

Czerny, Achim I.; Mitusch, Kay

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Cooperation and Competition in the Cargo Liner Shipping Industry

*Achim I. Czerny, Kay Mitusch**

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Abstract

It is widespread international practice that cargo liners meet at regular conferences to fix prices and quotas for individual routes. Presently, however, the respective European regulation granting liners an exemption from competition laws is under review. Liners claim that conferences are a necessary pre-condition for the provision of reliable services. In contrast, we demonstrate that there is little evidence for a destabilizing effect of competition, while conferences can themselves give rise to instability. The liners association (ELAA) has, in response to the EU review process, proposed an information exchange system as an alternative. In our view this has some merits. Transfer of data might even be mandatory, information output should be aggregated and anonymized and made available to the general public. We are skeptical, however, about any 'discussions' between liners that go further than anonymized information exchange.

* Both authors come from the Berlin University of Technology, Workgroup for Infrastructure Policy (WIP), aic@wip.tu-berlin.de, km@wip.tu-berlin.de.

Zusammenfassung

In der Containerseeschifffahrt ist es weltweit üblich, dass sich die Reeder in Konferenzen über Frachtraten und -quoten für spezifische Handelsrouten abstimmen. In Europa wird jedoch die Regulierung, die diese Ausnahme vom Wettbewerbsrecht erlaubt, von der EU-Kommission zur Zeit überprüft. Die Reeder argumentieren, dass Konferenzen nötig sind, um ein stabiles Angebot sicherzustellen. Wir kommen jedoch zu dem Schluss, dass es keine Anhaltspunkte für außerordentlich destabilisierende Effekte von Konkurrenz gibt. Im Gegenteil zeigt sich, dass eher die Konferenzen destabilisierende Effekte erzeugen können. Die Assoziation der Reedereien (ELAA) hat, unter dem Druck der Überprüfung durch die EU, als Alternative die Einrichtung eines Informationsaustauschsystems vorgeschlagen. Dies hat aus unserer Sicht einige Vorteile. Man könnte die Übermittlung von Daten sogar zur Pflicht machen; der daraus gewonnene Informations-Output sollte aggregiert und anonymisiert sein und der allgemeinen Öffentlichkeit zur Verfügung gestellt werden. Wir sind jedoch skeptisch gegenüber „Diskussionen“ zwischen den Reedern, die über den anonymisierten Informationsaustausch hinausgehen.

1 Introduction

The containerized liner shipping industry is a vital factor for the European economy. Container transport by sea accounts for around 20% of EU25 external trade in value terms (import and export, EC 2004). The worldwide largest three liners are European ones (see table 1). The routes connecting Asia and Europe, jointly with the routes connecting Asia and the USA, are by far the most important trade routes. Furthermore, since the yearly growth rates of trades from Asia to the USA and to Europe amounted to more than 15% in 2003 the relevance of those routes increased significantly (see table 2), and can be expected to be growing in the future.

Table 1 Top 10 liners.

Liner	Country	Number of Ships	Capacity in TEU*	Share of world capacity
Maersk/Sealand	Denmark	305	848,611	9.4%
MSC	Switzerland	250	649,403	7.2%
P&O Nedlloyd	UK/Netherlands	144	412,519	4.5%
CMA CGM	France	124	353,678	3.9%
Evergreen	Taiwan	124	344,285	3.8%
APL	Singapore	96	307,094	3.4%
Cosco	China	110	274,465	3.0%
Hanjin	Republic of Korea	68	271,644	3.0%
CSC	China	103	247,812	2.7%
NYK	Japan	74	243,339	2.7%
Sum		1,398	3,952,850	43.6%
World fleet		7,594	9,070,065	100%

*TEU: Twenty foot equivalent unit.

Source: Containerization International online database accessed 29 January 2005.

Table 2 Estimated cargo flows in millions of TEU along major trades routes.

Year	Asia-USA	USA-Asia	Asia-Europe	Europe-Asia	Europe-USA	USA-Europe
2002	8.81	3.90	6.13	3.94	2.59	1.50
2003	10.19	4.12	7.06	4.00	2.56	1.58
% change	15.70	5.60	15.20	1.50	-1.0	5.30

Source: UNCTAD, 2004.

