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THE TRANSFORMATION OF THE SYSTEM OF REGULATING TECHNICAL-NAUTICAL SERVICES: THE USE OF THE *PRICE CAP*

This paper analyses the structure of the market of the port services and shows that, in Italy, it is possible to imagine the use of other tools to regulate the market, inspired by ideas which are different from those currently used. The Italian regulation scheme as established in the law 84/94 can be seen as the starting point from which to work to make it further competitive in terms of the service provided and in terms of the tariffs. The change of the regulating instrument is important especially when the monopolist also offers other services, different from those managed as a monopolist. Therefore the model suggested would appear to be more suitable and it resolves the accounting problem which the current system does not take into account. In this work, the technical-normative aspects will be pointed out, and some reflections on the theme will be expressed.

The evaluations which are made with reference to the case of the port of Genoa show how the issue of the ground rent concession is strategic for the assessment and the modalities of the assignment of the port terminals. We will express some opinions on the above, providing as well some proposals for the amendment in the regulatory scheme.

Key words: price cap, services, ports, transports.

1. THE REGULATION OF THE PORT SERVICES

The issue of financing and pricing of port infrastructure and services has recently been a widespread debate in Europe and it is now high on the political agenda of the European Union. (Haralambides H.E. et al, 2001). This is the result of the globalisation and the changing operational environment of ports,

as well as of the increased port competition brought about by the completion of the internal market.

The aim of the regulatory activity is to improve competitiveness and enhance the quality of port services as a means of increasing competitiveness and, ultimately, the consumer's satisfaction resulting from lower prices of goods as one of the benefits of a more efficient and rapid distribution system. (Barros C. P., 2003)

The supply of the port services is made up of three sub-markets which have different characteristics and features. The markets which make up the supply are: the operations, the labour and the technical-nautical services.

The objective of this work is to provide some starting points and suggestions of an economic-normative character, which could allow us to make the current system which regulates the market more efficient, with the main purpose of bringing down those port costs which the operator bears, by means of an incentive towards the monopolist.

The legal monopoly set up by the law 84/94 for the activities of towing, operations, labour and technical-nautical services creates problems of regulations especially concerning the determination of the tariffs for the service and the quota of profit to be reserved to the monopolist, which limits the possibilities of liberalisation. Incentive regulation is defined as the implementation of rules that encourage a regulated entity to achieve its desired goals by granting some discretion to the entity.

The existing literature presents mainly two models of regulation: ROR *(rate of return regulation)*, which is currently used in Italy in the market of the port services, and the *price cap* which was first used in the English sectors of the public utilities towards the end of the '80s (Armstrong et al, 1994, Laffont et al, 1993, Littlechild, 1983), in particular in the telecommunications sector. (Laffont et al., 2000).

Proponents of the *price cap* regulation, Cabral and Riordan (1989) describe a large number of desirable attributes of this regulatory methodologies.

In the following paragraphs, the functioning of the different models will be examined, comparing them with regard to how they can be applied to the market of the port services.

2. THE REGULATION USING THE *RATE OF RETURN REGULATION*

This is a form of regulation widely used during the post-war period, especially in the United States of America. In Italy, it is still true to say that various contracts of concession of service to companies refer to the recognition of a fair return on capital.

The regulation consists in the determination of a fair rate of return on the capital (Averch et al, 1962). The enterprise subject to this type of regulation is free to make its own decisions about production and prices, as long as the return on the capital which is generated does not exceed the limit fixed by the regulator.

The formalization of the regulation through ROR is the following:

$$\pi = P\,Q - rK - wL$$

where π is the profit, P is the price of sale of the service, Q is the quantity of service sold, r is the price of the services of the capital, K is the quantity of capital employed, w the wage rate, L the quantity of work employed .

There is a difference between the fair return on the capital and the profit formalized in the previous expression. In fact, a constraint is applied, which is presupposed by the ROR model and which is the following:

$$f \geq \frac{P\,Q - wL}{K}$$

The f indicates the value of remuneration per unit of capital which acts as the maximum limit. The determination of the limit derives from the difference between the total proceeds of the enterprise and the cost of work divided between the individual units of capital. The profits of the enterprise are determined on the basis of the quantity of capital employed. If from the previous expression we subtract r from both the parts of the inequality we get

$$f - r \geq \frac{P\,Q - wL - r}{K}$$

$$f - r \geq \frac{P\,Q - wL - rK}{K}$$

$$f - r \geq \frac{\pi}{K}$$

$$\pi \leq (f - r)\,K$$

The regulator will not fix a remuneration of the capital lower than that which can be inferred from the value of the market, otherwise the enterprise would not be able to stay in the market and it would be forced to close down. Therefore, the constraint will be $f \geq r$.

