers' surplus.

This great economic benefit caused by transport infrastructure is followed by negative externalities that pour out into territories which partly correspond to the ones with economic advantages. Beside the positive externalities, due to the realization and the presence of the infrastructure, we also have to take into consideration the negative externalities - namely, noise and pollution - deriving from the transport service exercise. Moreover, not all the territories have the same pollutant loading capacity. There are territories which are particularly sensitive and vulnerable, in which interventions capable of breaking (or further damaging) the ecosystem fragile balance will have as unique a result as the generation of externalities with explosive effects on the surrounding territories. Mountains are one of such territories; for this reason the research of sustainable development for mountain areas is a question that involves everybody.

Italy has a special interest in mountain area development and particularly in the Alps, both because the

alpine chain is the natural boundary line with the rest of Europe, and because the mountains represent a fundamental element in the northern region economy (exploitation of natural resources as source of energy, as tourist resource, and, last but not least, as environmental resource), but also because the Alps represent the obligatory passageway by land in order to transport freight and passengers towards the rest of the European continent.

Among the various industries interested in international links, ports can suffer most from the consequences of interventions planned by nations, both individually and in associated form. The presence, behind ports, of an adequate and efficient infrastructure network, which is branched and connected to the main communication networks of the continent, represents the most important relative competition element among the European ports.

This paper tries to provide some elements for defining the market basins of some of the main European ports in order to show the crucial role of the Alps in relation to the ports of the Mediterranean basin and above all in relation to the Italian ports. By limiting the analysis to the Italian alpine passes, it is possible to provide a brief survey of the freight traffic flow evolution in the last two decades. The final task of the paper, in the end, is the description of the interventions foreseen in the alpine passes and in the Italian infrastructure network adduction lines in order to design a probable evolutionary scenario.

### 2. INCREASING OVERLAPPING OF PORT MARKET AREAS

Technological and management innovations in transport, and particularly those occurring in the inland transport with the development of intermodality (see, for example, Figures 1 and 2), have induced increasing overlaps between potential market areas of ports, so that each of them is less and less protected by the geographical distance from the competitors, since it no longer represents a cost, or this cost is now signif-



icantly reduced (Marchese, *et al.* 1998). Nevertheless, inward and outward accessibility remains the key factor in determining dimensions of the market basins of

the ports; and accessibility concerns either the physical structure of transport infrastructure, the quality of the network (including the number of connections) or

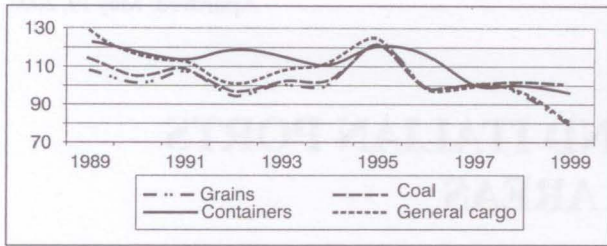


Figure 1 - Index of maritime freight rates in current US\$ (1997=100)

Source: Ufficio Italiano Cambi

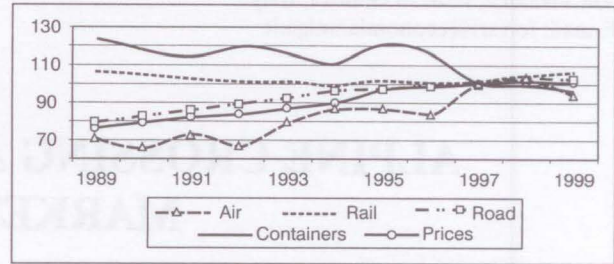


Figure 2 - Index of transport freight rates and prices in current US\$ (1997=100)

