An analysis of Bunker Adjustment Factors and freight rates in the Europe/Far East market (2000-2004)

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Abstract

This paper focuses on the monthly relationship between the Bunker Adjustment Factor (BAF) and bunker price and between the freight rate and charter rate on the Europe/Far East container trade. It investigates whether a causality relationship can be found between these variables in order to know whether tariffs are mainly driven by cost considerations, as claimed by shipping lines during the last 5 years. Results from VAR and VECR models suggest that a Granger causality does exist. This paper calls for a new way to look at pricing elements in liner shipping and more particularly for shipping conferences, that should focus more for instance on justified/unjustified BAF or rate restoration announcements rather than on a general debate on exemption/abolishment of collective pricing.

KEYWORDS: LINER SHIPPING CONFERENCE, CONTAINER, BAF, PRICING, GRANGER CAUSALITY, REGULATION, FEFC

Introduction

The review of immunity for liner shipping conferences in Europe during the last 2 years has stressed the opposite views of shippers and liner shipping companies. In our opinion, these views could lead to confusion, as there are two questions being raised at the same time. The first concerns the impact of shipping conferences on price stability, whilst the second concerns the justification by market conditions of the level of surcharges and tariffs announced by shipping lines that operate under shipping conferences.

We believe that the second question is certainly much more relevant that the first one. *Ceteris paribus*, why should we expect stability in the general price level, if at the same time cost elements such as bunker prices or charter rates are increasing? Concerning the second question, we can expect that shippers could rely on public market information to understand the general level of prices or surcharges such as BAF. Information is therefore a key element and we use public information to investigate these questions.

The remainder of this paper is organized as follows. The first section presents the general debate on liner shipping immunity in Europe and the reasons why the complexity of liner shipping tariff computation calls for a different approach when looking at pricing behaviour. The second section discusses the specific relationship between one kind of surcharge, the BAF, and bunker prices. The third section examines a similar relationship between tariffs and charter rates. Finally, the fourth section offers some policy recommendations that call for an examination between justified/unjustified common pricing rules by shipping conferences rather than the present choice on exemption/abolishment of anti-trust immunity for maritime conferences.

Review of literature and issues from the new debate on liner shipping conferences in Europe

The last review of anti-trust immunity for shipping conferences stressed the opposite views of shippers and shipping lines operating within shipping conferences. The main theoretical arguments from shippers and carriers can be found in the Final Report prepared for the European Commission by experts led by Erasmus University of Rotterdam (Haralambides *et al*., 2003) or in previous working papers from OECD (2002). A press release from the

American Shipper (Damas, 2004) on the public hearing held in Brussels on the 4 December 2003 also provides a synthesis of the contrary views expressed by shippers and carriers.

Both sides disagree on the impact of shipping conferences on tariff stability. Increasing suspicion from shippers on carriers' behaviour has also emerged regarding the relationship between changes in tariffs and justifications from carriers due to market conditions.

The first disagreement on the impact of shipping conferences on stability is not new (cf. Davies, 1983). To tackle this issue, the Erasmus consultants set up a stability index to compare changes in freight rates on the 3 main East-West container trade lanes with changes in the US GDP deflator used as a benchmark. For each market, specific trade characteristics were used, such as concentration index (HHI); excess capacity; dummy variables such as the Asian financial crisis; seasonality effect, etc. Although the comparison between changes in freight rates and a benchmark price is innovative, the main difficulty remains in linking price evolution with the maritime conferences' market shares. In line with previous theoretical work by the behaviourist school or by the New Industrial Economics (Tirole, 2003), a direct relationship between concentration and price is difficult to assess (the classical duopoly of Airbus and Boeing in aviation being a case in point). These arguments are mainly supported by carriers when Trevor Soames, the lead lawyer for carriers at the EC hearing states that "conferences may look like, but do not act like, cartels" (Damas, 2004, p. 78).

The report of Erasmus University Rotterdam then recognises, as Clydes and Reitzes (1995) did previously, that when using "disaggregated data, individual liner firms appear to have a larger potential for tacit collusion than conference members in setting freight rates".

In a similar study by Hinten-Reed *et al.* (2004) on the impact of Far East Freight Conference on prices in the North Europe-Asia trade, the authors state that FEFC members earn higher revenues per TEU than non-conference members but this difference is due to a higher quality of service. The authors also stress that conference rate announcements contain information on market fundamentals, especially in the westbound cargo movements, and these appear to be highly related to aggregate demand and fuel prices in the year 2002-2003.

When examining the main conclusion of the public hearing, it appears that another disagreement between shippers and shipowners is the requirement of shippers for additional

information on price computation. This does not mean *per se* that shipping lines hide information in order to increase market power, but it induces suspicion from shippers who therefore call for the end of anti-trust immunity of shipping conferences.