Averch and Johnson demonstrate that the choice of the regulated enterprise of the values of Q, K, L which maximize the profit respecting the constraint is such that:

- the level of production of the enterprise does not exceed that above which the marginal return is negative, so the elasticity of demand is less than 1; this level could be noticeably lower than the one which corresponds to the *second best* solution, where the price equals the average production cost. For each level of K, if to the current level of the production of the enterprise there is a corresponding negative marginal return, the enterprise can increase the profit reducing L and Q, as the reduction of L results in a reduction of the costs, and the reduction of Q creates a growth of the returns. If the profit is lower than the abovementioned constraint, the advantage obtained is clear; if the profit resulting is higher than the profit permitted, the enterprise finds it cost effective to increase K, contemporaneously with the reduction of L and Q, to loosen the constraint, with the main intention of getting to that point where the marginal return is positive;

- if the rate of return of the capital permitted is higher than the cost of the capital itself *(f > r)*, the relationship between the factors of production K and L selected by the enterprise is inefficiently high for the level of production; in other words, the enterprise could produce the same level at a lower cost, reducing the capital employed and increasing the use of the variable factors. One additional unit of capital has, for the enterprise, a higher value with regard to the marginal productivity of the capital, as it loosens the regulatory constraint allowing the creation of a return proportional to the difference between the rate of return permitted and the cost of the capital (Baumol et al., 1970);

In order to demonstrate these properties of the regulation through ROR, we should consider the problem of the maximization of the profit in the hypothesis where it was possible, at least theoretically, to waste the capital. If we indicate with *u* the quantity of capital wasted, the problem of the enterprise is :

$$\max_{K, L, u} \pi\ (K,\ L) - ru$$

under the constraints

$$R(K,L) - wL - fK - fu \leq 0 - u \leq 0$$

The lagrangiana of the problem is

$$\pi(K,L) - ru - \lambda\ [R(K,L) - wL - fK - fu] + \mu u$$

where $\lambda \geq 0$ and $\mu \geq 0$ are the multipliers of the constraints. The conditions of the first order for an internal solution are

$$\frac{\rho R}{\rho L} = w \qquad \frac{\rho R}{\rho K} = r - \frac{\lambda}{1-\lambda} \; (s-r) -r = -\lambda s - \mu$$

From the third condition we have $\lambda = (r\text{-}u)/s < 1$, as $\mu \geq 0$ and $r \leq s$; therefore from the second condition we infer that the enterprise uses an application of the capital higher than that which is efficient.

The ROR model, due to the fact that it tends to push the enterprise to use a distorted combination of the factors of production, using capital in excess, is widely criticised in the literature.

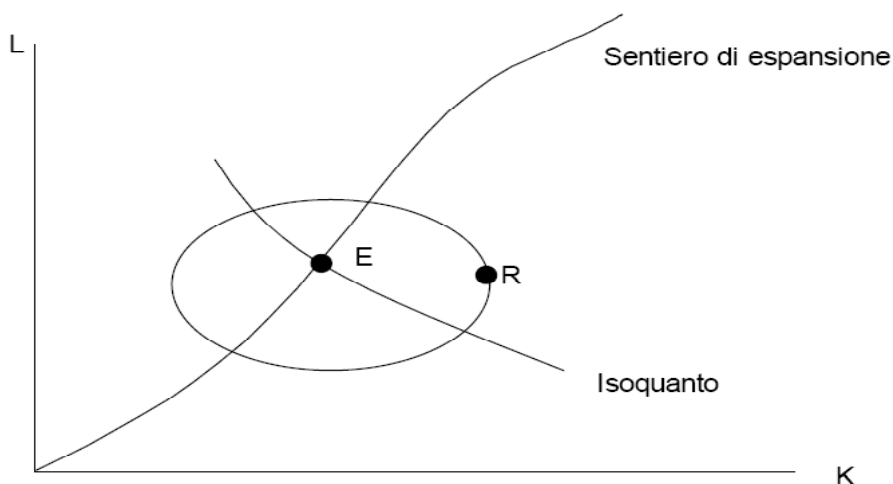As a graph, the distortion looks like this.

Fig. 1: Regulation through a ROR model

On the Cartesian axes the factors of production are indicated. The figure indicates the expansion path, which is the sum of the efficient combinations of labour and capital which the company should use in connection with the quantity that it wants to produce. The expansion path can be graphically expressed marking all the points tangent between isoquants. In particular, point E indicates the solution of a maximum profit for a monopolist: in the figure, the isoquant on which the solution of maximum profit ccurse is also indicated.

If the profit function previously described is rewritten in function of the quantity $P = g\,(Q)$, we obtain:

$$\pi = g\,(Q)\,Q - rK - wL$$

the quantity results also in a function of the factors of production, and therefore we obtain:

$$\pi = g\ (f\ (K,\ L))\cdot f\ (K,\ L) - rK - wL$$

The profit, considering as the given prices of the factors of production, changes only in function of the quantities used.

From the graph above, we can see all the productive combinations which allow the enterprise to reach the levels of profit allowed by the ROR regulation. Among the different levels of profit existing, the enterprise will choose the one associated with the combination of factors which occur at point R, where the productive factor of capital is employed most, which leads to the maximization of profit in one sector, like that of ports, where the capital is of the greatest importance. As we can see, the enterprise is to be found on an isoquant different from the one which corresponds to the maximum profit solution. The inefficiency originates from the excessive use of capital: in the example presented in the graph, there is also an insufficient use of labour, but this is not a general implication. Where there is a ROR regulation in force, an excess in the use of labour could also occur.

