Port pricing and competitiveness in short sea shipping[1]

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Abstract

The purpose of this paper is to revisit the issue of port pricing. The current trend towards commercial port operations will affect pricing.

Main port pricing principles may be classified as; cost based, cost recovery, congestion, strategic and "commercial" pricing. This paper starts from a welfare economics perspective using public enterprise theory and moves towards private enterprise pricing in a (quasi-) commercial setting.

Changes in port pricing have implications for competitiveness of short shipping. Efficient ports strengthen short sea shipping competitiveness with respect to road transport. Thus, port pricing strategies that give incentives to increase port efficiency seem appropriate.

Punctuality and the duration of the port stay are quality factors. They reflect the demand elasticities of price and of time, respectively. We suggest a two-part tariff to capture this two-dimensional structure in user costs. This pricing scheme gives the port incentives to increase their efficiency in port operations by being able to offer time guarantees to time sensitive users.

Key words: Pricing, seaports, public provided goods, privatisation

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1. INTRODUCTION

Seaports are a vital link in many supply chains and distribution channels, particularly those involving international trade. Europe's competitiveness in the global economy increasingly depends on an efficient and cost effective transport and port system. The Community's port sector handles more than 90% of the Union's trade with third countries and around 30% of intra-EU traffic as well as providing an essential interface between seaborne and land-based modes of transport (European Commission, 1997). While it is acknowledged that the ports sector is not standardised or homogeneous (the ownership, organisation, and administration of ports as well as their size, functions and geographical location vary from country to country), the European Commission is keen to adopt a common approach to pricing in ports so that the real costs of port services should be borne by the users.

The purpose of this paper is to revisit the issue of port pricing and to discuss current aspects of both theory and practice. This work should be viewed in the context of recent attempts in Europe to introduce fair and efficient pricing into transport (European Commission, 1995). It is important to appreciate that ports are simply a part of the transport process and, while they are clearly a very important link in the chain between different modes of transport, to realise that, perhaps, some of the 'mysticism' apparently conferred on ports in much of the earlier literature is misplaced. Ports are no different from any other multi-product industry offering a range of services and operating under different environments and organisational structures. In short port pricing is an economic problem which can be addressed via economic techniques and principles and, while there may be different strategies or

objectives arising from different philosophies, the solution to the problem lies in economic theory. This view is supported by the recent Green Paper on Seaports and Maritime Infrastructure (European Commission, 1997) which discusses a common ports policy in Europe and where one of the main instruments for achieving this is an adequate pricing system for ports and port services. Such a system could improve the efficiency of ports as transfer points in multi-modal transport chains and could also ensure free and fair competition in the ports industry.

This paper will start from a welfare economics perspective using public enterprise theory and move towards private enterprise pricing in a (quasi-) commercial setting. It recognises that port pricing objectives will be different for economists, governments, port administrators, and port users and appreciates the possible conflicts of interest between these parties. It will also consider the questions of the elasticity of demand for port services and whether the move towards cost recovery might influence price discrimination. The paper will be structured in five parts with a full discussion of the port pricing literature following this introduction. The discussion will lead on to pricing in practice that will consider both the objectives guiding the existing price structures and the differences between public and private ports. This will be followed by a discussion on quality pricing and the conclusions will be presented in section five.

2. A REVIEW OF THE LITERATURE

As mentioned earlier ports may be owned by a variety of bodies, e.g. the State, regional/local government, or private enterprise, and subject to different degrees of regulation and supervision. In the past ports were seen as providing services of general public economic interest and were paid for through taxation. Nowadays ports are often considered as commercial entities required to recover their full costs from users. Hence a port may have several goals or objectives but Bennathan and Walters (1979) classified the underlying principles into two doctrines, which they called the (continental) European, and the Anglo-Saxon doctrines. The former views the port as part of the social infrastructure and hence assesses its value in terms of contribution to the development of the region and not necessarily in terms of profitability. The Anglo-Saxon doctrine, on the other hand, considers that the port should be self- sufficient and should make a profit (or at least should not make a loss). According to Veenstra (1999) the continental European view may be further classified as either (a) the Latin model which entails centralised control of ports or (b) the municipal Hanseatic model which involves autonomous port authorities as featured in Germany, the Netherlands, and Belgium.

The main pricing principles discussed in the literature may be classified as (1) cost based pricing; (2) methods for cost recovery, (3) congestion pricing, and (4) strategic port pricing. In addition the price structures used in privatised ports can be classed as "commercial" port pricing.