2 Cooperation in the liner shipping industry

A closer look at table 2 shows that cargo flows are not balanced on the most important trade routes. Flows from Asia to the USA exceed those in the opposite direction; likewise, flows from Asia to Europe and from Europe to the USA are significantly higher than the respective flows back. To manage such imbalances, to meet the growing demand, and to improve cost efficiency liners engage more and more in various forms of cooperation. Consortia and alliances have become of special importance during the last decade. Consortia represent operational, technical or commercial agreements between different sea carriers to pool all or some of their activities on particular trade routes (PC 2004). Alliances represent agreements between carriers to cooperate on a global basis.

It is noteworthy, however, that consortia and alliances do not fix cargo rates or quotas. Therefore, they complement conferences, which have a long tradition, where liners meet regularly and decide jointly upon cargo rates and shipping quotas for trading routes. While cartels are usually forbidden by competition laws, liners enjoy a special status, almost throughout the world. In Europe, for example, Council Regulation 4056/86 allows certain categories of agreements, decisions or concerted practices by liner shipping conferences which boil down to a block exemption from Article 81(1) on competition of the EC Treaty (EC 2004).

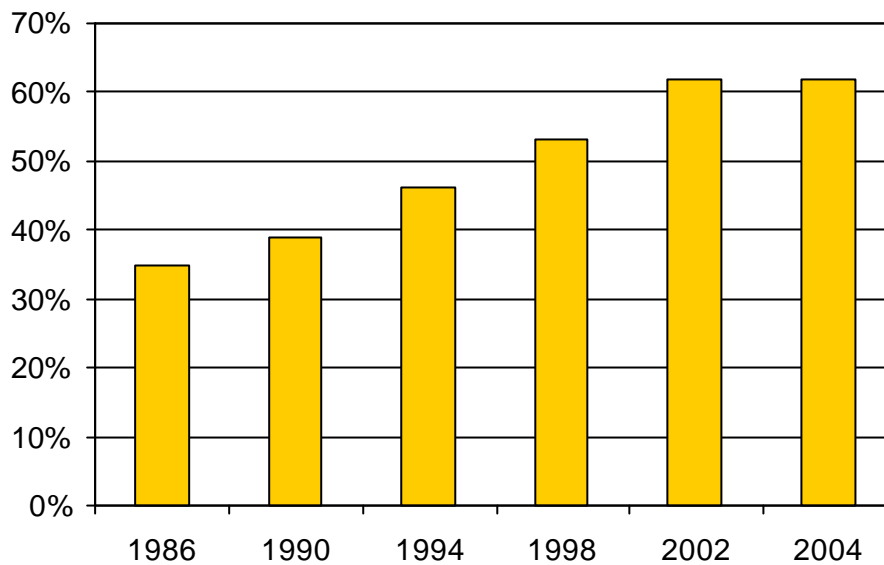
During the 1980s, non-conference liners (in the following 'independent liners') began to play a bigger role (FMC 2001), particularly for the US and Australian trades. As a consequence, so-called 'discussion agreements' evolved as another form of cooperation between liners. Discussion agreements provide a forum for information exchange between conference liners and independent liners. In contrast to conferences, they do not make binding agreements on freight rates and capacity. Still, delicate information is being exchanged, covering freight rates, costs, capacities,

and conditions of service for particular routes, so that discussion agreements also require exemption from cartel laws (PC 2004).

The rationale for block exemption was the presumption that the liner shipping industry, in contrast to other industries, operates under unique conditions of 'inherent instability'. The following specific features of the industry are brought forward (ELAA 2004). Demand is inelastic, but of great variability (sensitive to business cycles, exchange rates, and other), and unbalanced on important trade routes. Supply conditions are characterized by high fixed costs (of, e.g., ships) and lumpiness of capacities, implying inelastic supply both in the short and medium term. Since there is no or little regulatory intervention, periodic incidents of over- and undercapacity would evolve in the absence of conferences, with the consequence of erratic price movements. These would imply high risk for some operative decisions and for investments. The result could be a collapse of investments and a breakdown of the market on certain routes. To avoid this, conferences and discussion agreements are deemed necessary pre-conditions for the provision of reliable schedules to shippers.