The interest of the enterprise is to fully exploit all the factors of production, for the final purpose of maximizing the profit. In the previous figure, the output produced by the enterprise is higher than which hypothetically the monopolist could have offered. As described in figure 1, in point R an isoquant passes, which is higher than the one in point E, resulting in prices which are favourable to the consumers. This could re-balance the inefficiency in the allocation of the factors of production. On the basis of the quota of profit considered admissible we could arrive at a supply of the service lower than the optimal one of the monopolist, resulting in an increase of the prices. In this particular case, the regulation through ROR is not acceptable as it would bring inefficiencies in the allocation and would result in an incorrect redistribution of the profits.

However, the principal problem of the regulation through ROR consists in the possibility to transfer in the prices, by the part of the monopolist, any increase in the costs, creating therefore inefficiencies and lack of incentives to control the costs.

3. THE REGULATION THROUGH *PRICE CAP*

The regulation through ROR potentially creates distortions when the enterprise regulated serves, in addition to a market in which it is a monopolist, also a competitive market.

With the definition *price cap* we indicate the regulation of the system of pricing through the imposition of a ceiling of maximum growth per year of the services, within a time interval; the above is related to a change in the index of

prices and to modification of a size which takes into account the increase in the efficiency of the enterprise (X). Usually the index of prices used is that of the Retail Price Index (RPI)[1] and from it we can see that:

$$pc = RPI - X$$

In general, the regulator chooses to have, as a cap, a price which is higher than the average cost, as it operates in conditions of asymmetric information. A price which is too low could expose the enterprise to the risk of not being able to stay in the market, forcing it to abandon it.

The philosophy of the *price cap* is to eliminate any connection between the permitted return and the costs of the service in order to keep the price under that of the maximum profit. In quantitative terms it means offering a minimum quantity at the price which the consumer is willing to pay for the service. The regulator will try to impose a price which ranges between the maximum profit and that which corresponds to the average costs with quantities included between those obtained in correspondence of the two prices. The ways in which the enterprise combines the factors of production are illustrated in the figure below:
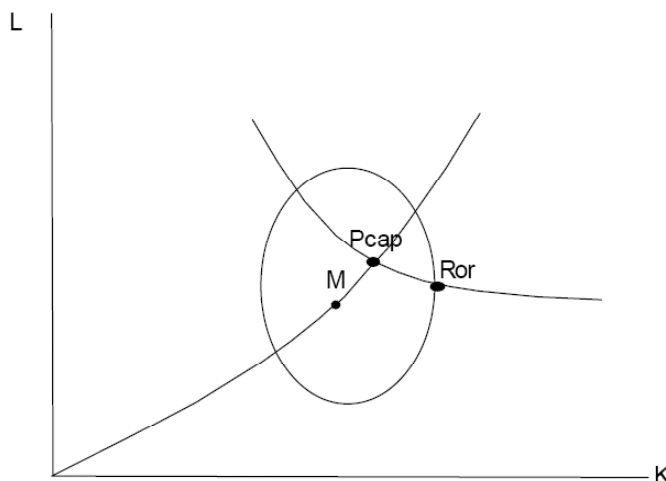

Fig. 2: Regulation through price cap.

In the figure above, the expansion path and the constraint of a zero profit for the single product enterprise - to which a price-cap is imposed - are considered. The price cap corresponds to a quantity P cap higher than the maxim profit (M). The enterprise chooses efficient combinations of the inputs. At

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[1] This index of prices was introduced especially in Great Britain and is called the *Retail Price Index.*

price parity, an enterprise regulated through the *price cap* will be more efficient than one regulated through ROR.[2] The increase of efficiency made possible by the *price cap* translates, however, entirely in an increase in profit for the enterprise and not in an increase in the benefit for the consumer.

The use of the *price cap* can be seen as a solution to the following problems (Littlechild, 1996 and 2003):

- as an incentive to break the monopolies;
- as an incentive for efficiency and innovation;
- as a reduction of the cost of regulation;
- as a means of promoting competition;
- as a way to provide revenues for the State deriving from privatisation.

Through the *price cap* it is simple to delimit the area of the activities subject to regulation from those which are extraneous to the field of application. The ROR, instead, presupposes that it is necessary to regulate also any other hypothetical activity which does not belong to the regulated area. Instead Littlechild recommended *price cap,* which he called the "local tariff reduction scheme" because he assumed il would apply only to local telephone services and that there would be competition in other services (Armstrong et al., 1994).

Furthermore, the *price cap*, as it operates through an automatic rule, implies a limited contact between the regulator and the enterprise, and therefore limits the occasions of "capture" of the regulator (Demsetz, 1968).

Furthermore, the author affirms, in the same article, that the tender is the best method to obtain a competitive efficiency which needs to be matched with the use of the *price cap* in order to obtain the full efficiency in the allocation of the factors of production.