Nevertheless, the complexity of liner shipping tariff computation makes this relationship difficult to assess. To the basic shipping freight rate that provides more of a benchmark than the final price paid by shippers (Wajilda, 2002) a rate restoration can apply: others are freight additional (pre-freight additional, heavy lift/long length addition, port additional, etc.) and surcharges (Bunker Adjustment Factor - BAF, Currency Adjustment Factor - CAF, Port Congestion Surcharges - PCS, Peak Season Surcharge - PSS, Terminal Handling Charge – THC, War risk, ISPS surcharges, winter surcharges). Each element can be adjusted following public pre-announcements to shippers. Appendices 1 and 2 provide some examples of rate restoration and BAF by the Far East Freight Conference (FEFC) on the Europe/Far East market from 2000 to 2005.

Considering these elements, we decided to focus on two relationships, assuming that price setting is mainly driven by a cost recovery approach (Farthing, 1993). Using public information, is it possible to establish a relationship between changes in BAF and average bunker prices, as well as a relationship between changes in freight rates and charter rates? Public data were collected from the Far East Freight Conference website[i], Drewry Monthly Report[ii], and Harper Petersen & Co.[iii].

The relationship between Bunker Adjustment Factor (BAF) and bunker price

The FEFC BAF system was first introduced following the oil shocks of the 1970's (Riseborough, 2005). The underlying justification for such a system was that lines operating in freight conferences could not otherwise adjust their prices promptly enough to counteract the devastating effect of bunker price increases.

When first introduced, the basis for the FEFC BAF calculation was the bunker prices paid by member lines. These were reported by them to third party chartered accountants. However, as reported prices remained largely confidential, the system was felt to be too opaque to explain adequately to customers. Lines have accordingly changed the system in order to base the

BAF calculation on the independent indices shown in the Marine Oil Bunker Market Report and in the shipping press by Cockett Marine Oil Ltd.

The BAF system applied by the FEFC has changed over the years from a percentage of the tariff, calculated on a 90-day average, to a lump sum, based on a monthly calculation. This calculation is monitored twice per week, to coincide with the publication of the Cockett report, and is based on a weighted average of fuel loaded in Asia, the Middle East and Europe. The deviation between the change in BAF and in Bunker prices can be explained by developments in two main elements:

The fuel consumption of ships deployed in the market;
The location and amount of bunkering.

Therefore, even if bunker prices are not the only element in explaining BAF, we have assumed that the public BAF announcements by FEFC, during the November 1999 (reintroduction of BAF by FEFC) to March 2005 period, should follow the main changes in average bunker prices (ABP) on the Europe/Far East market. In order to analyse the relationship between the two variables, we chose to use the monthly reported bunker prices in Rotterdam and Singapore for IFO380, to calculate an average Europe/Far East bunker price, and then assess the relevance of Granger causality tests to detect any relationship with BAF (Figure 1).

Figure 1 somewhere here.

The estimation was on logarithms and introduced a “lag effect” in the application of BAF, with one period delay. From November 1999 to May 2002, the period delay refers to the previous 90 days average bunker price. From June 2002, it refers to the previous month (notice period).

Using conventional Augmented Dickey-Fuller and Phillips-Perron tests (Table 1), we find that both variables, BAF and ABP, are not stationary in levels. The stationarity hypothesis is strongly rejected at any conventional level. Conversely, when performing the same tests on first differences, on both BAF and ABP, the unit root hypothesis is rejected. Furthermore, it appears that the existence of a trend in the D.BAF and D.ABP regressions can be rejected

too. The t-values of the trend term for D.BAF and D.ABP are equal to 0.12 and 0.84 respectively, which are absolutely not significant at any conventional level.

Table 1 somewhere here

To test the causal relationship between BAF and ABP using Granger causality, a set of lag selection statistics, to fit a VAR model of the correct order, has been used. We focus on the following final prediction error (FPE), Akaike's information criterion (AIC), the Bayesian information criterion (BIC), and the Hannan and Quinn information criterion (HQIC). The last criterion stresses that the lowest value of the different lags is equal to -6.5, with one lag. The AIC criterion gives a value slightly lower with three lags than with one lag, albeit both statistics being very close (the values for the AIC are respectively equal to -6.61 and -6.60).

A VAR model was therefore estimated for D.BAF and D.ABP with one lag. We did not impose structure on the error variance-covariance matrix, but we specified small-sample degrees of freedom adjustment in estimating the covariance matrix of the disturbances. The results of the VAR model are presented in Table 2.

Table 2 somewhere here

We rely on causality in the sense defined by Granger (1969), which is inferred when lagged values of a variable, say x_t , have explanatory power in a regression of, say y_t, on lagged values of x_t and y_t. Causality tests are based on simple F statistics in the single equations of the VAR model. We find a value of 11.269 for the Wald test in the D.BAF equation, which is significant at the 1% level. This means that an increase in the difference in ABP leads to a significant rise in the difference in BAF. Conversely, in the D.ABP equation, the Wald test is absolutely not significant, with a value of 1.382. This implies no feedback effect between the bunker adjustment factor and bunker price, since we only find the Granger causality from ABP to BAF, as expected.