Source: Ufficio Italiano Cambi

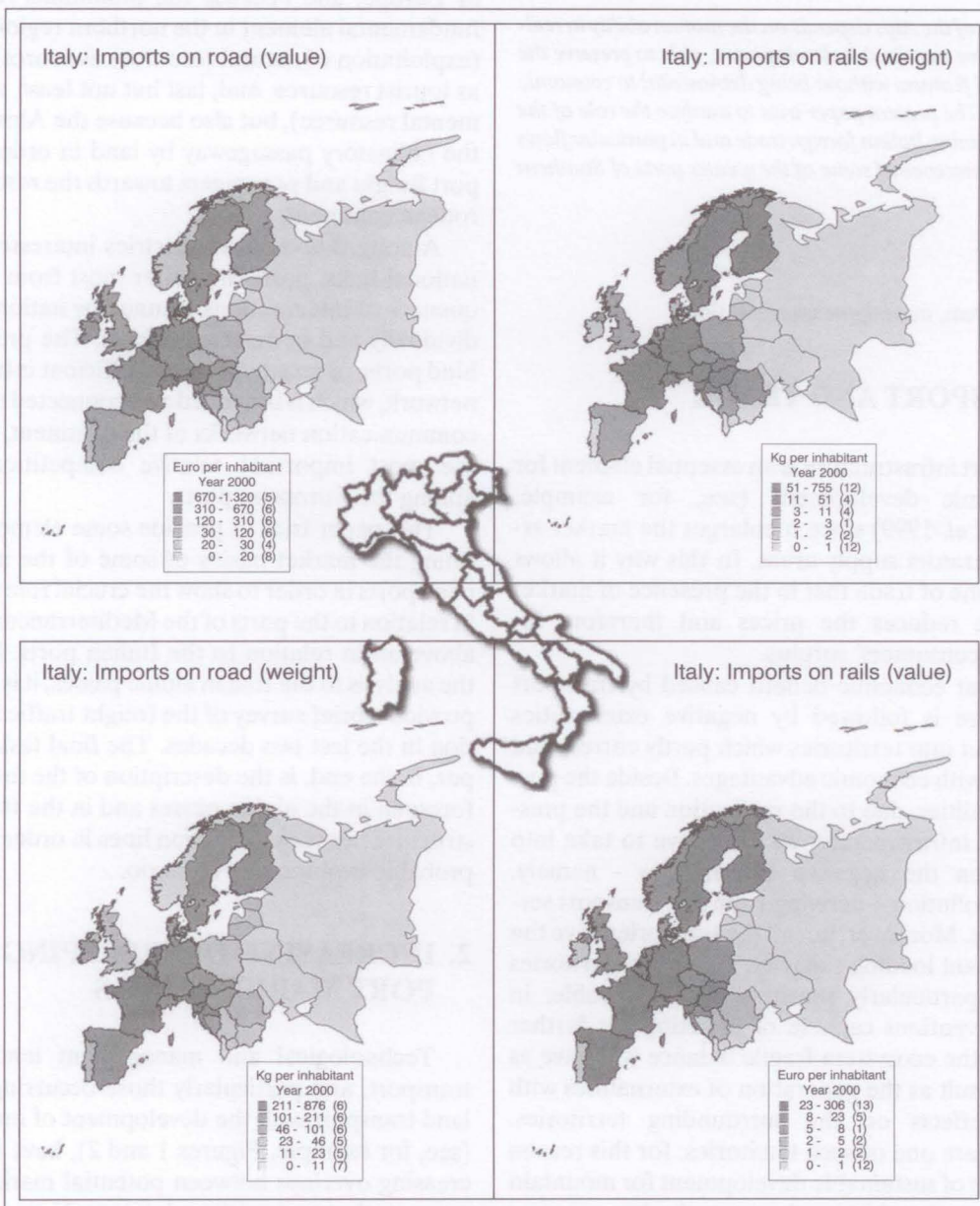


Figure 3 - Italian imports from Europe per means of transport, in value and weight.