It is clear that ports are not homogeneous. They differ in what they offer to users in terms of resources, activities and services, often offering a mix of all three. Gardner (1977) pointed out that the port is an interchange point between land and sea transport and that the demand for port services is a derived one. As most of the services supplied by a port are provided to facilitate the movement of goods he claims that it is not logical to base any part of the charges for these services on the characteristics of the ships (for example on the vessel's length, draught or tonnage). Gardner argues that port prices, traditionally levied partly on ships and partly on cargo, should really only be based on the goods themselves. However the port tariff reflects the type of services offered to the user and typically tariff items are divided between charges to the vessel and charges to the cargo. Thomas (1978) discussed the form of such charges and pointed out that port charges could form a significant proportion of ocean freight rates and hence of total transport costs in international maritime trade. These charges are influenced by a variety of factors including the nature of the commodities carried/handled, the type of ship used, the volume of trade and the elasticity of demand for the commodity. It should be noted that more recent writings (Dowd and Fleming, 1994) have suggested that nowadays the cost of transiting a port represent only "a rather small fraction of total voyage costs for most long-distance inter-modal movements".

Jansson and Rydén (1979) developed a theoretical model of optimal port charging which proposed an occupancy charge as one of its components. Such charges are examples of "input pricing" i.e. prices depend on the amount of resource used, whereas many port tariffs are based on "output pricing" e.g. charges per tonne handled. Such prices generally will not make it easier to attain financial objectives.

Thus, Jansson and Rydén (1979) introduce a two-part tariff. Their suggestion differs, however, from the traditional two-part tariff scheme used by ports. Their model divides the port tariff into (a) a charge per tonne of cargo that would be differentiated with respect to the elasticity of demand and (b) a charge levied on the carrier to reflect the opportunity cost of using the facility, that is optimal occupancy charges. Thus, the theme to the writings of the late 1970s was that ports should move away from the archaic pricing systems of the nineteenth century into more appropriate pricing policies based on costs. Gilman (1978) wrote in favour of cost based pricing systems, based on the recovery of marginal social opportunity cost.

Button (1979) set out to assess the viability of an economic-based pricing system arguing also that the users of a port (when viewed as a public utility) should be charged the full marginal social opportunity cost of the resources that they use. Recognising that the application of short run marginal cost pricing in a decreasing cost industry, such as a port, would inevitably result in a financial deficit Button proposed three ways of recouping capital expenditure. One of these would involve a two part tariff using the marginal social opportunity cost based method for the cargo handled plus a fixed periodic standing charge being levied for the right to use the facility. In such circumstances the regular users of the port could claim priority over infrequent callers since the use of a "first come first served" system fails to reflect the actual demand each vessel has for port services.

Advocates of cost based pricing who point out that the basis for efficient pricing should be marginal instead of the traditional average cost pricing, take the economic point of departure. Since economies of scale exist both in providing port

infrastructure and for cargo handling equipment, this pricing rule requires subsidies for ports to cover the total costs unless capital expenditure is recouped as suggested by Button (1979). The fixed element of port costs represents a substantial share of total costs. For container operations as much as 80 per cent of the costs are independent of the number of vessels or volume of cargo handled. For break bulk operations the fixed element typically is smaller, but still 60 per cent of the costs are independent of the volume, see Bennathan and Walters (1979). Rudolf (1995) set the capital costs for container cranes at 70 per cent of total costs.

Ports are congested at times and congestion pricing has been advocated to obtain efficient exploitation of port capacities. The main part of the congestion costs is, however, related to the opportunity cost of vessel time. This reflects both the alternative income that the vessel forgoes by postponing the next fixture and the capital costs of the cargo. The latter of course depends on whether selling the goods is postponed or whether port congestion merely implies that storage time on board the vessel replaces storage time on land. Congestion pricing was discussed both by Bennathan and Walters (1979), and Vanags (1977) with the former pointing out that congestion pricing poses practical problems, since prices will have to vary over the season. Depending on the relative bargaining power of the port and the shipping firms, the mark up may accrue to the port or to the shipping firms.

Arnold (1985) suggested that port tariffs were based on a mix of pricing strategies designed to reflect the demand for port services, the competition between ports, and the cost of providing the services. The demand based pricing strategies are used when there is little competition and measure the demand according to the port user's ability

to pay and the benefits derived from using the port's resources. Such an approach requires considerable marketing data and is usually associated with a profit-maximising objective. Prices based on comparisons with other ports may involve a simple rate comparison between charges in competing ports or possibly a comparison of user costs based on the quality of service, and the generalised cost involving distance, time and inventory costs. The cost based pricing strategy is similar to those discussed earlier and Arnold considers a variety of measures on which to base costs. Average cost, average variable cost, marginal cost, and congestion costs are all possible bases. It is clear from his study that the different strategies require different analysis and different data. He suggests that the appropriate units of measurement should be those that are correlated with the main measures of sensitivity of demand e.g. the value of the cargo or the size of the vessel. In our approach we take this a little further and allow for differentiation according to time sensitivity, which, of course, reflects the value of the capital bound up in the cargo and the vessel. Ultimately what matters is that the port tariff should be designed to be consistent with the objective of the port which may be financial, marketing, operational, or economic developmental.