As both series are *I*(1), we have also tested whether BAF and ABP are cointegrated. For this purpose we relied on the Johansen's maximum likelihood cointegration rank test. Assuming an intercept term in the VAR model, but not in the cointegration equation, we test the null hypothesis that the rank is R=0 against the alternative R=1. The Max-lambda test statistic of

36.16 exceeded the critical value of 20.20 (at the 1% level), which led to the rejection of the hypothesis of no cointegrating relationship. When moving on to testing the null hypothesis that the rank is 1, the Max-lambda statistic of 0.34 was now smaller than the critical value of 6.65, and the null hypothesis could not be rejected. This means that there is one cointegrating vector between ABP and BAF.

Following the two-step approach suggested by Engle and Granger (1987) when modelling cointegrated processes, we first estimated a linear regression of ABP_t on BAF_t and calculated the residual e_t. An augmented Dickey-Fuller test indicated that the residual variable was itself stationary. Then, in a second step, we used the lagged residual as an error correction term in the dynamic first-difference regression, to finally obtain:

$$D.BAF_t = \underset{(0.70)}{0.005} + \underset{(6.34)}{1.502}\, D.ABP_t - \underset{(-5.74)}{0.558}\, e_{t-1}$$

As expected, the lagged residual has a negative effect and is significant, owing to cointegration. However, the key result is that a change in ABP has a positive impact on a change in BAF, and the estimate of 1.502 with VECR is very close to the one found using the VAR model.

In conclusion, we can state that a Granger causal relationship exists between average bunker price and the BAF announced by the FEFC during November 1999- March 2005. A coefficient higher than 1 suggests that the BAF is following the main trends of the average bunker price, but over-reacts to up and down movements. The fact that average bunker prices have increased more or less continuously since November 2001 could explain the suspicion of shippers who have only faced rises during the last 3 years.

The relation between charter rates and freight rates

The changes in the freight rate all-in may be due to a number of reasons. For instance, in a Far East Freight Conference public notice on 14th January 2005 on rate restoration, it was stated that:

> At present, freight rates are at their lowest level ever, while lines are facing unprecedented increases in their costs caused by the following factors:

a) Increase in charter rates which have risen by as much as 40% over the last 12 months;
b) Increasing congestion at a number of container terminals, both in Europe and Asia;
c) Increased cost of containers, both owned and leased;
d) Ever increasing container imbalance;
e) Increased feeder costs both in Europe and Asia.

For the above reasons, and in order to maintain the viability of the trade, member lines of the FEFC wish to re-confirm their commitment to increase tariffs (as outlined in the 2005 Business Plan) by USD50/Container on 1st February 2005 (FFEC Website).

The general statement on the global outlook of the Europe/Far East market makes shippers suspicious, especially when public information, such as that published by Containerisation International on the freight rate all-in, does not actually show that "rates are at the lowest level ever" (Figure 2).

Figure 2 somewhere here

We select one specific justification for freight rate changes, i.e. changes in charter rates. We rely on the information that around 40-60% of the liner shipping fleet operated by the main shipping lines is chartered-in (Alphaliner, 2005[iv]) and that this cost element could therefore explain a significant part of changes in freight rates during the last 5 years[v].

The freight rate – charter rate relationship could be easily established if ship-owners belonging to shipping conferences were providing public information on the chartering costs of their vessels. In the absence of this, we used the average monthly, one-year charter rate index reported by Harper Petersen & Co[vi], so as to relate to the quarterly data, during the 2000 - 2005 period, published by Containerisation International, on the Europe/Far East freight rate all-in. In order to eliminate the effect of BAF on freight rates, we subtracted the official monthly BAF from FEFC tariffs to determine an estimated monthly freight rate[vii], as described in Figure 3.

Figure 3 somewhere here

Using conventional tests (Table 3), we found that the series WEST (westbound freight rate), EAST (eastbound freight rate), AVERAGE (the mean value of WEST and EAST) and HARPEX (the charter rate index) are not stationary in levels. The series are stationary in first differences at the 1% level of confidence, for WEST, EAST and AVERAGE, and at the 5% level for HARPEX. Then, we assumed that HARPEX may be seen as I(1). Furthermore, the t-values of the trend term of the series D.WEST, D.EAST, D.AVERAGE and D.HARPEX are not statistically significant. Finally, the Johansen's cointegration rank test suggested that there is no cointegration relationship between HARPEX and AVERAGE, EAST and WEST (Table 4).