Source: Istat - Foreign Trade Survey



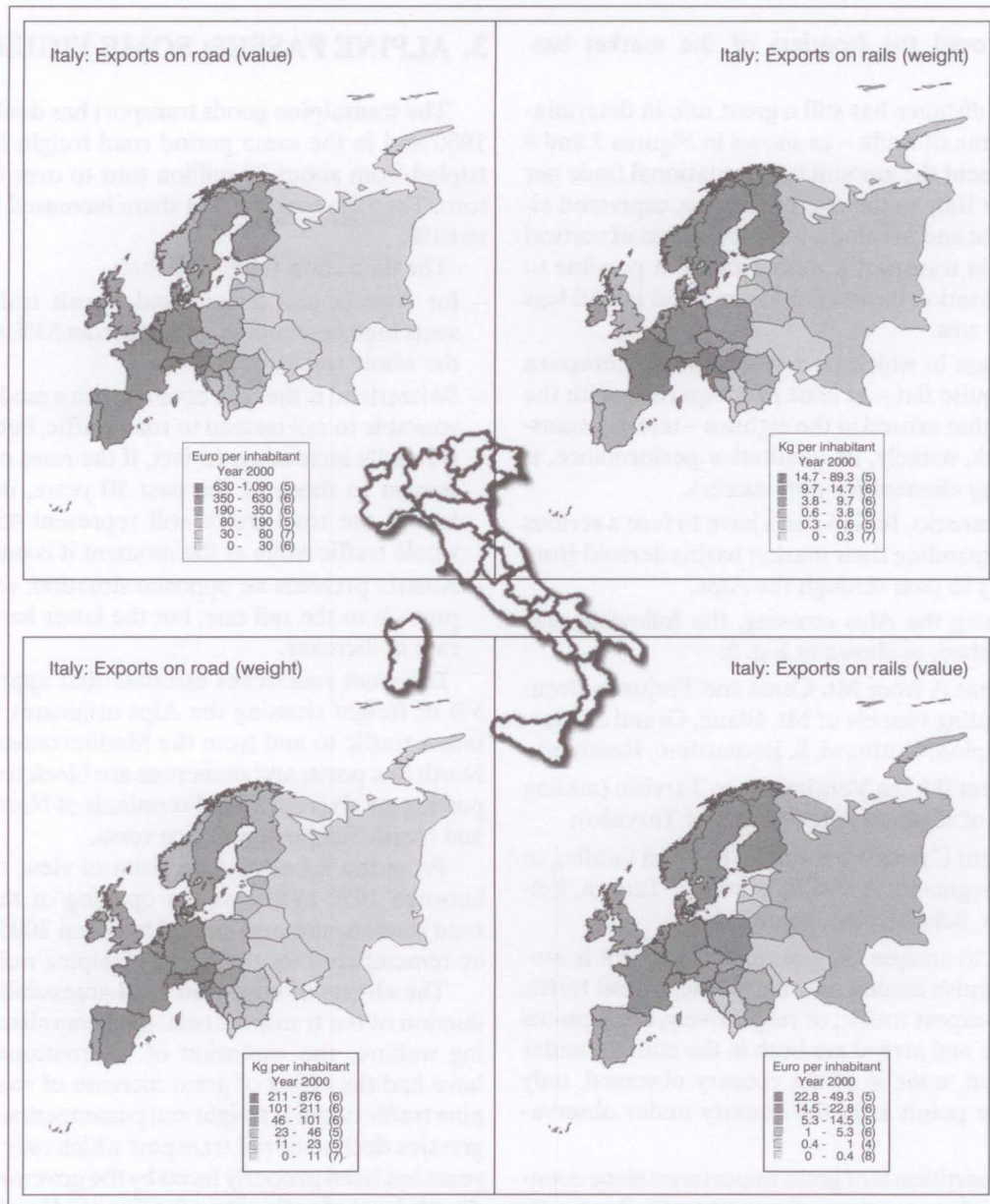


Figure 4 - Italian exports from Europe per means of transport, in value and weight.

Source: Istat - Foreign Trade Survey

the conditions of use (on the demand side), i.e. the level of congestion.

The increasing overlapping of port market areas is a matter of fact, undoubtedly, a clear evidence (easily exemplified by the existence in these days of numerous freight trains - managed by Hupac, Kombi Dan, BTZ, and other companies - linking ports of the Northern Europe to the major Italian inland terminals). But this overlapping cannot be explained more deeply and clearly since the ports complain about the lack of data regarding the origins and destinations of goods they load onto, and unload from the ships. These kinds of data are available only to the shippers and to the multimodal transport operators, but only with regard to their own portion of the whole traffic.

The only data available from the Port Authorities refer to the ports of destination of cargo shipped and the ports of origin of cargo unloaded; but these elements are insufficient to determine the real origin/destination of goods. Yet, they somehow show that the minimization of maritime transport distance is no more the only goal influencing the route choice, but intermodality (first) and verticalization of transport chains (next) have modified the traffic routes in order to minimize the entire (maritime + land) transport cost of goods. Moreover, in the last decades the transport cost has been deeply reduced and the cost of maritime transport has been reduced even more than the land transport cost; as a consequence, there is internal (i.e. land) transport



that has moved the frontiers of the market basins.

Yet, the distance has still a great role in determining the volume of trade – as shown in Figures 3 and 4 which represent the amount of international trade per person from Italy to the rest of Europe, expressed either in weight and in value – but the process of vertical integration in transport industry makes it possible to cross subsidisation between maritime and inland legs of transport cost.

In the days in which port tariffs in the European Union are quite flat – at least in comparison with the differences that existed in the eighties – internal transport network, namely, its qualitative performance, is newly the key element for port success.

In this scenario, Italian ports have to face a serious barrier in expanding their market basins derived from the necessity to pass through the Alps.

Concerning the Alps crossing, the following may be distinguished, as shown in Fig. 5:

- the segment A from Mt. Cenis and Frejus to Brenner (including tunnels of Mt. Blanc, Grand St. Bernard, Simplon, Gotthard, S. Bernardino, Reschen);
- the segment B from Ventimiglia to Tarvisio (adding to passes of segment A the tunnel of Tarvisio);
- the segment C from Ventimiglia to Wien (adding to those of segments A and B, passes of Tauern, Felbertauern, Schoberpass, Semmering).

In order to analyse the transalpine traffic it is useful to distinguish among internal traffic, transit traffic and import-export traffic; or respectively, if the points of departure and arrival are both in the country under consideration, none is in the country observed, only one of these points is in the country under observation.

This tri-partition is of great importance since countries with high percentage of transit traffic bear only quite negative externalities deriving from traffic and from congestion of their transport networks and do not make use of any benefit deriving from that trade (apart from some fees). This condition occurs namely in Switzerland and Austria, small countries playing the role of vital links between Southern Europe and the core of the European Union - i.e. the richest and the most populated area of the continent – and also the Balkans.