Existing pricing structures often suffer from trying to satisfy conflicting objectives - economists, ports, governments and users will all have different views on what constitutes an efficient port tariff. If governments require ports to pay a dividend then the efficient management of assets becomes the goal; economists want to minimise welfare losses; ports want to maximise throughput; and users now insist on transparency of charges and prices which reflect the cost of the services they have used. There is no single solution to the problem which is port pricing and Meyrick

(1991) considered the relevance of economic theory to this problem by asking the questions: who is right? Is it the economic theorist or the rationalist practitioner? The theorist would consider marginal cost pricing, second best pricing, and Ramsey pricing but might view sunk costs as irrelevant to pricing. The economic rationalist, on the other hand, might tend towards full cost recovery, financial targets, rate of return on assets and profit centres. Meyrick tends to support the rationalist point of view on the grounds that the theory is concerned with allocative efficiency and ignores several factors including technical efficiency and distributional considerations. One fear of users is that the price structure might be to their disadvantage in so far as elements of price discrimination (and perhaps cross subsidy) might work against them. It seems that any successful pricing policy would have to acknowledge the tradeoffs being made between financial and economic objectives, and between the rigid application of some managerial discipline and the encouragement of trade.

It is worth noting that in an earlier paper Meyrick (1989) had considered that "insofar as the focus in pricing is on costs at all, it is on the average cost of service provision rather than the marginal cost" and that typically "port accounting systems are incapable of providing a basis for pricing on anything other than an average cost basis". He concluded this paper by suggesting the following pricing guidelines:

1. The full cost of providing port services and facilities should be recovered from port users
2. Those costs arising from services or facilities provided for an identifiable user or group of users should be recovered from that user or group of users
3. Costs which cannot be attributed to specific user groups should be allocated according to the following principles: (a) all port users should make some

contribution to common costs and (b) the contribution that any group of users makes should not exceed the cost that they would incur if they were the sole users of the port and (c) within these limits cost allocation should reflect the benefit that a user derives from the service provision

4. The structure of port charges should, as far as possible, reflect the structure of costs
5. The cost of capital should reflect the opportunity cost of the original investment in the case of assets for which there is no ready market. For other assets, it should reflect the opportunity costs of holding the asset in its current use.

A similar cost axiomatic approach was discussed by Talley (1994) who argued that such an approach would avoid the conflict which might arise between marginal cost pricing and full cost recovery in ports as well as circumventing some of the difficulties associated with the measurement of marginal costs. He defines cost axiomatic pricing as " a pricing mechanism which determines the prices of the outputs of multi-product firms by allocating the full cost of production to all the outputs"; further, it assumes that the demand for port services is relatively inelastic with respect to port prices. Based on earlier work by Mirman et al. (1983) which shows that the Aumann-Shapley pricing mechanism adheres to the five axioms of cost sharing, rescaling, consistency, positivity and additivity (for details see the original text) Talley produces four axioms applicable to port pricing. These are rescaling, attributability, allocating, and additivity, which he then applies to a container terminal. This methodology determines prices that allow for full port cost recovery, do not require the estimation of marginal costs, and do not require the port to be cost efficient.

An alternative is to set prices according to “what the traffic will bear", i.e. using the Value of Service Principle (VSP). This means that a higher price is charged for handling more valuable commodities as these are assumed to be more elastic with regard to price than low-value commodities. (Jansson and Rydén, 1979). This is similar to using Ramsey pricing to obtain cost recovery, (Ramsey, 1927). In this case, the common costs are allocated reflecting differences among different users in elasticity of demand for the specific port services. Monopoly ports´ services tend to be inelastic as long as port costs make up a fairly low share of the price of the cargo though even in monopoly ports there may be alternatives for storage outside the port. Elasticity of demand therefore may be lower for cargo handling services than for the navigational aids offered by the port. If so this difference should be reflected in the allocation of common costs.

More recently and in revisiting the issue of port pricing some twenty years after their original report (UNCTAD, 1977), UNCTAD considered port pricing as a strategic issue (UNCTAD, 1995). Two basic approaches may be taken to pricing policy, economical or financial, with the former arguing for marginal cost pricing while the latter bases prices on accounting costs. The original UNCTAD report argued the case for the economic approach (with a focus on costs, utilisation, and what the traffic will bear) as did the later study, though the latter requested more flexibility based on three critical elements - cost, performance, and value. The idea of a value chain, Porter (1985) is common in the literature and may be applied to a port user (Haezendonck et. al., 1998). Table 1 below depicts the port's value chain that consists of distinct value-producing activities in the form of the movement, storage and processing of the goods, of the collection and delivery and movement aspects, and of inter-modal transfers of

cargo. Modern ports are seeking to extend their value chain by offering other logistics (value added) services and port authorities, faced by an ever increasingly competitive environment, are resorting to strategic planning and strategic pricing for their survival.

UNCTAD claim that "the cost, performance, value (or CPV) approach allows port managers through tariffs to accomplish different sets of objectives". Cost based tariffs can maximise the use of port services; performance based tariffs can maximise the throughput and reduce congestion; value based tariffs generate sufficient revenue to cover the port's costs. The CPV approach provides flexible limits within which to operate since the port must not charge less than the incremental cost of serving the user and cannot charge more than the value received by the user. Hence it establishes both a floor and a ceiling for pricing purposes.