Table 3 somewhere here
Table 4 somewhere here

Results from the different VAR models and Granger causality tests (Table 5) suggest that HARPEX leads to an increase in the general level of freight rates (AVERAGE) at 1.7%, and that HARPEX also increases the westbound freight rate at 1.6%. Then, there exists a Granger causality between HARPEX and AVERAGE and between HARPEX and WEST. Conversely, HARPEX exerts no significant impact on the eastbound freight rate (11.7%). As might be expected, in the reverse direction, the different freight rates have no causal influence on HARPEX.

Table 5 somewhere here

One of the most interesting results is the differentiated influence of charter rates on westbound and eastbound freight rates. Although the same ships are used, the trade imbalance in favour of the westbound trade could explain this result. Shipping lines would mainly use this trade to cover the impact of charter costs rather than the eastbound freight rate, a weaker trade where the utilisation ratio is rather low and prices more sensitive. This finding is similar to the results of Hinten-Reed *et al.* (2004) on the impact of Far East Freight Conference activity on prices in the North Europe-Asia trade, according to which conference

rate announcements contain information about market fundamentals, especially in the westbound cargo movements.

Policy implications

In the general debate on the revision of anti-trust immunity for maritime conferences, observers from American Shippers (1994) noticed the European Commission's frustration when it states "shippers and carriers were not prepared to provide direct answers to technical questions". Even in its written answers following the public hearing, the European Liner Affairs Association (ELAA, 2004) does not give a clear indication on how cost elements are taken into account when valuing surcharges. This leads to a suspicion from the shippers as to the carriers' behaviour, which was reflected during the general public hearing.

No clear evidence on the relationship between cost elements and the level of freight rates or surcharges, and even more on the effect of maritime conferences on these levels were given. Our conclusion is that for both issues, a relationship still exists. Nevertheless, the lack of information on the average consumption of ships, or on the charter rates for vessels used by operators in specific trades for example, reduced the accuracy of available data.

Whatever the limitations, we may wonder in which way our results could be used within the general debate on maritime conferences. In our view, they can be used when considering the three alternatives that could be imagined in the near future.

Firstly, the carriers could provide to shippers more information to link cost variations and changes in respective surcharges or rate restoration. This first alternative could lead shipowners belonging to maritime conferences to provide confidential information and/or to create new specific surcharges similar to BAF and CAF such as a Charter Rate surcharge (a CHarter Adjustment Factor - CHAF?). This solution would have the advantage of more transparency, but does not seem conceivable in the current context where shippers are already concerned about the numerous existing surcharges.

Secondly, carriers could decide to eliminate all surcharges or the rate restoration system and bear the risk of potential deviations from pre-announced freight rates. This would call for the abolition of adjustments from pre-announced freight rates, and it could lead to the adoption of

more hedging against bunker or currency fluctuations; such techniques are already used by the major shipping lines. This extreme solution could also give rise to the following question: are shippers ready to pay more to eliminate the uncertainty stemming from unanticipated announcements in BAF and CAF surcharges? The eventuality of an increase in price is conceivable, and justified in our opinion if one considers that most of the risk concerning future cost elements will be borne by shipowners who could therefore call for a premium.

Thirdly, a mixed solution could be chosen, where only surcharges that can be justified and clearly linked to cost elements would subsist. Once again, this would not lead automatically to a reduction in freight rate levels or volatility, but it might have the advantage of restoring confidence between shippers and carriers, and of limiting the risk borne by shipping lines.

Conclusion

The objective of this paper was to look at one issue among the various ones which have been raised during the European reviewing process on anti-trust exemption for shipping conferences. Our study focused on the increasing suspicion of shippers towards carriers that leads them to question if maritime conferences still play a role in price setting and if tariff changes are really reflecting changes in costs or market fundamentals.

In order to tackle this issue, we chose to investigate two related questions. The first one is the relationship between BAF and bunker prices, while the second one concerns the relationship between charter rates and the general level of freight rates in the Europe/Far East market during the last 5 years. Although a relationship could be detected using the Granger causality approach, we reached a similar statement to that of shippers: the available information is not sufficient to have a clear idea about the relationship. We therefore call on shipping lines to present more transparent price information.

This could be, in our opinion, the only way to restore confidence between shippers and carriers. If not, the abolishment of anti-trust immunity of shipping conferences could imply the end of some of the surcharges that are actually justified, as well as a higher risk transferred to carriers. At the same time, contrary to some of the shippers' arguments used against liner shipping conferences, we do not consider that the absence of a clear relationship due to missing information is enough to deny any stabilising impact of maritime conferences.

An extension of this work could be to try to compare changes in prices (freight rate, additional, BAF, CAF, etc.) of maritime conferences with changes coming from shipping lines that are not operating under the conference system.