From the Italian point of view, all transalpine traffic is import or export traffic. For Italy, namely, but also for France, the alpine crossing is unavoidable for trading with some of their most important commercial partners, excluding the opportunity to develop forms of cabotage and short sea shipping, but they do not seem to support well the North-South European trade.

In the present paper the attention will be paid only to the segment A.

### 3. ALPINE PASSES: SOME FIGURES

The transalpine goods transport has doubled since 1980 and in the same period road freight has nearly tripled from about 22 million tons to over 60 million tons. Then the road market share increased from 44% to 61%.

The data show fairly well that:

- for Austria and Switzerland transit traffic represents high percentage, ranging from 53% to 91%, of the whole traffic;
- Switzerland is the only country with a modal split favourable to rail instead to road traffic, but the latter is rapidly increasing. In fact, if the rates of increase remain as those of the past 20 years, in the next twenty the road traffic will represent 45% of the whole traffic while at the moment it is only 30%;
- Austria presents an opposite situation: road traffic prevails to the rail one, but the latter has a greater rate of increase.

Different researches estimate that approximately 5% of freight crossing the Alps originates from container traffic to and from the Mediterranean and the North Sea ports; and numerous are block trains transporting goods from inland terminals of Northern Italy and North Sea ports and vice versa.

From the infrastructure point of view, the period between 1950-1980 saw the opening of the present road tunnels; the next period between 2005-2016 will be remembered for the new transalpine rail links.

The effects of improved road accessibility, the reduction of the transport cost, the generalized increasing welfare, the explosion of international tourism have had the effect of great increase of road transalpine traffic both for freight and passengers and the progressive decline of rail transport which only in the last years has been properly faced by the governments on a double level of policy: *i*) on the financial level by raising tariffs for road traffic in order to internalise externalities, for example: Switzerland has imposed the Heavy Vehicle Fee (HVF) instead of the previous lump-sum

Table 1 - Alps crossing traffic

	Rail			Road		
	Tons (000)	Transit (%)	Var. % 1980-00	Tons (000)	Transit (%)	Var. % 1980-00
France	9.4	33.0	20.5	25.8	31.8	29.0
Switzerland	20.6	83.0	17.0	8.9	52.8	122.5
Austria	8.7	90.8	77.6	26.6	90.6	63.2
Total	38.7	72.6	27.3	61.3	60.4	52.1

Source: USTE, Bern



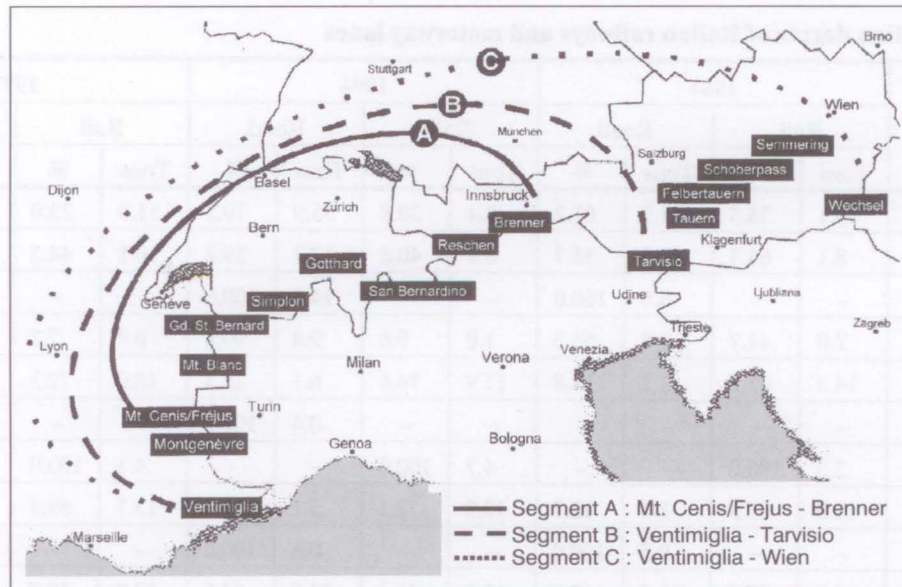


Figure 5 - Alpine passes

Source: USTE

fee and Austria has introduced the system of eco-points to limit the emission from transit traffic and the number of trucks; *ii*) on the planning level with projects for the increase of transalpine railways capacity.

Nowadays, in fact, rail links are not competitive with road links, especially on the freight market, for various reasons:

- maximum length of trains admitted is about 400-450 metres while longer trains may transit on adduction lines;
- reduction of track utilisation due to the presence of single lines (like Ventimiglia);
- different gauge profiles admitted on the Alps passes and on adjacent lines (like for example those of most of Italian lines and transalpine links);

and other elements such as lines block systems, electrical devices, minimum radii and lines grade (that in some cases need the double or triple traction of trains). For private railway companies crossing international borders also a simplification in both customs and fiscal terms is needed.