Shippers, however, are critical of the stabilizing effects of conferences (ESC 2004). They complain that conferences act as a barrier to trade, inflate shipping prices and threaten the sustainability of international shipping services. Partly as a response to these complaints, EU Regulation 4056/86 is currently under review. The question is whether the 'uniqueness' of the liner shipping industry is still important enough (if it has ever been) to justify the exemption from competition laws. This is to be seen in the light of recent market developments. The growing importance of consortia and alliances and the increasing concentration in the liner shipping industry during the last 20 years (see figure 1) put into question whether liners are so vulnerable to regional or temporary market conditions. Moreover, liners increasingly offer long-run service contracts. Such contracts establish cargo rates for a predetermined period and thereby contribute to rate stability (EC 2004).

Figure 1 Twenty largest carriers' share of total liner shipping capacity.



Source: Productivity Commission, 2004.

3 A closer look at 'inherent instability'

Price movements are a common phenomenon in many markets. In some markets, like oil, we experience long and protracted price swings. In other markets, like hardware and software, dramatic price falls have been observed. There are also markets with excessive price fluctuations and supply conditions that are comparable to the liner shipping industry, like the airline industry. However, in none of these cases did we see a collapse of investments or a breakdown of companies on a massive scale. Let's therefore take a closer look at the logic behind the claim that liner shipping markets are 'inherently unstable', and try to assess its consequences.

Unstable prices under stable demand and supply conditions

The standard explanation of 'inherent instability' rests on the possibility that there may not exist a price equilibrium in the liner shipping market. The argument, as put forth by Sjostrom 1989 and Telser 1996, can be illustrated by a simple example. Suppose a market with two liners, one ship each, and three shippers. Each shipper wants to ship exactly one good and is willing to pay at most 10 Euro for the transfer.

Each liner has a transport capacity of two goods and the cost per trip is 5 Euro. This example has some of the properties mentioned above: demand and supply are lumpy, and inelastic for a wide range of prices. In particular, one liner can operate at full capacity while the other has to put up with half capacity. We show that there is no stable price (per good transferred) that clears the market. Moreover, there is not even a stable combination of two *different* prices by the two liners that could prevail.

To see this, suppose liner A sets a rather high price, say $p_A=8$. Liner B would then undercut him slightly, say $p_B=7.5$, in order to attract two shippers and earn $15-5=10$. Since liner A would then earn only $8-5=3$, he would now have an incentive to change its initial price and undercut liner B. The same argument can be applied to any price higher than 5, which shows that there is no stable price equilibrium in which a firm chooses a price higher than 5. Now suppose that liner A sets a rather low price, say $p_A=4$. Its rival will then compare two alternatives. He can either undercut liner A (this yields at most $8-5=3$), or rather set a very high price and be satisfied with only one customer (this yields at most $10-5=5$). Whatever he does, liner A will again have a reason to revise its price. In particular, if liner B chooses a very high price, say $p_B=9.5$, then liner A would want to *increase* its price to, say, $p_A=9$. The same argument can be applied to any price below or equal to 5. In short, liners find no price at all that makes them satisfied with their choice, given the response by the other firm. They always find a reason to revise it.

The example shows that, indeed, prices can be inherently unstable. But what is the consequence? It does not mean that the market breaks down. In our example, liners would simply try to take each other by surprise. One can actually calculate the probability density function of their price-mixing behavior (a mixed-strategy equilibrium). Choice will be confined to prices between 5 and 10, so that both liners will almost always make a positive operating profit. If the situation of our example would come up regularly, firms will sometimes turn out to be lucky (“this time I managed to undercut my rival slightly” or “this time I rightly chose a high-price, since my rival’s offer was just too cheap to undercut”) and sometimes not so lucky.

From everyday experience we are well-acquainted with such pricing behavior. It resembles the well-known sales offers by large retail stores – with the latter being far from a breakdown. Recent examples from the transport sector are the irregular price cuttings and sales offers in the airline industry. There may be some indications that

this industry could be ripe for a consolidation; but no-one expects that airfares will ever rise again to the heights of former times. In our simple example, the expected profit of each liner would be about 5 and the expected price about 7; a stable cartel, in contrast, would fix the price at almost 10, leaving no surplus for the shippers.