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Table 1. Tests of stationarity for BAF and ABP

Variables		ADF [a]	DF-GLS [b]	Phillips-Perron [c]
BAF	Level	-1.76	-1.20	-1.82
D.BAF	First difference	-7.08***	-5.07***	-7.03***
ABP	Level	-1.06	-1.09	-0.96
D.ABP	First difference	-6.63***	-5.24***	-6.49***

Significance levels are respectively 1% (***), 5% (**) and 10% (*). The different models comprise an intercept and no trend. The sample comprises 65 observations for BAF and 63 for ABP.
(a) Critical values for the ADF test are respectively -3.56, -2.92 and -2.59 for the 1%, 5% and 10% levels.
(b) Critical values for the DF-GLS test are respectively -2.61, -2.23 and -1.92 for the 1%, 5% and 10% levels.
(c) Critical values for the Phillips-Perron test are respectively -3.56, -2.92 and -2.59 for the 1%, 5% and 10% levels.

Table 2. Results of the VAR model for D.BAF and D.ABP

Variables	Coefficient	t-value	Confidence interval (95%)
Equation 1: D.BAFt			
D.BAFt-1	-0.212	-1.410	[-0.507;0.083]
D.ABPt-1	1.475***	3.360	[0.614;2.336]
Constant	0.005	0.520	
Granger causality test (Chi²; prob.)	(11.269; 0.000)		
R^2	0.171		
Equation 2: D.ABPt			
D.ABPt-1	0.235	1.390	[-0.095;0.566]
D.BAFt-1	-0.068	-1.180	[-0.181;0.045]
Constant	0.004	0.900	
Granger causality test (Chi²; prob.)	(1.382; 0.240)		
R^2	0.035		

Significance levels are respectively 1% (***), 5% (**) and 10% (*). The size of the sample is 61 observations.

Table 3. Tests of stationarity for WEST, EAST, AVERAGE and HARPEX

Variables		ADF [a]	DF-GLS [b]	Phillips-Perron [c]
WEST	Level	-0.670	-0.583	-0.795
D.WEST	First difference	-8.048***	-5.382***	-8.062***
EAST	Level	-2.319	-2.185*	-2.307
D.EAST	First difference	-8.736***	-5.798***	-8.761***
AVERAGE	Level	-0.981	-0.815	-1.029
D.AVERAGE	First difference	-8.390***	-5.676***	-8.350***
HARPEX	Level	0.946	-0.510	-0.109
D.HARPEX	First difference	-2.984**	-2.438**	-3.095**

Significance levels are respectively 1% (***), 5% (**) and 10% (*). The different models comprise an intercept and no trend. The sample comprises 60 observations.

(a) Critical values for the ADF test are respectively -3.57, -2.92 and -2.60 for the 1%, 5% and 10% levels.

(b) Critical values for the DF-GLS test are respectively -2.61, -2.23 and -1.92 for the 1%, 5% and 10% levels.

(c) Critical values for the Phillips-Perron test are respectively -3.57, -2.92 and -2.60 for the 1%, 5% and 10% levels.

Table 4. Results of Johansen tests between HARPEX and AVERAGE, WEST, EAST

Max-lambda statistics	HARPEX and AVERAGE	HARPEX and WEST	HARPEX and EAST
Assumption H_0: rank R =			
0	12.666	16.378	4.356
1	1.217	1.267	1.069
Result	No cointegration	No cointegration	No cointegration

Critical values for the Max-lambda statistics are respectively equal to 18.63 and 6.65 for assumptions H_0: R=0 and H_0: R=1 for a 99% confidence interval.

Table 5. Results of VAR models between HARPEX and AVERAGE, WEST, EAST

Variables	Coefficient	t-value	Confidence interval (95%)
A. Equation 1: D.AVERAGEt			
D.AVERAGEt-1	-0.257*	-1.820	[-0.533;0.019]
D.HARPEXt-1	0.220**	2.390	[0.039;0.401]
Constant	-0.001	-0.270	
Granger causality test (Chi²; prob.)	(5.693; 0.017)		
R^2	0.106		
A. Equation 2: D.HARPEXt			
D.HARPEXt-1	0.720***	7.180	[0.523;0 .916]
D.AVERAGEt-1	0.042	0.270	[-0.259;0.342]
Constant	0.002	0.660	
Granger causality test (Chi²; prob.)	(0.074; 0.786)		
R^2	0.542		
B. Equation 1: D.WESTt			
D.WESTt-1	-0.229	-1 .590	[-0.511;0.052]
D.HARPEXt-1	0.240**	2.400	[0.044;0.436]
Constant	-0. 001	-0.240	
Granger causality test (Chi²; prob.)	(5.748; 0.016)		
R^2	0.099		
B. Equation 2: D.HARPEXt			
D.HARPEXt-1	0.710***	6.970	[0.510;0.909]
D.WESTt-1	0.069	0.470	[-0.217;0.355]
Constant	0.002	0.670	
Granger causality test (Chi²; prob.)	(0.224; 0.636)		
R^2	0.543		
C. Equation 1: D.EASTt			
D.EASTt-1	-0.214	-1.580	[-0.481;0.052]
D.HARPEXt-1	0.155	1.570	[-0.039;0.349]
Constant	-0.001	-0.270	
Granger causality test (Chi²; prob.)	(2.452; 0.117)		
R^2	0.067		
Equation 2: D.HARPEXt			
D.HARPEXt-1	0.737***	7.800	[0.552;0.922]
D.EASTt-1	-0.028	-0.220	[-0.283;0.226]
Constant	0.001	0.620	
Granger causality test (Chi²; prob.)	(0.047; 0.829)		
R^2	0.542		