All these elements combined together limit the potential capacity of railway lines to 80 trains/day in Ventimiglia, 150 trains/day in Modane, Gotthard and Brenner, 100 trains/day in Simplon link, and the situation is worse regarding the hauling capacity that on Modane link equals 650 tons, on Brenner and Tarvisio 700 tons, and solely on Ventimiglia and Chiasso passes it is 1,600 and 1,400 tons, respectively.

At the moment, the railways compete effectively with roads only when they offer mixed and piggyback transport.

Nowadays, Italian railways and motorway lines present the utilization degree shown in Table 3.

On the French segment of the Alps, after the Mt. Blanc tunnel was partially reopened to trucks in early 2002, no improvements of the infrastructure links are expected until 2016 when the new rail link Lyon-Turin (included in the Trans-European Network) will be opened to traffic.

On the Swiss side, works have started for the construction of the New Railway Alp Transit Route (NRATR) including the tunnels of Lötschberg (38 km long) and Gotthard (57 km) that are expected to open, in 2007 and 2014<sup>1</sup>, respectively.

In the future, the Brenner rail link will also be doubled for the realization of the Combined Transport North-South link of the Trans-European Network interesting for Italy, Austria and Germany.

These projects mean huge financial efforts: at the moment their cost is expected to be of about 42,715 million EUR, namely 18,260 million EUR for Lyon-Turin link, 15,102 million EUR for the North-South High Speed Train (Brenner link), 13.6 milliard of Swiss francs for the NRATR.

#### 4. ITALIAN RAILWAYS INFRASTRUCTURE: EXPECTATIONS OF DEVELOPMENT

The new (Italian) General Plan of Transport and Logistics foresees investments for over 60 billion EUR, 47 of them not yet financed. Among these investments, the Alps links on rail are considered as national priorities, in order to face the high degree of saturation and the limited haulage capacity of the railway infrastructure.



Table 3 - Utilization degree of Italian railways and motorway lanes

	1984				1994				1997			
	Rail		Road		Rail		Road		Rail		Road	
	Tons	%	Tons	%	Tons	%	Tons	%	Tons	%	Tons	%
France	10.1	38.8	15.9	61.2	9.4	20.8	35.9	79.2	11.0	23.0	36.9	77.0
Frèjus	8.1	64.3	4.5	35.7	8.4	40.8	12.2	59.2	10.1	44.5	12.6	55.5
Mt. Blanc	-	-	8.6	100.0	-	-	14.3	100.0	-	-	12.7	100.0
Ventimiglia	2.0	41.7	2.8	58.3	1.0	9.6	9.4	90.4	0.9	7.2	11.6	92.8
Switzerland	14.3	87.2	2.1	12.8	17.9	74.6	6.1	25.4	18.0	72.3	6.9	27.7
Gr. St. Bernard	-	-	-	-	-	-	0.4	100.0	-	-	0.3	100.0
Simplon	3.3	100.0	-	-	4.7	100.0	-	-	4.3	100.0	-	-
Gotthard	11.0	87.3	1.6	12.7	13.2	72.1	5.1	27.9	13.7	69.5	6.0	30.5
S. Bernardino	-	-	0.5	100.0	-	-	0.6	100.0	-	-	0.6	100.0
Austria	8.1	37.5	13.5	62.5	13.3	36.4	23.2	63.6	32.9	29.7	30.6	70.3
Brenner	4.7	25.8	13.5	74.2	8.3	32.0	17.6	68.0	7.8	28.0	20.1	72.0
Tarvisio	3.4	100.0	-	-	5.5	49.5	5.6	50.5	5.1	32.7	10.5	67.3
Total road			31.5	49.5			65.2	61.3			74.4	64.0
Total rail	32.2	50.5			41.1	38.7			41.9	36.0		

Source: Comitato Promotore Transpadana, Turin

Table 4 - National strategic interventions on Italian rail network (figures in million Euros)

Infrastructure	Public cost	% of project advancement	Years Opening	Expected expenditure in the next 3 years	Expected completion of works
Frejus rail link (only tunnel)	1807,60	30%	II half 2004	149,77	2011-2015
Simplon rail link	1807,60	20%	I half 2004	22,23	2009
Brenner rail link	2582,28	20%	II half 2005	50,00	2015
Rail Corridor n. 5 Lyon-Kiev	7901,79			1962,54	
- Turin-Novara		100%	I half 2002	955,45	2006
- Novara-Milan		90%	I half 2003	516,46	2007
- Milan-Verona		60%	II half 2003	180,76	2008
- Verona-Venice-Trieste		40%	I half 2004	309,87	2007
Rail axis Ventimiglia-Genoa-Novara-Milano (Simplon)	4379,55			224,12	
- Ventimiglia-Genoa		80%	I half 2003	118,00	2008
- Genoa-Milano		60%	I half 2004	106,12	2009
Rail axis Brenner-Verona-Parma-La Spezia	1510,64	30%	II half 2003	568,10	2008