Unstable demand

In the above example there is price instability in spite of stable demand conditions. Let's now extend the example by adding demand uncertainty. Suppose that there may turn up either two, three, four, or five shippers in the market (each event with probability 0.25). If only two shippers turn up, capacities of the two liners are grossly oversized, so that prices will be driven down to 2.5. Only one ship will make the trip, and both liners' operating profits will be zero. The case with three shippers has been discussed above; it results in a price-mixing behavior yielding an expected operating profit of about 5 that can be used to cover fixed cost elements. When four shippers turn up, capacities are just right and, if shippers have difficulties negotiating, the prices will be quite high. Prices will be particularly high when there are five shippers; rates are then competed upwards due to capacity shortage.

Taking the expectation of operating profits over all four market situations yields a strictly positive expected operating profit that can be used to cover fixed cost elements. (If expected profits are extraordinarily high, market entry by other liners would bring them down to normal rates.) Thus, there is again no reason for a breakdown of the market or a collapse of investments. There is of course price variability but, as in many other industries, price swings cancel out in the longer run. Particularly the larger carriers will be able to diversify price risk internally so that it should not affect their investment decisions very much. Note finally that the price-mixing behavior appears only in one out of the four situations (namely, when just three shippers turn up); it seems to be a rather rare phenomenon.

Our example suggests that prices in the liner shipping industry may be, but need not be, inherently unstable in the absence of conferences. Moreover, if they are unstable, this need not be a problem. Things will be different when there are conferences. Not only can average prices be expected to be higher, there might also be more instability in the market. This will now be demonstrated.

4 The effects of conferences

How do conferences affect the market result? If all liners join the conference and choose prices to maximize their joint profits, prices would clearly be higher. In our example, price would be set at (almost) 10, regardless of the number of shippers who turn up, to extract surplus from the shippers.

Since conference membership is not mandatory, but open to everyone, one might wonder how many liners will actually join in. On the major trade routes conferences have market shares between 40% and 70% (EC 2004). Therefore, competition between conference liners and independent liners is of significant importance. When a liner chooses to join the conference or not he will compare two effects. On the one hand, it is attractive to become an independent liner and be able to undercut the conference price (second-mover advantage in price competition). This is based on the realistic presumption that the conference, which dominates the market and has some inertia in its decisions, is a price leader and independent liners are the followers. Of course, the conference will anticipate competition by the independent liners and start out with a rather low price. Therefore, on the other hand, reducing the number of independents by joining the conference has the advantage that one can profit from a rather high price, since the conference price will be the higher the lower the number of independent liners. Comparing these effects, each liner will decide to join the conference or not. Depending on the total number of firms, it turns out that either all join in, or that there is also a group of one or more independent liners around it. Generally, the following holds. For any given number of carriers, prices are the lower the larger the number of independent liners is. Quite plausibly, price will be somewhere in between the case of full conference membership and the fully competitive case (i.e. without conferences). Moreover, the larger the number of carriers in the market the larger will be the subset of independent liners. Thus, the larger the number of carriers in the market the lower will be the price. In any case, a ban of conferences would always lead to a further price reduction.

Table 3 Pay-offs of a conference liner (first number) and a potential entrant (second number) when the potential entrant chooses from (N,C,I).

N	C	I
3, 0	0.5, 0.5	-1, 1

Moreover, competition between conference liners and independent liners turns out to be another source of market instability once the possibility of entry is taken into account. A potential entrant can choose between three alternatives: becoming a conference liner (C), becoming an independent liner (I), or not entering the market at all (N). Table 3 illustrates a situation of inherent instability. It assumes that, with a given number of firms before entry, everyone would join the conference. The potential entrant, liner A, can choose from the strategies (N,C,I). For each strategy the table lists the payoffs of each conference member and of the entrant, assumed in this example. As the numbers indicate ($0 < 0.5 < 1$) the entrant would prefer to enter as an independent liner (here the second-mover advantage dominates). However, once this has happened, the market is not profitable any more for conference members (the -1). Hence, one of them, say liner B, should leave the market (assuming that it is not profitable to become a second independent liner). After this has happened, the number of liners in the market is the same as before, and, as already stated, for that number it is optimal for all of them to join the conference. Thus, the entrant A who came in as an independent liner will now have an incentive to join the conference. But if he does, this will invite the other liner, B, who dropped out of the market, to re-enter again as an independent liner. And so on.