The theory of the tenders *à la* Demsetz demonstrates that the competitive efficiency is obtained if (*i*) the participants of the tender can get the inputs of production in competitive conditions, (*ii*) any possible collusion is impossible or would anyway have costs too high with respect to the advantages of winning the tender, (*iii*) the position of the *incumbent* (the subject who was the previous holder of the tender or of the *asset* in question) does not determine by itself the competitive advantages in terms of technological , organizational or market information, (*iv*) after the award of the tender, the public authority is in a position to verify that the contract is carried out correctly, or to impose sanctions or even to revoke it. (Musso, 2001)

The formula of the *price cap* may be subject to amendments. It could happen that during the period which is not subject to regulatory revision, the costs (for example, the fuel of the tugs) are modified, resulting effectively in a chan-

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[2] The ROR foresees an excessive use of factor of production "capital" which generates inefficiencies.

ge in the prices. In connection with the incidence of these factors on the costs, it is foreseen that they have an influence on the price to be applied. Nevertheless, the enterprise could lose the incentive to try to contain the costs through looking for more profitable agreements with its own suppliers.

In the case of a multi–product enterprise, instead, these characteristics depend exclusively on the choice of the coefficients used for the weighting of the price of the goods under constraint. The justification for the impositions of weightings which are equal to the demand expected recalls the optimal results mentioned in the theory of prices *à la Ramsey:* using in the denomination of the weightings, the quantities which would be demanded by the market in correspondence to the prices *à la Ramsey,* also the enterprise which is regulated through *price cap* finds it optimal to apply to its products exactly the prices *à la Ramsey.*

If we consider the problem of maximizing the profit in the period *t:*

$$\max_{p_1 \cdots p_n} \ \sum_i p_i q_i - C(q_1 \ldots q_n)$$

under regulatory constraint

$$\sum_i \alpha_i p_i \leq \bar{P}$$

where the weightings α and p are given.

The monopolist is induced to choose the Ramsey structure of the prices, on the basis of the regulatory constraint presented. This makes it possible to justify the use of estimates of demand as weighting in the constraint, in a perspective of progressive adjustment, because the exactness *ex post* of the estimate of production of the regulator incorporated in the constraint indicates the reaching of a structure of prices *à la Ramsey*. In respect to the direct fixing of prices as practised by a monopolist, the further advantage of adopting the constraint previously illustrated consists in the flexibility that the said constraint gives to the enterprise, which can adapt to the changes in the costs or in the demand.

4. APPLICATION AND COMPARISON OF THE TWO MODELS IN THE PORT SERVICES. A HYPOTHESIS FOR THE ITALIAN MARKET

Outlining the existing legal frame, to fully understand the choices made by the regulator in the field of the tariffs policies, remains one of the central points which must be taken into consideration to understand the behaviour of the enterprises in the market. In Italy the port services are managed as legal mono-

poly. (Tartuffo, 1977) The a.m. modality chosen by the other countries appears different from that coming from Italy. Currently it is possible to auto produce the service abroad in order to allow to shipowner and the terminal operator to obtain and provide a *tailor made* service.

It is the enterprises themselves which freely determine prices and tariffs, even when an intervention of the regulating Authority, correcting the levels fixed, occurs.

In the past, situations of imposition of tariffs which had been considered too onerous for the final user have been pointed out to the competent Authorities. On the basis of the data made available by the Autorità Garante della Libera Concorrenza e del Mercato – Antitrust Authority, different situations are recorded[3]. The tariffs for piloting in the Italian ports are lower than those of the other European ports; a similar consideration can be made for the service of the tugs. As far as the berthing is concerned, the dimensions of the ship which is asking for the services is the most important determinant with which to evaluate the tariffs; making an approximate estimate of the levels of the tariffs, these as well appear to be on average lower than in other European ports. These considerations must also take into account that the Italian ports have characteristics and volumes of traffic which are completely different from those of other European ports.[4]

On the basis of the legal regulations in force, the Authority competent to set and update the tariff determines, after having consulted the parties involved, the level of the tariffs for the provisions of the service. This mechanism does not guarantee that an adequate level of tariffs is reached and it creates an asymmetry of information among the categories involved and the final users, due mainly to the lack of information on the costs of the service. At the moment, there is no incentive for the enterprises to provide an optimal level of information, to the end of reducing this information mismatch. Furthermore, the associations of the operators do not represent all the enterprises offering the service.

The systems of tariffs presented above are based on the principle of covering the costs borne. In addition to the introduction of specific corrective systems, the determination of the prices and their changes is based on the historical values of the costs borne by the enterprises, to the end of guaranteeing the return on the factors of production.

At the moment, the Italian regulatory system for port services shows some critical points, especially:

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[3] Cfr. *Indagine conoscitiva nel settore dei servizi portuali,* 1997, page 96.

[4] The objective difficulties for the determination of the tariffs and the criticism regarding the excessive cost of the service with respect to the professional quality (in terms of means and labour) which is effectively provided, compared with the other ports outside Italy.

- the lack of an exhaustive legislation;

- the lack of a clear separation of the distinctions between the freedom of the enterprise and the responsibility of the regulator;

- the tariffs are determined through negotiation with the respective associations of operators;

- the difficulty in identifying a coherent process for the determination of the tariff tables, especially in the case of multi-product (Gans J.S. et al, 2003);

- the costs not included in the tariff, in order to the absence of competition (Carbone et al, 1995).