3. PORT PRICING IN PRACTISE

3.1 The traditional approach

Port pricing schemes tend to reflect the fact that ports traditionally regarded themselves as providers of public infrastructure services which implies that the port is open to any ship calling. Furthermore there is no tradition for managing the approaches to ports. The tradition is “first come first served” irrespective of the different vessels contribution to port revenue.

Most ports were and still are publicly owned and administered. The authorities have incentives to reduce subsidies paid to the port irrespective of whether ownership is national, regional or municipal. Port administrators at the same time have incentives to increase or maximise throughput of the port. This implies growth of operation and thus of the opportunities open to port administrators. These incentives are not compatible in a setting without charges designed for cost recovery.

There are elements of cost recovery in traditional port pricing. They usually reflect either average cost pricing or a combination of charges and subsidies. Economies of scale exist in port infrastructure, e.g. in aids to navigation and cargo storage. Similarly there are economies of scale in cranes for loading and discharging cargo. Such economies of scale imply that the economic principle of marginal cost pricing would result in a deficit for port operations. Thus, financial objectives have traditionally been used in port pricing as pointed out by Meyrick (1991).

Two characteristics of traditional port pricing are striking. One is the tradition for discriminatory charges. The statement made by Talley (1994) very well illustrates this; “Tasmanian ports encourage regional development by discriminating among import and export cargoes”. Svendsen (1967) pointed out a similar favouring of exports. In some instances coastal transport is favoured against international transport, thus discriminating against both imports and exports relative to domestic transport. The second characteristic is the tradition of non-transparent or a rather complicated structure of port charges. As was seen in Table 1 above, charges are levied against the vessel and against the cargo, in addition to charges for specific services. Shipowners often claim that charges against vessels put shipping at a

disadvantage relative to road and rail transport where vehicles are not charged for their use of the terminals. Since charges levied on vessels will be reflected in the freight rates paid by the cargo owner, the effect mostly is one of adding to the non-transparency in port costs. That is, charges levied on vessels do not by themselves reduce shipowners´ profit as long as these costs may be pushed onto freight rates. The ability to do so is dependent on the elasticity of demand and on the proportion of total costs attributable to freight charges.

Port pricing in Norwegian ports follows the traditional pattern and may be listed as an example of the complexity of port tariff structures. The typical port will charge multiple tariffs, as illustrated in Table 2.

Port entry and berth dues are related to the size of the vessel. Figures 1 and 2 below show some differences between the different Norwegian ports. For most ports entry dues are similar per gross tonne irrespective of the size of the vessel. Thus, there is little discrimination between short sea and deep-sea vessels based on their difference in size. One exception, however, is the port of Kristiansand, which discriminates against smaller vessels in their entry dues. When both entry and berth dues are taken into account, however, the difference between Kristiansand and the other Norwegian ports included is reduced. Berth dues are illustrated in Figure 2. They decrease with tonnage and thus reflect the fact that quay space is limited in these ports.

3.2 Current ideas on port pricing

The demand for port services changes with the variations in the level of seaborne trade. The formation of the EU internal market is an important element in the ongoing development. There are both indirect effects, via trade development and changing trade flows, and direct effects of the EU policy on transport infrastructure, exemplified by the Trans European Network (TEN) initiative, the Green Paper on port policy (European Commission, 1997) and the Green Paper on fair pricing of infrastructure (European Commission, 1995). Such changes reduce the impact of national borders on the choice of ports. One result may be that more ports will face stronger competition. This competition will come, not only from neighbouring ports, but also from all ports that are used in alternative routes through the network.

Parallel to such changes in trade restrictions and trade flows, port operations in several countries are heading towards more commercial operations and the privatisation of ports has come furthest in the UK. The EU allows for a more economically based operation of ports, commercialising the dedicated services and opting for "user pays" charges to obtain cost recovery for the remaining public infrastructure services (European Commission, 1997). The remaining public service elements are navigational aids, dredging, waste disposal and the port state control measures introduced to secure safety and vessel quality. Port state control typically implies inspections of vessels during port calls.

Changes likes these have implications for the pricing policy for ports. Thus, we may ask; how may the trend towards commercial port operations change port pricing?

And, since the traditional port pricing schemes typically discriminated in favour of imports against exports and deep sea against coastal traffic, we may further ask; What implications may such changes in pricing policy have for the competitiveness of short sea shipping relative to road transport?

One would expect these changes to induce lower subsidisation of user specific services offered in ports. Allowing one port operator to supply both commercial and subsidised public services may also induce internal cross subsidisation between these types of services. Increased competition, both among ports already competing with each other and the opening up of competition among more geographically distant ports, may induce even more strategic port pricing. Such changes imply new challenges for price regulators and competition authorities.