One might argue that the independent liner A will not join the conference if this triggers re-entry of liner B. But why not? If liner B re-enters, some other conference liner (say, liner C) might drop out of the market as a response. Moreover, the sequence of moves is not always as clear as indicated above. There may also be some uncertainty or inertia in liner B's re-entry to the market. Therefore it is quite plausible to expect some circling of market participation and of conference membership in the above example. Is this a problem? It is more of a problem than the mixing of prices that we observed in our first example. Mixing and circling with market entry and exit is directly related to investment decisions, and there are also real transaction costs of entry and exit (like fixed costs of renting harbor facilities and

making some specific investments in harbors; costs of licences, advertising, and reallocation of ships).

It therefore appears that the existence of conferences (with non-mandatory, but open membership) not only leads to higher prices on average, but also to more uncertainty with respect to entry and investment decisions. Concerning uncertainty, there might be a tragic misperception in the liner shipping industry. There is a traditional consensus among liners that conferences contribute to stability of supply conditions. Thus, if one observes market instability which is actually induced by the presence of a conference, liners would tend to reinforce their support of the conference for its presumed stabilizing effect.

5 ELAA proposal for an Information Exchange System

As a response to EU Commission's review of Regulation 4056/86 (block exemption) the European Liners Affairs Association (ELAA) was established in May 2003 to represent the liners' position in this process. On 6 August 2004 the ELAA submitted a "Proposal for a new Regulatory Structure" (in the following "the Proposal") accompanied by two market studies by Charles River Associates. In the Proposal the ELAA pursues a two-tier strategy. In a first line of defence, it denies need for reform of Regulation 4056/86, arguing that conferences are effectively not used to push up prices above average costs (at least since about 1998). However, in view of the fact that the block exemption is under heavy criticism by the EU Commission, the ELAA proposes, in a second line of defence, that at least an information exchange system should be allowed in the future, quite similar to the 'discussion agreements' in U.S. and Australian trades. The design of the system is sketched in the Proposal. The ELAA emphasizes that, in contrast to Regulation 4056/86, the new Proposal makes no reference to 'price fixing' or the 'regulation' or 'limitation' of supply or capacity, and rightly points out that this represents a significant change in the position adopted by the industry.

The proposed information exchange system is run by the industry itself. Industry bodies or agreements will set up 'committees per trade' that carry out the operative tasks. The system will still require exemption from competition laws, due to the kinds

of information to be exchanged. These are (cited from the ELAA proposal, see also figure 2):

1. Exchange and discussion between lines of aggregated capacity utilization and market size data by trade and on a region/zone to region/zone basis (historic data with a month's delay);
2. Exchange, discussion and evaluation of commodity developments by trade (based on data aggregated with a month's delay);
3. Discussion and evaluation of aggregate supply and demand data by trade/commodity. Forecasts of demand by trade and commodity would be published;
4. Lines will obtain their own market share by trade, by region, and by port (data aggregated with a month's delay);
5. Price index differentiated by type of equipment (e.g. reefer, dry) and/or trade (data aggregated with a quarterly delay). This information would be made publicly available;
6. Surcharges and ancillary charges based on publicly available and transparent formulae; the details of which would be discussed with shippers.