Applying the theories mentioned above, and therefore comparing the two models, the following considerations can be made (Littlechild 1983):

- the *price cap* would oblige the enterprises to minimize the costs and therefore eliminate all the productive inefficiencies which can be found in the technical-nautical services; whereas, the covering of the costs foreseen by the *rate-of-return regulation* does not create this incentive for the enterprises;

- the *rate-of-return regulation* model allows the enterprise to cover its costs and allows for its survival. In the *price cap* system, the maintenance of the enterprise on the market depends on the ability of the regulator (regulatory ability);

- the few technological innovations present in the industry of the technical-nautical services (VHF) do not provide enough incentives to introduce a *price cap,* but their presence, in connection with the regulating tool, allows the reduction of the costs and of the tariffs;

- as far as the tariff flexibility is concerned, the *price cap* is better, as it pays particular attention to the enterprise which provides services both as a monopolist and those with competition (technical-nautical services and other activities like bunkering, dry-docking, etc…);

- the tariffs of the technical-nautical services are updated almost every year. The *price cap* would turn out to be less costly than the *rate-of-return regulation,* as the intervals of regulation could be wider;

- the higher flexibility of the *price cap* system in the application of regulatory instruments makes it more suited to favour competition (self-production.

All things considered, the use of a regulation through *price cap* appears to be preferable, especially if seen in the perspective of the criteria presented

above. In the sector with a low degree of technological development like the port sector, the *rate-of-return regulation* method appears to still be acceptable, even if it would be preferable to use the *price cap* system.

Imagining controls carried out directly by the regulator and short regulation intervals, the two models are almost equivalent. Given that the direct controls of the regulator are limited and it is oriented to observe intervals of regulation which are medium term, the *price cap* method is clearly the preferable one.

5. THE CASE OF THE GENOA PORT

As we can see in the work carried out by Ferrari et al. (2007) we can easily understand the importance, with the aim of establishing a competition model for the market of Italian ports, of a model able to guarantee efficiency also in ports like Genoa, which suffer from a morphological configuration which is markedly unfavourable from the point of view of the availability of support areas. In the study carried out by Ferrari et al. is it suggested to combine the institution of public tenders for the assignment of ground rent areas with the application of yearly increases of the rental price of concession calculated with regard to efficiency (change in the traffic) of each terminal operator, based on the criterion of the *price cap*, which at the moment is not used in Italy. The adoption of such a method would imply on the one hand the abandonment of the current practice of expressing the rent as a function of the level of investments planned *ex ante* in the plans of the enterprise, but on the other hand it would oblige the Port Authority to evaluate and measure the efficiency of the terminal operator, not having any information on the structure of the costs of the enterprise itself (with a clear risk of capturing the regulator). The method used in Ferrari's work is that of the DEA (Data Envelopment Analysis) which works well for the needs of the Port Authority to increase the traffic and to divide the risk between the regulatory body and the individual terminal operator who in the end would have an incentive. The presuppositions on which the implementation of the *price cap* is based are mainly two: the institution of tenders as a tool for the Port Authority to promote competition in the market and the fixing of rent which is related over a period of time to the efficiency of the terminal operator. The first presupposition is currently already foreseen by Italian regulation, lacking only its correct application, while the second one appears to be included in the duties of the regulatory body as per art. 6 of the law 84/94. There are various models for the definition of the rent of the concession (De Monie, 2005); the one which is closer to the need of increasing efficiency on the basis of the logics foreseen by *price cap* is that with the rent which increases according to a *min-max* rate, starting from an initial level, and fixed according to the volume of activity registered. Once the operator reaches the maxi-

mum level of traffic expected, he/she is given the possibility to keep the entire advantage originating from the excess traffic.

First of all, it is necessary to define the relationship (RPI-X) and determine the value of X, in addition to the breadth of the interval to be regulated, the consistency of the costs to the charged to consumers and the opportunity to include, or not, an indicator referring to the quality of services. To determine the *cap* the regulator chooses to consult all the actors who are involved, in order to collect the broadest quantity of information possible and to legitimise the choices made. The regulatory period chosen in Ferrari's study is four years, and the modalities of revision of X are to be fixed immediately at the beginning and this is important in order not to underestimate or overestimate the value. The use of DEA applications foresees the estimate of the relative efficiency in relation to the resources employed and the results obtained in the individual terminals measuring the degree of efficiency X. At the moment, the Port Authority of Genoa fixes the rent for the concession of areas of the quays of the public property at 5% of the patrimonial value of the areas themselves, taking into account a series of corrective coefficients which balance out the final value of the rent , and the consistency of the investments made by the terminal operator, or investments which he/she is about to make, in terms of new infrastructures.

The objective of the study of the case of the Port of Genoa is to evaluate how much the ground rents paid to the Port Authority would be increased using the *price cap* system.

The parameter X, which represents the variation of the relative efficiency, was quantified through the application of a DEA model with variable returns of the *output orientated* type (Coelli et al., 1998) as foreseen by the law, without taking into account the costs borne by the terminal operator in which the regulator is not interested. The configuration as a natural monopoly which is difficult to contest and the presence of diseconomies of scale justify the variable return of scale.

The variables (input) verified are mainly the area (sq.m.) , the length of the pier (mt.) and the depth of the sea bottom in the main Italian container terminals.

VTE (Genova)	SECH (Genova)	LSCT (La Spezia)	TDT (Livorno)
Savona	SCT (Salerno)	CICT (Cagliari)	TCR (Ravenna)

The existing efficiency was evaluated using the software Win4Deap (Coelli *et al.*, 1998), calculating the reductions of the input without having a reduction of the output. From the table here below it can be seen how the potential traffic and the effective traffic of a terminal can be estimated, assessing the efficiency of the terminal and more generally the work of the terminal operator.