In the UK there are three groups of docks forming the Port of Grimsby and Immingham: the Grimsby Fish Docks, the Grimsby Commercial Docks, and the Immingham Docks. Immingham overshadows Grimsby in terms of annual tonnage of trade but together Grimsby and Immingham make up one of the busiest port complexes in Britain, handling over 44 million tonnes of cargo annually. Port tariffs in Grimsby and Immingham are used as an example of "commercial" port pricing. The non-transparent structure of port pricing remains in these privatised ports. The structure of port charges is seen from Table 3 below.

We may note that the goods charges levied by these privatised ports reflect similar differentiation as the one used in liner shipping. Thus, the charges may not be set mainly to cover handling costs, but to reflect the value of the goods, i.e. a policy of

charging "what the cargo can bear". In the case of fish, for example, fresh fish is charged more than twice as much per tonne, compared to fish cakes.

The ports have kept a price structure that favours coastal traffic. Firstly, ship dues are approximately three times as much per net ton for vessels in international trade compared to coastal vessels. Furthermore in Immingham the dues for deep-sea vessels differs with trading distance with higher dues charged on vessels from far away. Thus, the dues are higher the higher the freight rates per tonne of cargo. In addition both ports charge goods in coastal trades 70 per cent of the dues specified for goods in international trade. Goods dues are not differentiated between export and imports. This structure may give a wrong impression, however. If most goods are either exported or imported, differences in dues charged for different goods may still imply higher dues for imports than for exports depending on the relative dues for typical import and export goods.

Figure 3 below illustrates that berth and mooring charges are fairly constant over the size of the vessels serviced. This is different from the traditional charging schemes in the Norwegian ports listed in Figure 2 above.

4. An alternative pricing strategy.

The policy suggestions put forward by the European Commission are motivated by the idea of "fair" pricing of transport infrastructure. By such a pricing policy uni-modal

transport should not be favoured relative to multi-modal transport using ports.[3] Increased transparency in port tariffs may also serve to increase the competitiveness of short-sea shipping and multi-modal transport. Both types of changes are motivated by a wish to reverse the preference of users for road transport over sea transport for general cargo and containers.

We have seen that coastal transport often is charged lower port tariffs and at first sight this may seem to suggest a policy aimed at strengthening sea transport competitiveness. However, such a tariff structure is nothing new and it has not been enough to lessen the established and common drift towards road transport. The relatively low tariffs charged to coastal traders merely compensate coastal shipping somewhat for their more frequent port calls for loading and discharging compared to deep-sea shipping. Hence any preferential treatment inherent in such charges is intra-modal rather than inter-modal in nature. Still, port charges make up only 5 - 10 per cent of overall transit costs for deep-sea shipping compared to 40 - 60 per cent for vessels engaged in short-sea trades. (European Commission, 1997).

Port efficiency must be higher to strengthen short sea shipping competitiveness with respect to road transport. Many cargo owners still regard road transport as faster and more punctual. Thus, port pricing strategies that take into account incentives to increase the efficiency in ports seem appropriate. Neither traditional nor what we have called "commercial" port pricing differentiates port prices according to such

[3] The basis for "fair" pricing is the user-pays principle combined with cost recovery of operating and external costs. Revenue shall cover both operating costs and future investments in infrastructure. Thus "fair" pricing implies long term marginal (social) costs pricing.

qualities of service. Quality of service has long been recognised as an important concept in supply chains and distribution channels and, by extension, this applies equally to transport and port activities. Such a concept is of crucial importance to industries, which provide services rather that produce output. Logistics, transport and distribution companies produce no physical output, rather the demand for their product is a derived demand for a service which requires them to satisfy the demands of consumers or users. Customer service is an integral part of quality and the idea of quality has been translated into quality assurance measures such as BS5750 in the UK or, more generally in logistics, as ISO 9002. Total quality management has evolved through several different forms and quality is often taken as a synonym for value-added activity since a quality product or service will add value to the processes involved.

In some manufacturing industries quality of product is the norm, i.e. good quality is built in rather than poor quality being inspected out, but this is by no means universal and the possibility arises that quality operations might attract a premium payment. It is certainly difficult to arrive at an unambiguous definition of quality in an industry providing services such as those offered by a port. The quality dimension of port services includes elements such as total time in port, punctuality and handling with little damage. A scheme of quality pricing may give port operators the right incentives to increase efficiency. In the following, we discuss a port pricing structure that takes such quality dimensions into account by letting shippers and shipowners chose between different qualities of port services.

At this stage we try to give an indication of what elements to include in such price systems rather than presenting a detailed structure of quality based port pricing. The demand for port services is variable over time, and ports do not have full information on the schedules of incoming vessels. In this setting port costs reflect the expected time in port and the punctuality in port operations, in addition to the different port dues or payable port costs. Thus total port costs would consist of:

$$C = d + f(t + p)$$

where d = tonnage and goods dues

t = duration of port stay

p = waiting time reflecting punctuality

f = costs per unit of time

The time or duration of the port stay and the punctuality are seen as quality factors. The duration depends on the time for handling vessels and cargoes, while quality class defines the punctuality requirements. This quality dimension can be specified, as a guarantee on total handling time for the vessels and the total time needed for the goods to pass through the port. The value of speed and punctuality reflects the opportunity cost to shipowners of fewer fixtures per period and to shippers of having to wait for the goods to be delivered. These opportunity costs vary with the length of the delay and the value of the goods in their final use.