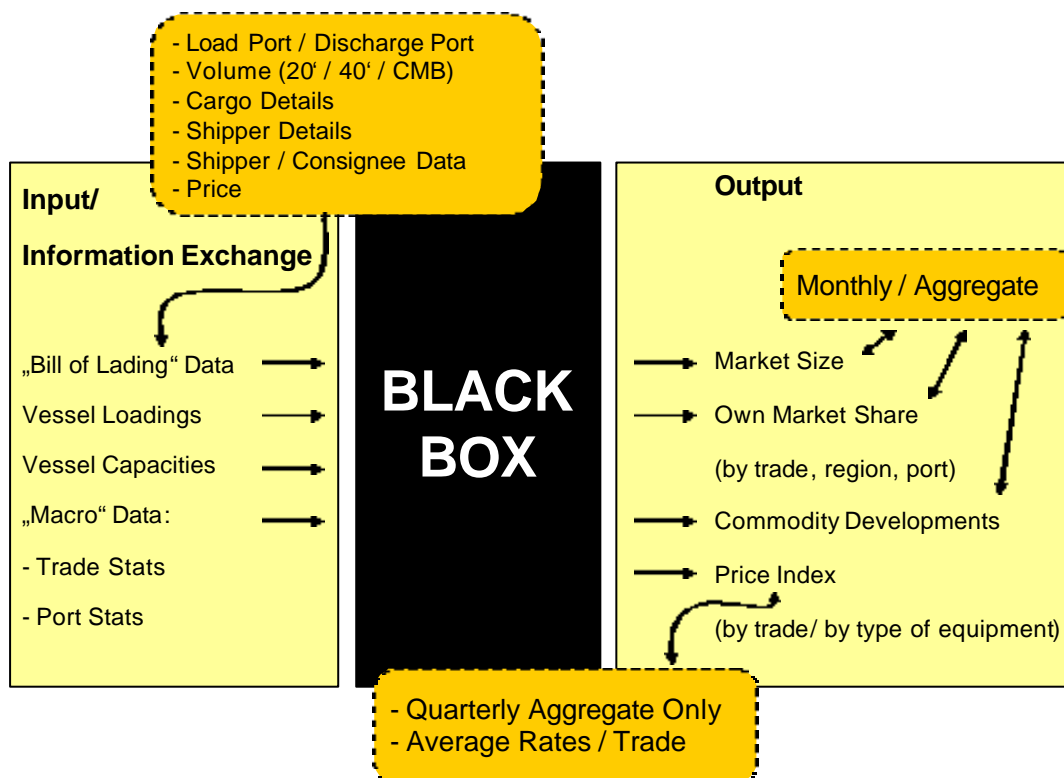
The Proposal leaves some room for discussion. The main question is whether an information exchange system and discussions will facilitate tacit collusion (i.e. collusion which works without any explicit agreement at all) or hidden collusion (which is based on illegally organized agreements and enforcements) that could replace the current system of legalized agreements on prices and quantities. This question is discussed at some length in a study 'Competitive Impacts of Information Exchange' by Charles River Associates as annex to the Proposal. To a large extent it surveys the recent literature on industrial organization on the topic. It should be noted, however, that the CRA study is silent about the 'discussions' of data.

Pros and cons of information exchange

A good starting point of the CRA study is the assertion that information exchange is almost always positive to welfare (i.e. to all the parties involved: liners, shippers, ports, and final consumers) if it does not give rise to competition concerns. The point

here is that liners, although in competition, have many common concerns over which they would like to exchange information. The CRA study lists many economic aspects that can be improved by such information exchange: development of new products, investment decisions, organizational learning, lower search costs, and so on.

Figure 2 ELAA proposal for an information exchange system.



Source: ELAA 2004.

There are, however, some counter-examples where information exchange might not work to the benefit of all parties. In particular, shippers may feel uneasy that too much information about them is being exchanged, allowing liners to price-discriminate very effectively among them, so that most of the surplus is drawn away from them. This is an instance where information exchange has a 'collusive effect' without any collusion at all (neither tacit nor hidden). Firms simply inform each other about current demand characteristics which helps them to extract higher rents from shippers. The example shows that the content of information exchange should be controlled by competition authorities and revised regularly.

The Proposal acknowledges that some important pieces of information should be made available to the general public (namely, demand forecasts, price indices, and

surcharge formulae; see items 3, 5, and 6 of the list above). This leaves the question why information on capacity utilization, market size, and particularly commodity developments (items 1 and 2) and possibly also some market concentration indices (as part of item 4) shall not also be publicized. Shippers and ports, for example, may want to use this information for improving efficiency. Furthermore, an extensive data base can improve the ability of competition authorities to watch and evaluate the market.

One might ask whether liners would be less willing to convey data if all information output is made public. However, if liners want to inform each other, but not ports or shippers, the information is probably used to the disadvantage of the latter ones, so that its exchange should not be allowed. To conclude, we are sceptical about any non-public exchange of information.

Anonymized information

With reference to the theoretical and empirical literature on industrial organization (particularly an earlier survey by Kühn and Vives 1995) the CRA study warns that the exchange of individualized information (i.e. single liners' prices, quantities, or general contracting conditions) would be particularly conducive to collusion because it would allow to pin down individual behavior and write hidden contracts, i.e. internally enforceable cartel agreements, on it. A look at the Proposal confirms that information output is planned to be aggregated and anonymized. Indeed, aggregating the data to a sufficient degree is probably the right measure to avoid its use as a basis for collusion. This argument calls for transmission of only coarse information to guarantee that carriers do not receive individualized information about competitors. Taking this into account, it appears to be a risky idea to provide liners with more detailed information on their own market position, as is proposed in item 4 of the list. Cartels could use data on individual market shares to monitor each other, by agreeing on a regular, hidden exchange of this (hard) information.