Source: Report on Economic and Financial Planning 2003-2006

Launching of the General Plan of Transport and Logistics goes back two years ago, then before the break in the international trade that followed September 11, 2001 and the present crisis of the world economy, so that the estimates regarding the future of transport demand may result a little optimistic. At the same time also the scheduling of investments

will probably bear some delays due to the lack of public finance (namely, if the economic cycle is not favourable). But the necessity for deep modernization of the Italian transport network still remains, in particular in the railway sector. It has been confirmed by the Italian Government in the Report on Economic and Financial Planning for the period 2003-2006 which



allocates over 5 thousand million Euros in the next three years for financing new rail links (see Table 4).

Confetra (Italian General Confederation of Transport and Logistics) has reported a study, commissioned by EU DG-Transport, that analyses the distribution of transport demand, between road and rails, in 2010 comparing the situation in which all the Italian and European transport projects are completed and the common transport policy is fully applied (scenario A) with an alternative situation where only a few interventions are made on the Italian infrastructure networks (scenario B).

The results are of great interest. In the lack of massive interventions on transport infrastructures (i.e. scenario B) transport demand is expected to be in 2010, 76% greater than it was in 1992 and rail transport will grow by 86% while road transport will increase by 68%, thanks to the very stringent road transit policies of Switzerland and Austria that will contribute to the development of combined transport and rolling roads (see Fig. 6).

The figures change considerably if all projects are implemented (i.e. scenario A). In fact, in this case the total demand for transport will increase by 83%, but the increase in rail transport is expected to more than