Significance levels are respectively 1% (***), 5% (**) and 10% (*). The size of the sample is 60 observations.

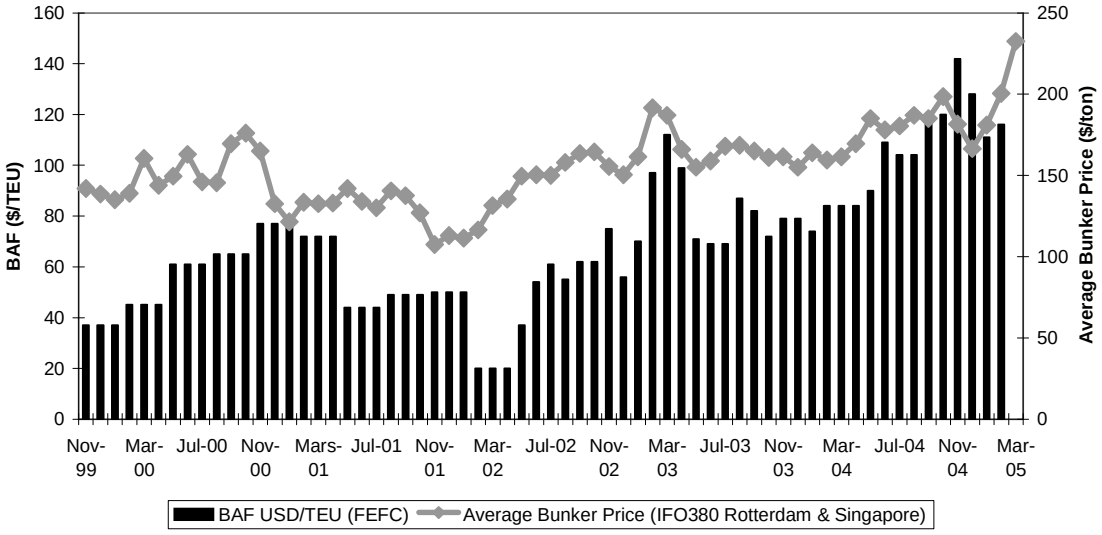


Figure 1: Changes in BAF (mid-month) and ABP (Nov99-Mar05)