We suggest a two-part tariff to capture the two-dimensional cost structure. The two parts reflect the demand elasticities of price and of time, respectively. The first replaces vessel and goods dues and is fixed irrespective of quality class. The second

part should reflect quality class with higher prices for fast and punctual port services than for port services without any quality guarantee. The two-part tariff suggested here differs from that discussed by Button (1979) even though he suggested a structure with one part based on marginal social opportunity costs combined with a fixed periodic standing charge levied for the right to use the facility. Button focuses on the opportunity cost of too little port capacity, whereas we concentrate on the opportunity cost of too little choice i.e. of not being allowed to choose from different port service qualities.

It does not matter whether the fixed port due and the price paid for a specific quality class are levied on the shipowner or the cargo owner. If levied on the shipowner, the shipper will pay port costs as part of the freight rate. Whether the shipowner´s outlay is covered by the freight rate in full or in part, will depend on the conditions in the freight market. If port dues are levied directly on the cargo owner, this implies that the freight rate is a net transport cost to the shipper for the sea leg only. Both the fixed element and the quality dependent port price may of course be split between the vessel and the cargo owners. This reduces transparency in port costs, however, without adding to the incentives of the port to offer a service that is more consistent with the time sensitivity of the vessel and the cargo.

The above scheme is not only relevant to congested ports where vessels may have to wait before being discharged or loaded. Generally, some over-capacity in ports is economical. Estimates from Swedish ports for example indicated an optimal occupancy rate of as low as 40 to 60 per cent of port capacity. (Jansson, 1984). This follows from the high time costs for the vessels themselves and also that of the cargo.

Hence ports with ample berthing capacity may also differentiate their service by guarantees on the total handling time and the total time for goods to pass through the port, i.e. to ration capacity when the port faces bottlenecks hampering the flow of goods through the port. Such pricing schemes give the port incentives to increase their efficiency in port operations by being able to offer time guarantees to time sensitive users.

5. CONCLUSIONS

We have suggested a pricing policy for ports where price differentiation is not based on the value of cargo (a traditional basis for tariff differentiation in transport) but rather we suggest that port prices be differentiated based on the quality of port service. Relevant quality factors are the time in port, and the punctuality of handling the vessel and its cargo.

Earlier we asked what implication changes in pricing policies for ports might have for the competitiveness of short sea shipping relative to road transport. In a system with price differentiated as suggested here, the distinction between short and deep sea shipping is less relevant. When one focuses on differences in valuation of speed and punctuality of port operations, some but not all vessels operating in short sea shipping will be time sensitive, as will some of the deep-sea vessels. Thus, short sea vessels competing with road transport for their cargo will be time sensitive. Short sea shipping transporting heavy bulk cargoes like sand and stone will not be as sensitive

to time. These segments of short sea shipping will be price sensitive, however. Similarly deep-sea container shipping will be more time sensitive than bulk shipping.

In conclusion it is clear from the range of ideas presented in the literature and discussed in this paper that there is no shortage of ideas or principles to follow and that this is such a complex topic that it appears unlikely that there could ever be one simple panacea. There is no single pricing principle that would be universally applicable to all ports but perhaps a more flexible approach might be useful.

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TABLE 1 THE PORT'S VALUE CHAIN

SERVICES TO THE SHIP

- ***Safe Navigation***
  - Aids to navigation
  - Dredging
  - Pilotage,
  - Towage
- ***Services at the Berth***
  - Berthing
    - Stevedoring, wharf handling
    - Equipment, short-term rental
    - Water, bunkers garbage removal
    - Electricity and communications
  - Stowage planning

SERVICES TO THE CARGO

- **Cargo Processing, Storage**
  - Storage, short-term
  - Storage, long-term
    - Processing to different form
    - Consolidation/ deconsolidation
    - Equipment, short-term rental
- ***Information Processing***
  - Cargo inventory
    - Notification of vessel and cargo arrival
  - Cargo clearance

OTHER SERVICES TO USERS

- ***Leasing land, other resources***
  - Office space
  - Warehouses
    - Equipment, long-term rental
    - Land for development
    - Land for operations
- ***Security***
  - Vessels
  - Cargo

OTHER PORT ACTIVITIES

- ***Marketing and Sales***
  - Market analysis
    - Marketing activities
- ***Human Resource Development***
  - Training
  - Recruitment
    - Reorganisation of work and gangs

Source: UNCTAD (1995)

TABLE 2. PRICE STRUCTURE CHARGED BY NORWEGIAN PORTS

TONNAGE RELATED DUES

- ***Entry dues***
    - Decreasing by vessel size
- ***Berth dues***
    - Decreasing by vessel size
    - Charged per day

CARGO RELATED DUES

- ***Cargo and traffic dues***
    - By tonne cargo or by TEU
    - Traffic dues for imports only