According to the Proposal, information transmitted should be based on historic data with a month's delay. On the other hand, the ELAA points out that it would be useful for planning purposes to make more recent data available (in the current system, information is exchanged on a weekly basis). The relevant issue is again that of anonymity. If it is not possible to single out individual transactions from the changes

in aggregate market data there is no reason not to provide market data more frequently, say every one or two weeks.

On designing an information exchange system

To sum up, an information exchange system seems to be useful and welfare enhancing if it is carefully designed and under constant control of competition authorities. The Proposal assumes that an information exchange system is based on voluntary participation. This rises questions about, both, the completeness and reliability of the data set, since an industry committee based on voluntary participation may not have the authority to enforce quality standards. Therefore, in order to guarantee a high quality of data for planning purposes, a mandatory information exchange system, where liners are liable for the quality of data provided, might be more advisable.

All information output must be anonymized and aggregated to a sufficient degree to impede collusion. As long as this requirement can be met, data should be provided with a high frequency, may be every one or two weeks, in order to ensure that liners can quickly react to new market developments. In principle, all information should be made public. The exclusive provision of individualized data on market shares to the respective liners should only be allowed if it can be guaranteed that this data cannot be exchanged between liners as hard information. Furthermore, the competition authorities should have access to the raw data in case of a dispute on anti-competitive behaviour.

We are sceptical with respect to 'discussions' of market data. It is noteworthy that the Proposal, as well as the accompanying CRA study, is completely silent about the exact content and purpose of 'discussions' (let alone stating any rules). The cloudy word alone stirs suspicions that 'discussions' will turn out to be a formidable platform for communication between liners that can be used to hamper and manipulate competition. There are many examples where firms proved to be very inventive using communication channels open to them for colluding. Thus, unless the ELAA can give very good reasons for very well-defined 'discussions', the latter ones should not be allowed.

6 Conclusions

EU Regulation 4056/86, that gives cargo liners the right to hold conferences to fix prices and transport quotas (block exemption), is currently under review. It was implemented on the grounds that the cargo liner shipping industry supposedly suffered from an 'inherent instability'. We have illustrated a situation in which there does not exist a market equilibrium with stable prices. However, this does not imply a breakdown of the market or collapse of investments. In contrast, there is then an equilibrium with mixed prices where firms constantly try to take each other by surprise, similar to the sales offers by retail stores or airlines. On expectation, such mixing equilibrium generates positive profits for liners and is also preferable for shippers, as compared to cartelization by conferences. Moreover, the current move to concentration and forming of consortia and alliances improves liners' or consortia's ability to diversify price variability internally. And the wide use of individual service contracts with long-term price agreements reduces price risks for both sides.

We also illustrated that competition between conference liners and independent liners can contribute to instability of market entry and exit. This type of market instability appears to be more wasteful than pure price instability. For these reasons we conclude that traditional conferences are not an adequate measure to enhance the market performance of the cargo liner shipping industry. They should be abolished.

As Regulation 4056/86 is under heavy criticism, the liners' association ELAA has, in a remarkable effort, advanced a proposal for a pure 'information exchange system' that will not fix prices or quotas. It is a voluntary system where industry data is collected and later on provided to liners in an aggregated form and with a delay of at least one month. Some additional, more detailed data on market shares should be given to each liner exclusively. The proposal also suggests that there should be data 'discussions' between liners, however, it leaves unclear what is really meant by 'discussions' and why they are needed.

The literature on industrial organization suggests that information exchange is usually welfare enhancing, as long as it does not serve as a basis for anti-competitive, collusive behaviour. As the value of an information exchange system depends on the quality of data, we propose to make participation mandatory, so as to guarantee completeness and reliability of the data. Still, it seems a good idea that the committee

collecting and processing the data is an industry body, not a government agency. Since not only liners, but also ports and shippers and the regulatory authority (and the general public) have an interest in observing market developments, the information output should generally be made public. Fresh information should be provided as often as possible, as long as this meets the requirement that individual transactions cannot be singled out. In order to prevent collusion, it must be assured that no liner-specific data will circulate among liners and that no 'discussions' take place that allow for uncontrolled communication and agreements between liners.

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