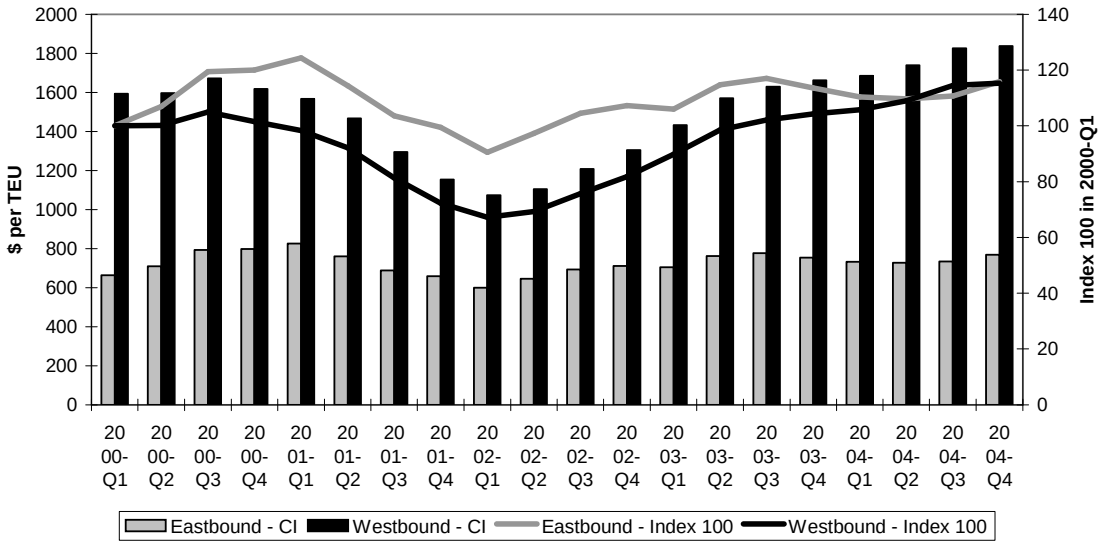


Figure 2: Change in freight rate value and index on Europe/Far East trade

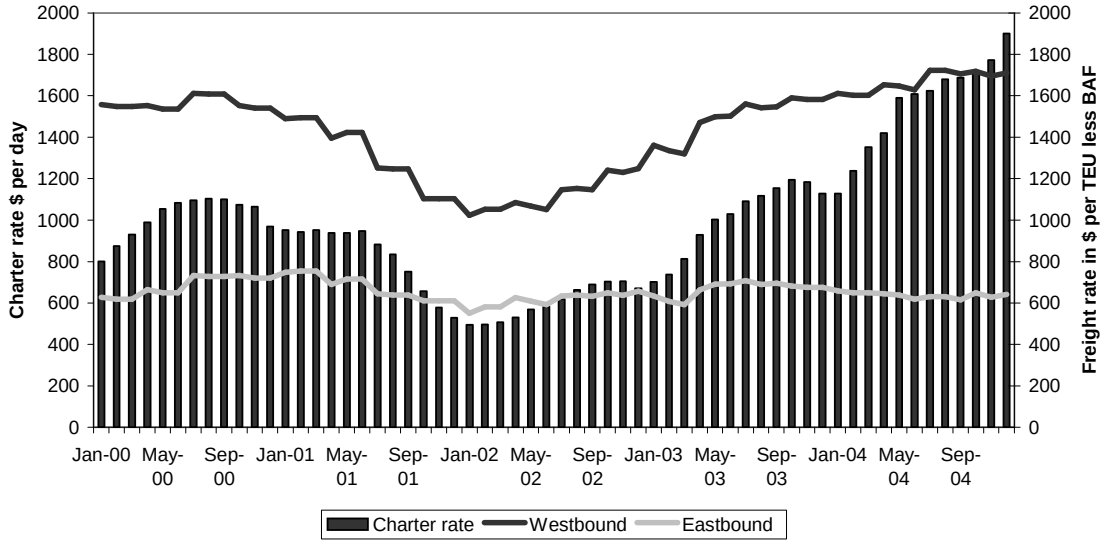
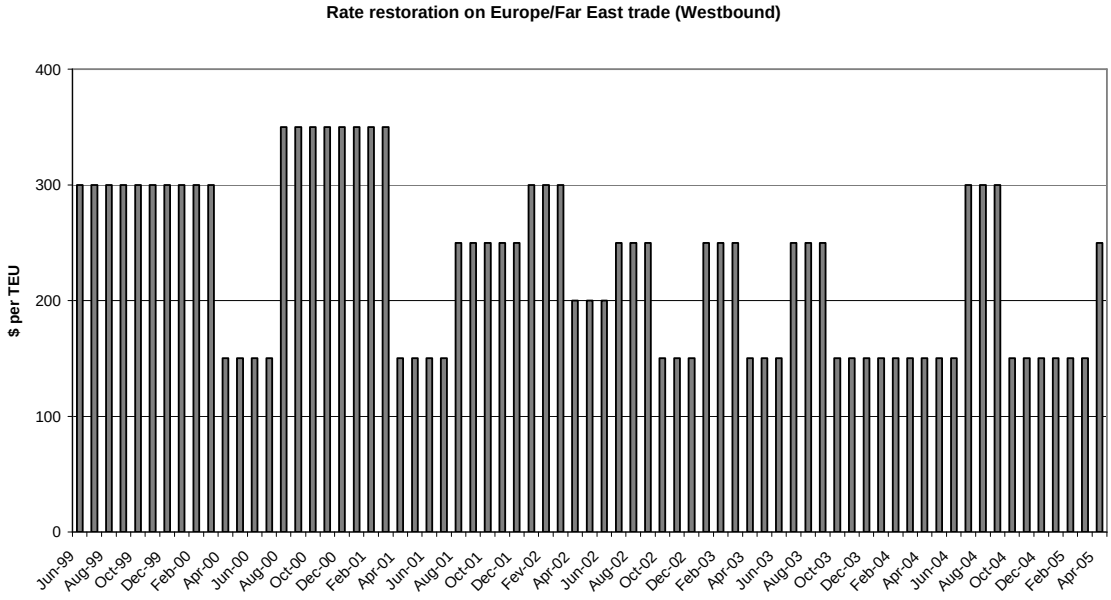
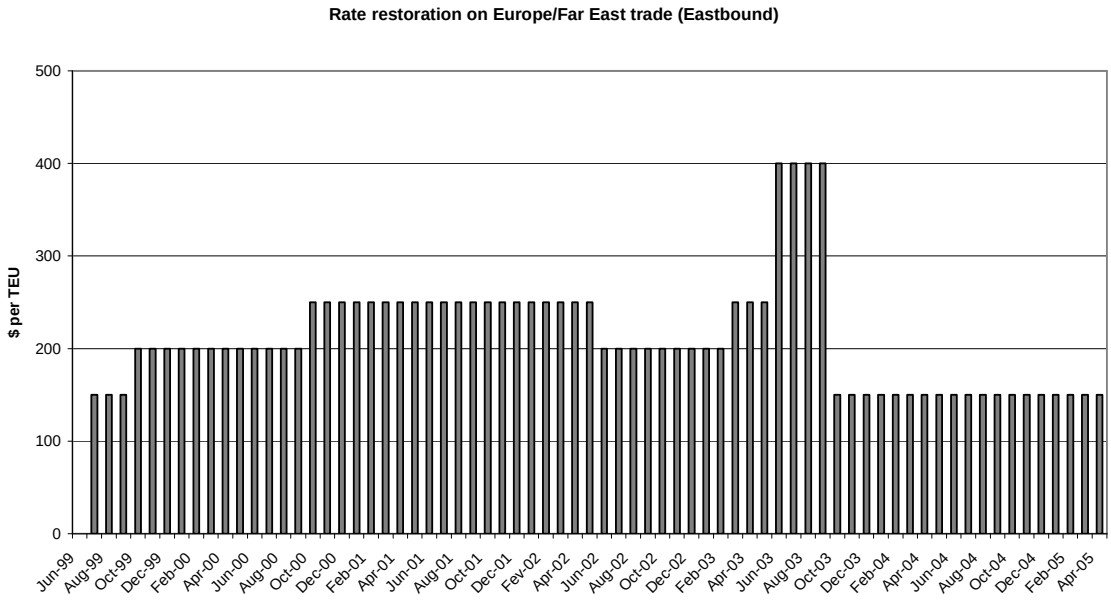