Tab. 1: Improvement of efficiency in the period 2003-2006

Terminal	Year	Real traffic	Potential traffic	(In)efficiency	(In)efficiency value
LSCT	2003	867.948	867.948	0,0%	-0,4%
	2004	889.362	889.362	0,0%	
	2005	873.281	889.362	-1,8%	
	2006	996.292	996.292	0,0%	
TDT	2003	422.575	792.895	-46,7%	-45,3%
	2004	447.665	809.882	-44,7%	
	2005	476.407	791.110	-39,8%	
	2006	439.970	873.368	-49,6%	
TCR	2003	148.454	148.454	0,0%	-0,4%
	2004	159.315	159.665	-0,2%	
	2005	157.189	159.315	-1,3%	
	2006	150.949	150.949	0,0%	
CICT	2003	302.783	868.034	-65,1%	-41,8%
	2004	494.766	889.852	-44,4%	
	2005	631.435	889.362	-29,0%	
	2006	690.392	996.292	-30,7%	
VTE	2003	868.321	868.321	0,0%	-2,8%
	2004	891.508	891.508	0,0%	
	2005	858.708	889.362	-3,4%	
	2006	925.105	996.292	-7,1%	
SECH	2003	363.628	363.628	0,0%	-0,7%
	2004	358.622	358.622	0,0%	
	2005	351.652	361.652	-2,8%	
	2006	353.772	353.772	0,0%	
SAVONA	2003	53.543	53.543	0,0%	0,0%
	2004	83.891	83.891	0,0%	
	2005	219.876	219.876	0,0%	
	2006	231.489	231.489	0,0%	
SCT	2003	417.480	417.480	0,0%	0,0%
	2004	411.618	411.618	0,0%	
	2005	299.851	299.851	0,0%	
	2006	242.592	242.592	0,0%	

Source: Ferrari et al. 2007

In the situation of Genoa it can be seen how both terminals present a certain degree of average inefficiency: -2,8% for VTE and –0.7% for SECH. The results obtained in this way correspond to the parameter X of the respective functions of foreseen increase of the rent for the four years following 2006.

On the basis of the data presented, it is possible to make some calculations for the definition of the tariff for the following periods, allowing in fact to increase the ground rent due by the terminal operator. The increase of the RPI in the period is equal to 2,4% and the changes in efficiency of the terminals in Genoa turned out to be negative. The most relevant limit to the evaluation of this system is the lack of a referral value which could allow the calculation of a real value of the concessionary rent. The estimates presented in Ferrari's study, carried out on the basis of the state revenues and on the total surface of the Ligurian port determine a value of about 2,5 euros per square meter.

It is interesting to compare this result with the one obtained by the DIEM at the University of Genoa in a study on the destinations of some areas of Cornigliano in Genoa. The department has identified some referral values for the letting and the sale of areas, for different destinations, in Genoa, Barcelona, and Rotterdam. As can be seen in table 5, the minimum price, in the area of Genoa, is reached for those areas which are dedicated to logistics activities and it is of 50 euros per square meter, a value which is enormously different from that calculated at 2,5 euros per square meters for the port areas.

Tab. 2: Offer of areas (sell/location) in Genoa, Barcellona and Rotterdam (2005)

	CONTRACT TYPE	GENOA	BARCELLONA	ROTTERDAM
INDUSTRIAL ACTIVITIES premise	Sale (€/m²)	€ 845,00	€ 850,00	nd
	Rent (€/m² annual)	€ 67,00	€ 60,00	nd
LOGISTICS ACTIVITIES	Sale (€/m²)	Nd	Nd	€ 611,00
	Rent (€/m² annual)	€ 50,00	€ 84,00	€ 38,00
OFFICES	Sale (€/m²)	€ 1.300,00	Nd	€ 611,00

Source: DIEM (2005)

As a consequence, on the basis of the above mentioned data, the value of the rent paid at the end of 2006 by SECH and VTE to the Port Authority should be respectively 467,500 and 2,575,000 euros per year. Making an hypothesis, applying an increase on the model RPI-X to the year 2007, the Port Authority of Genoa would obtain … 2,708,900 euros from VTE (+133,900 in comparison with the previous year) and almost 482,000 euros to SECH (+14,492 euros compared to 2006).

5. CONCLUSION

The arguments illustrated above demonstrate how the subject of the port services needs to be improved in order to be better able to favour liberalization and privatisation of the market maintaining the security and universality characteristics which are an inflexible requisite. The Italian legal system foresees a concessionary system which should be put aside in order to make space for a system where the enterprise is authorised to operate. This would give the possibility, as foreseen by the various attempts of European directives made by the Transport Commission (DGTREN) aimed at the liberalisation of the market of the port services. Allowing shipowners and terminal operators the possibility to produce the technical-nautical services themselves would have the result of introducing competition mechanisms in the market (AGCM, 1991 and Macario 1993).[5]

The problem of the tariff regulation would appear to be the central problem needing solution. The choice of the best model to use for the calculation of the tariffs of the services must be assigned to a body with a high degree of technical ability, able to make adequate choices of tariff policies (central *super partes* organ). At the moment, this body is the Autorità Marittime – Maritime Authorities which govern the safety of navigation. From the amendments made to art. 14 of the Law 84/94[6], also the Autorità Portuali –Port Authorities have the duties to control the tariffs of port services[7].