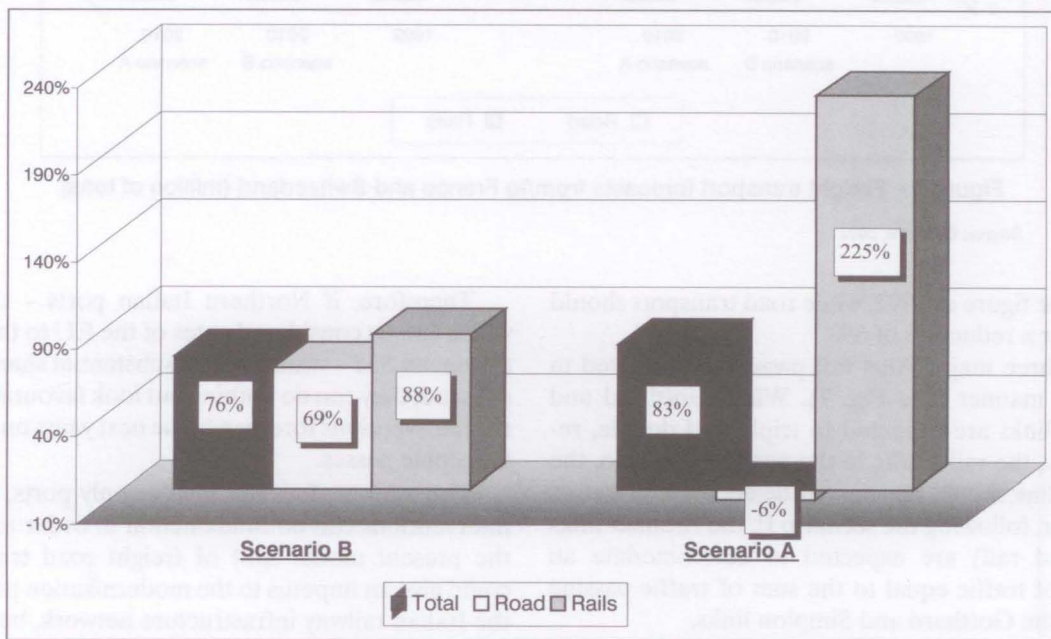


Figure 6 - Percentage increase to 2010 in the Alps crossing modal split

Source: Confetra, 2002

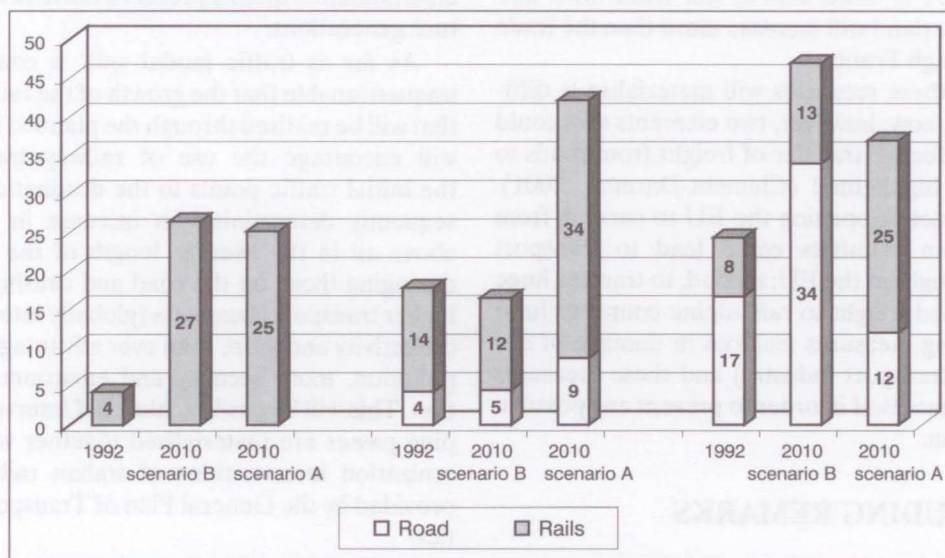


Figure 7 - Freight transport forecasts for major alpine links (million of tons)

Source: Confetra, 2002



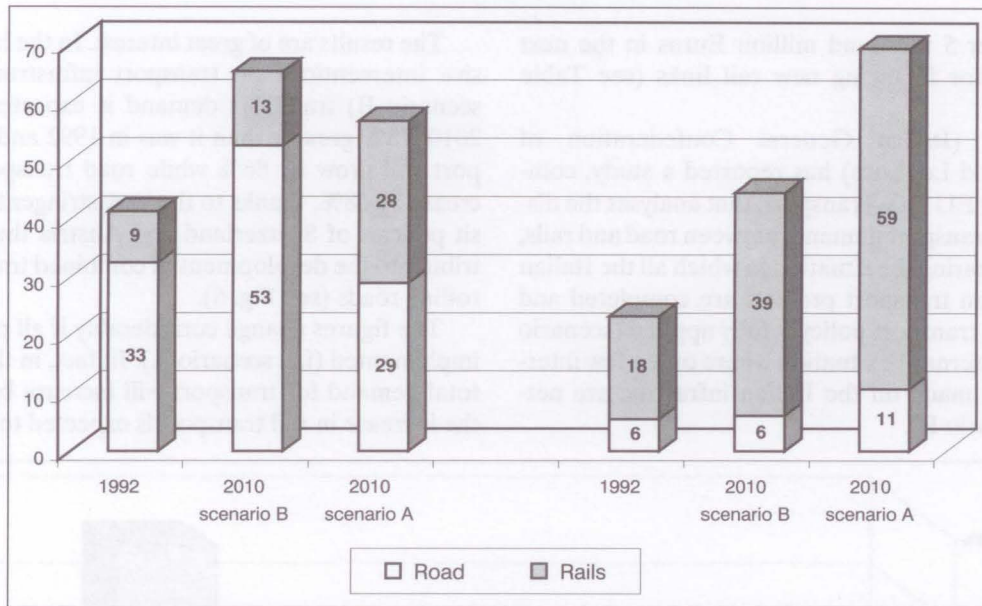


Figure 8 - Freight transport forecasts from/to France and Switzerland (million of tons)

Source: Confetra, 2002

double the figure of 1992, while road transport should encounter a reduction of 6%.

The three major Alps rail passes are involved in different manner (see Fig. 7). While Gotthard and Brenner links are expected to triple and double, respectively, the rail traffic in the positive scenario, the Simplon link should register a little decrease in traffic. Moreover, following the scenario B, the Brenner links (road and rail) are expected to accommodate an amount of traffic equal to the sum of traffic passing through the Gotthard and Simplon links.

Finally, Fig. 8 shows how infrastructure interventions modify commercial trade and market basins: if the scenario A is materialised, the trade with and through Switzerland will increase more than the trade with and through France.

Which of these scenarios will materialise is difficult to predict now; however, two elements that could contrast an effective transfer of freight from roads to rails may be highlighted (Clement-Darmon, 2001). First, the impact of opening the EU to carriers from East European countries could lead to transport dumping throughout the EU; second, to transfer huge volumes of road freight to rail, alpine countries have to adopt strong measures (seldom in damage of domestic truck transport industry) and these measures should be harmonised in order to prevent any possible route diversion.

## 5. CONCLUDING REMARKS

Drewry (2000) estimates a growth in port throughput demand of over 30 million TEUs in the next 15 years for the entire Mediterranean basin.

Therefore, if Northern Italian ports – the ones which can be considered gates of the EU to the Mediterranean Sea – want to get a substantial share of this demand, they can do nothing but look favourably at all the interventions foreseen in the next years on the Italian alpine passes.

The interest does not involve only ports, as these interventions can be fundamental in order to modify the present modal split of freight road traffic and could give an impetus to the modernization process of the Italian railway infrastructure network, besides, of course, to the sustainable development research which is able to combine economic development with environmental quality preservation in favour of the future generations.