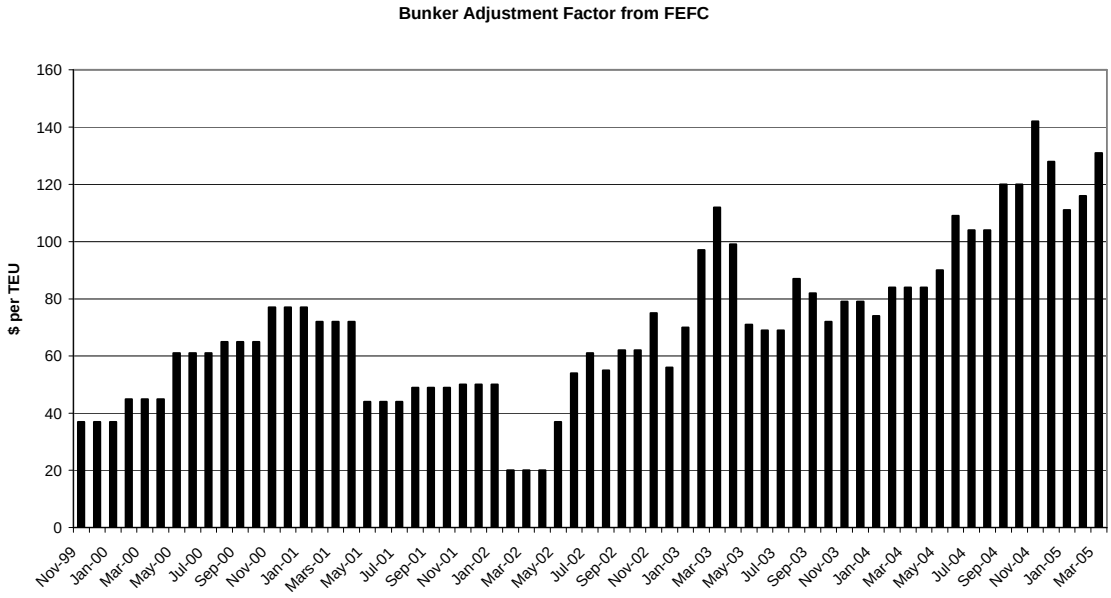
Figure 3. Changes in charter rate and Europe/Far East freight rate

Appendix 1. Reported rate restoration by FEFC in Eastbound and Westbound Europe/Far East trade





Appendix 2. Reported BAF by FEFC in Europe/Far East trade



[i] http://www.fareasternfreightconference.com/
[ii] *Drewry Monthly Report*, Various issues June 1999-April 2005, Drewry Shipping Consultant.
[iii] http://www.harperpetersen.com/
[iv] http://www.alphaliner.com/brs-alpha/search.htm
[v] The same could apply to THC, container imbalanced etc.
[vi] see http://www.harperpetersen.com/ for more details on index calculation.
[vii] The same research could have been done considering all surcharges announced by the FEFC.