The model currently in force presupposes that the collection and the elaboration of the data referring to costs are made by the regulated enterprise. This choice creates an asymmetry of information which affects the relationship between the regulator body and the regulated enterprise, not allowing an exact control of the tariffs. The idea of involving the operators' associations through consultations seems to be inefficient and inopportune from the point of view of competition[8].

The tariffs should be related to the costs borne by the enterprise and any discrimination among users should be avoided. In those cases in which discrimination has occurred, the re–introduction of a scheme based on discounts has effectively favoured some players and discriminated against others. This

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[5] The proposal to introduce a *royalty* for the service produced autonomously to be paid to the Port Authority, which will then transfer part of it to the monopolist appears to be a possible route to follow.

[6] Modification introduced by the Law 647/96.

[7] The criteria which are issued by the Ministero delle Infrastrutture e dei Trasporti – Ministry for Infrastructure and Transport remain however valid. The Port Authorities have a role of control and apply the criteria issued.

[8] The associations never represent all the operators and therefore they obtain advantages for their own members discriminating against the rest. Also, often agreements are made regarding the drawing up of high tariffs, which are not justified.

shows that there is the necessity to have a regulator capable of examining the requests of the enterprises to increase the tariffs.

Adopting a structure for the updating of the rent, using price cap as in the hypothesis made for the port of Genoa, there would be two possible scenarios (Ferrari et al.):

- The terminal operator is efficient and therefore the difference from the efficiency benchmark is at zero, and as a consequence, also the parameter X is nil. In the following four years, the operator bears increases of the maximum rent equalling to the increase in prices as registered by ISTAT. To further push the terminal operator towards efficiency, and therefore to increase the traffic, the Port Authority could consider the opportunity of assigning a sort of "bonus" to the operator who is efficient, deducting from the factor a predetermined percentage, indicated in the request for bids.

- The terminal operator is not efficient, and therefore it suffers increases of the rent matching the consumer prices index, deducted from the percentage of relative efficiency, which in this case would be negative. It is possible to register particularly high levels of inefficiency for some terminals and therefore, in order to avoid such an increase in the rent so as to induce the terminal operator to question the continuation of the activity, due to the amount of the losses, it would then be reasonable to foresee a maximum limit of the parameter X.

Art. 6 of the law 84/94 clearly states the will of the legislator to separate the activity of regulation, carried out by a non-economic public institution, such being the Port Authority, from the operational activity which is directly assigned to private entities through authorisations and concessions. The rent (either an authorisation or a concessionary) is, as a consequence, utilised as a tool for the regulation, through a tender, for the assignment of empty spaces and as a source of revenue for the balance sheet of the Port Authorities.

At the moment in Italy there are only few cases of assignment of port terminals through the procedure of international tenders. Usually, the concessions are renewed for those companies which have already had them in the past. Thus, also in the last few years, the possibility of re-assignment by international tender has been neglected, in favour of direct negotiations with those terminal operators already in place. As a result, the rent paid lacks the element of being an incentive for the terminal operator, as its variation turned out in many cases to be irrelevant. The lack of the decree to be issued on the basis of art.18 to provide clear indications on the way in which the concessions should be awarded and about the level of the rent leads to the choice of the non-homogeneous criteria on the part of the various Port Authorities. Therefore the level of the rent appears to be simply the result of negotiations between the parties concerned, thus resulting in certain distortions:

- the policy of the concession of rent as a tool to attract a terminal operator appears not to be based on the valorisation of the ground rent and on the valorisation of the economic activities present in the individual port. Often, especially in small ports, even where there are no Port Authorities, the policies of applying rents, even decreasing ones, are preferred. The distortion lies in the reduction of the rent which, given the system of financing, does not in the slightest push the terminal operator to make investments for infrastructures and aiming at the improvement of the service;

- the sale "at a low price" of the spaces determines the demand from the terminal operator to obtain as much space as possible, without considering its rationalisation; putting it better, the terminal operator will not be interested in concentrating the goods in the minimum space available as the opportunity-cost to buy it will be extremely low, resulting in a over-evaluation of the needs for space necessary for the port;

- the confusion created among the authorised enterprises (art. 16) and the enterprises which have a terminal (art. 18) determines also a strong differentiation between the rent fixed for the carrying out of the two activities. The lack of a single figure and the opportunist behaviour of some operators, especially in minor ports have *de facto* determined the carrying out of terminal activities, which should be carried out according to art. 18, with instead just the authorisation of art. 16 and with the payment of the rent (definitely lower) calculated in connection with this "status".

BIBLIOGRAPHY

[1] AGCM, Servizi portuali, segnalazione del 27 marzo 1991, Boll., (1991), 2.

[2] AGCM, Indagine conoscitiva nel settore dei servizi portuali, Roma, Istituto Poligrafico della Zecca dello Stato, 1997.