As far as traffic modal split is concerned, it is unquestionable that the growth of the railway capacity that will be realised through the planned interventions will encourage the use of railway transport from the initial traffic points to the destination ones, consequently determining an increase in the use and above all in the average length of the railway trips damaging those on the road and causing therefore a higher transport cheapness (globally intended) for the collectivity and more than ever advantages due to less pollution, more security and environmental protection. This will be easily achieved if interventions on alpine passes are materialised together with the modernization interventions of Italian railway network provided by the General Plan of Transport and Logistics.

The latter seems to be the crucial element concerning the possible consequences of these interventions on port traffic.



These planned interventions have the task of combining the future European transport network with the single nation networks, but this "networks unification process" has been ignoring ports for years (Pallis, 1997 and Ferrari, 2000); even though the recent realization of the so-called "freight freeways" has modified the situation. As a consequence the Northern European ports, that in the past decades managed to create a remarkable gap in comparison to the Southern ports – as far as concerning the inland infrastructure equipment – can now gain advantages from the modernization of the internal Mediterranean nations networks and above all from Trans European Network - Transport (TEN-T), thwarting in this way the reversal of the last years' trend in the competition between the Southern and the Northern European ports (Marconsult, 2002).

For the Italian ports, then, interventions foreseen in the alpine passes are the necessary condition in order to manage the growth of traffic which is expected within the next years; moreover, the interventions can be a favourable element for the prosperity of internal traffic or for opening a gap in its own market basin borders; this will be realised if the interventions go along with railway network modernization – in terms of adoption of dedicated lines for freight transport, gauge profiles enlargement, modern electrical devices, etc. – and with the actual enforcement of railway transport regulations which will hopefully lead to greater service cheapness.

These are the conditions for an effective contribution of TENs to the reduction of the development gap between peripheral and central European areas, providing more cohesion to the European space. If this is realised, not only ports will benefit from this situation, but also the whole community and the territories where this traffic takes place.

**CLAUDIO FERRARI, D.Sc.**  
 Università degli Studi di Genova  
 Dipartimento di Economia e Metodi Quantitativi (D.I.E.M.)  
 Via Vivaldi 2, I-16126 Genova, Italy  
 E-mail: ferrari@economia.unige.it

## SOMMARIO

### TRANSITO ALPINO E AREE DI MERCATO DEI PORTI ITALIANI

*Il futuro delle Alpi risiede nella capacità di realizzare un effettivo modello di sviluppo sostenibile, capace di preservare le virtualità ambientali senza pregiudicare lo sviluppo economico del territorio.*

*Il lavoro cerca di analizzare il ruolo giocato dalla catena alpina nella determinazione dei flussi commerciali italiani con l'estero concentrandosi in modo particolare sui flussi di traffico legati alla presenza di alcuni tra i grandi porti del sud Europa.*

## LE PAROLE CHIAVE

*aree di mercato dei porti; flussi di traffico transalpino*

## NOTES

1. Formerly, the entry into service of Gotthard tunnel was scheduled in 2012, but in these days the Federal Transport Office has announced a delay of two years and an increase of construction costs of the NRATR project of about 1.5 billion of Swiss francs and another increase of 230 million is expected in the next years.

## LITERATURE

- [1] **Bougheas, S. – Demetriades, P. O. – Morgenroth, E. L. W.** (1999) *Infrastructure, transport costs and trade*. In: *Journal of International Economics*, 47: 169-189.
- [2] **Clemont, L. – Darmon, F.** (2001) *Transalpine Transportation Policies in Switzerland and Austria*. In: *Japan Railway & Transport Review* 26
- [3] Confetra (2002) *Il transito delle merci attraverso le Alpi* (eds.). Quaderno n. 118/1
- [4] Containerisation International, (2001) *Switzerland perplexed*, July
- [5] Drewry Shipping Consultants Ltd. (2000) *Mediterranean Container Ports and Shipping*, London
- [6] **Ferrari, C.** (2000) *Imprese terminaliste nel trasporto containerizzato: funzione di produzione e forme di mercato*, Genova, ECIG
- [7] **Marchese, U. – Musso, E. – Ferrari, C.** (1998) *The role for ports in intermodal transports and global competition: a survey of Italian container terminals*. In: H. Meersman - E. Van de Voorde - W. Winkelmans (eds.), *Transport Modes and Systems*, Vol. 1, Amsterdam, Pergamon, 141-154
- [8] Marconsult (2002) *Performance of Container Terminals*, Genova
- [9] Ministry of Economics and Finance - Department of the Treasury (2002) *Report of Economic and Financial Planning 2003-2006*. Rome
- [10] **Musso, E. – Ferrari, C.** (2001) *Impact of the Mediterranean Economic Growth on the European Port and Transport System*. In: *Promet-Traffic-Traffico* 13: 77-102
- [11] **Pallis, A. A.** (1997) *Towards a common ports policy? EU-proposal and the port industry's perceptions*. In: *Maritime Policy & Management*, Vol. 24, No. 4