PASSENGER DUES

SERVICE RELATED DUES - RENTING COSTS FOR

- ***Ice-breaking***
- ***Storage***
- ***Cranes***

Source: Fjærli (1997)

TABLE 3 EXAMPLE OF "COMMERCIAL" PORT PRICING, (UK). Structure of charges in the privatised ports of Grimsby and Immingham**.**

TONNAGE RELATED DUES

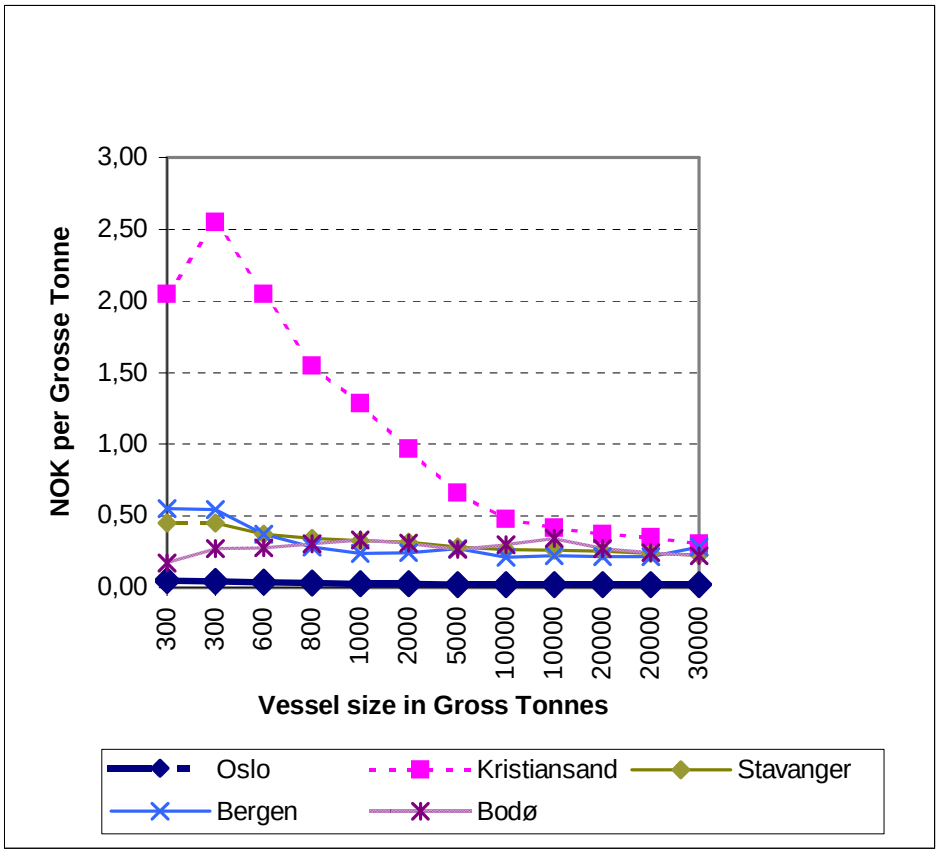
- ***Ship dues***
    - Favour coastal shipping
    - For international trades dues are progressive with distance (Immingham only)
    - Increasing with length of port stay
- ***Berthing and mooring charges***
    - Similar across ship sizes

CARGO RELATED DUES

- ***Goods dues***
    - Per tonne cargo, strongly differentiated depending on value of cargo
    - Favouring coastal trade.
- ***Related to cranes and equipment hire***
- ***Hire charges***
    - Obtained by application to the port manager