[3] Armstrong M., S. Cowan, J. Vickers, Regulatory reform: economic analysis and British *ex*perience, Cambridge, The MIT Press, 1994.

[4] Averch, H., L. Johnson, Behavior of the firm under regulatory constraint, American Economic Review, 52 (1962), 1052-1069.

[5] Barros, C. P., Incentive regulation and efficiency of Portuguese port authorities, Maritime Economics & Logistics, 5 (2003),1, 55-69.

[6] Baumol, W. J., A. Klevorick, Input choices and rate of return regulation: overview of the discussion, Bell Journal of Economics, 1(1970), 162-190.

[7] Cabral, L., M. Riordan, Incentives for cost reduction under price cap regulation, Journal of Regulatory Economics, 1 (1989), 26-42.

[8] Carbone, S., M., F. Munari, Port services ancillary to navigation between market and service requirements, Il Diritto Marittimo, (1995), 957.

[9] Coelli, T., D. S. Prasada Rao, G. E. Battese, An Introduction to efficiency and productivity analysis, Boston, Kluwer Academic Publisher, 1998.

[10] De Monie, G., Public-private partnership: analysis of possible alternative partnership models; concessioning as a workable PPP instrument; the advantages and inconveniences of the various concession models; the distribution of risks between partners; review of key criteria in awarding concession contracts, lezione al corso di specializzazione in Public Private Partnerships in Ports Structures, pricing, funding and performance measurement, 10-14 ottobre 2005, ITTMA, Antwerp, 2005.

[11] Demsetz, H., Why regulate utilities? Journal of Law and Economics, 11 (1968), 55-65.

[12] Ferrari, C., M. Basta, Price cap e concessioni portuali: il caso dei terminal contenitori di Genova, IX Riunione Scientifica della Società Italiana degli economisti dei trasporti, Napoli, 3-5 ottobre 2007.

[13] Gans, J. S., S. P. King, Contestability, complementary inputs and contracting: the case of harbour towage, Melbourne Business School, University of Melbourne, 2003.

[14] Gardina, M., Strumenti e modelli per la regolazione delle infrastrutture e dei servizi portuali, XVIII ciclo di dottorato in Trasporti, traffico ed ambiente – Università degli Studi di Trieste, 2006.

[15] Haralambides, H. E., A. Verbene, E. Musso, M. Benacchio, (2001), Port Financing and Pricing in the European Union: Theory, Politics and Reality, International Journal of Maritime Economics, 3 (2001), 1, 368-386.

[16] Laffont, J-J, J. Tirole, A Theory of incentives in procurement and regulation, Cambridge, The MIT Press, 1993.

[17] Laffont J-J, J. Tirole, Competition in telecommunications, New York, The MIT Press, 2000.

[18] Littlechild, S.C., Regulation of British telecommunications' profitability, London, HMSO, 1983.

[19] Littlechild, S., Operational research and regulation: theory and practice, Journal of the Operational Research Society, 47 (1996), 5, 601-611.

[20] Littlechild, S. C., Wholesale spot price pass-through, Journal of Regulatory Economics, 23 (2003), 1, 61-91.

[21] Macario, F., Autoproduzione, in Diritto antirtust italiano, in Frignani, A., Pardolesi R., Patroni Griffi A., Ubertazzi L.C., Bologna, 1993.

[22] Musso, E., Regulation e deregulation nei porti: che cosa, come e quando regolamentare, Giornate di studi superiori sull'organizzazione dei trasporti nell'integrazione economica europea 42° Corso Internazionale - Trieste, 10-14 settembre 2001.

[23] Productivity Commission, Economic Regulation of harbour towage and related services, Inquiry Report No. 24, 20 August, Canberra, 2002.

[24] Tartuffo, N., Servizio di pilotaggio nei porti – teoria della tariffa, Roma, 1997.

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Sažetak

PRETVORBA SUSTAVA ZA REGULACIJU TEHNIČKO-NAUTIČKIH USLUGA: PRIMJENA LIMITA CIJENE

Nadahnuti idejama koje se razlikuju od onih koje se trenutačno koriste, u radu se analizira struktura tržišta lučkih usluga ukazujući pri tome na činjenicu da je u Italiji moguće koristiti i druga sredstva kojima se regulira tržište. Shema talijanskih propisa, utvrđena zakonom iz 84/94, može se smatrati polaznom točkom od koje se treba krenuti kako bi lučke usluge i lučke pristojbe postale još konkurentnije. Promjena regulative je značajna osobito u slučaju kad monopolist nudi i druge usluge koje se razlikuju od onih koje pruža kao monopolist. Stoga bi predloženi model bio mnogo prikladniji i riješio bi problem izračuna, a kojeg postojeći sustav ne uzima u obzir. U radu je istaknut i tehničko-normativni aspekt, a data su i neka razmišljanja s time u vezi.

Procjene koje su date u odnosu na slučaj luke Genova ukazuju na činjenicu kako je davanje zemljišta u koncesiju od strateške važnosti za procjenu modaliteta ustupa vlasništva nad lučkim terminalima. Izrazit ćemo i neka razmišljanja u tom pogledu, dajući i neke prijedloge za izmjenu propisa.

Ključne riječi: *limit cijene, usluge, luke, prijevozi*

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