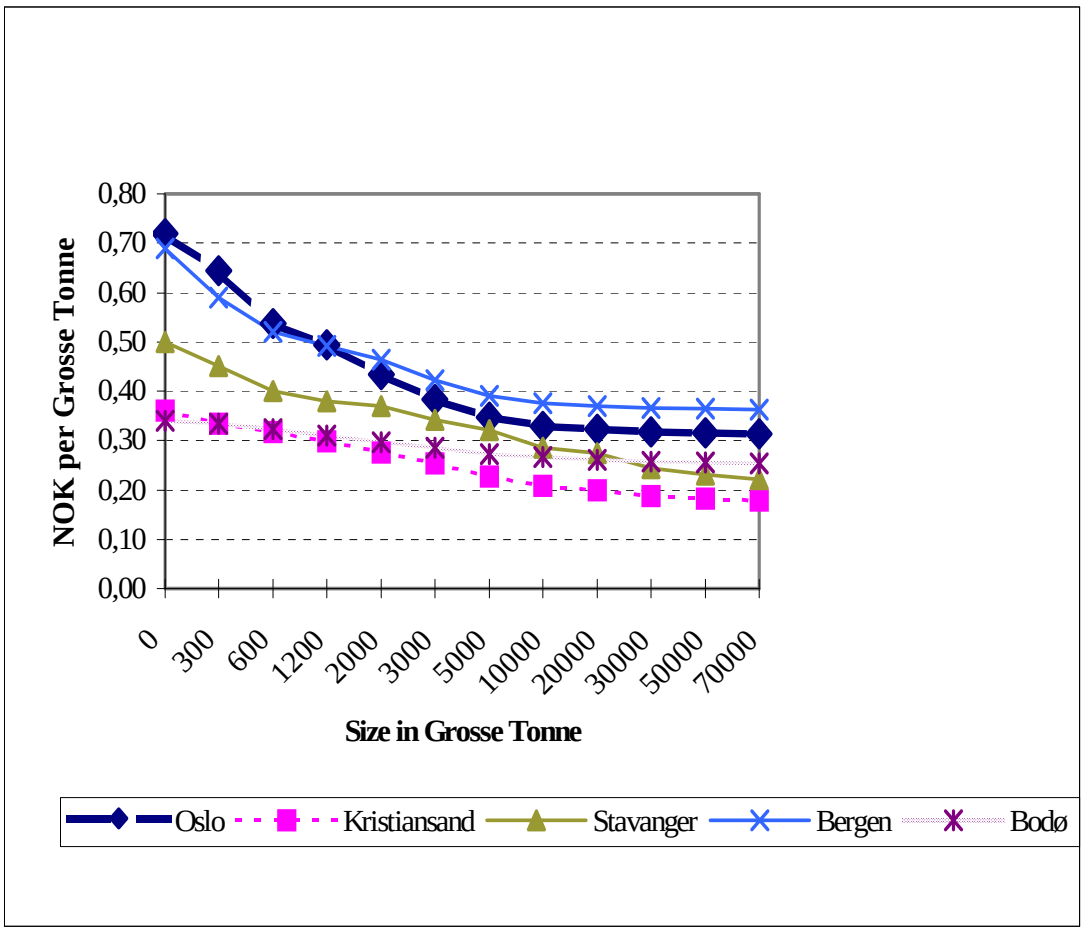
Source: Grimsby and Immingham (1998)

FIGURE 1 NORWEGIAN PORT ENTRY DUES PER GROSS TONNE



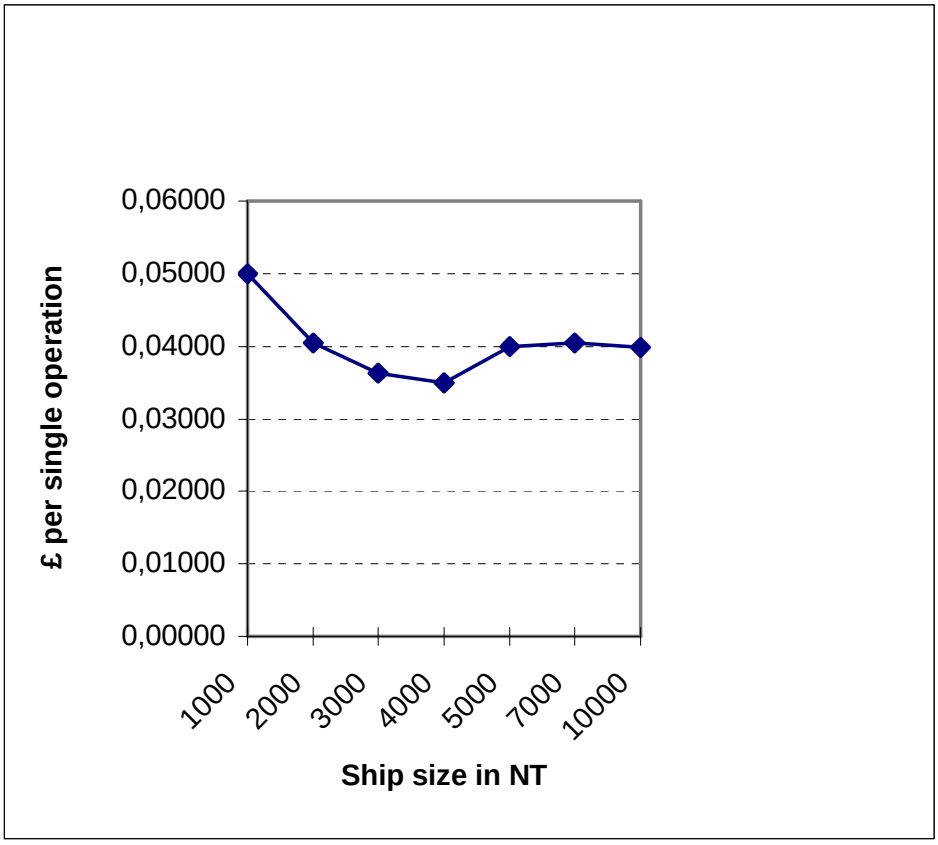
Source: Data from the individual ports, compiled from Fjærli (1997)

FIGURE 2 NORWEGIAN BERTH DUES IN GROSS TONNE



Source: Data from the individual ports, compiled from Fjærli (1997)

FIGURE 3 BERTHING AND MOORING CHARGES, IMMINGHAM (1998).



Source: Grimsby and Immingham, 1998.