

Working Paper No 72/00

**An Acquisition in the Nordic Ferry Market:
Rivalry or Coordination on Capacity?**

by
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SNF project no 1670
“Spillet om passasjertrafikken i Nordsjøen”
(Mergers and Acquisitions in the North Sea Ferry Market)

The project is financed by The Norwegian Shipowners Association

SIØS - Centre for International Economics and Shipping

FOUNDATION FOR RESEARCH IN ECONOMICS AND BUSINESS ADMINISTRATION
BERGEN, DECEMBER 2000
ISSN 0803 - 4028

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*An Acquisition in the Nordic Ferry Market:
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by

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December 2000

JEL classification:

Keywords:

Abstract:

The purpose of this article is to test the effect of Color Line's acquisition of Larvik Line in September 1996. We formulate theoretical predictions for the changes in sales, capacity and capacity utilisation following an acquisition, and use econometric techniques to test these predictions. From descriptive statistics we observe some changes in sales and capacity utilisation following the acquisition. When testing empirically we do find some weak evidence for changes in sales and capacity utilisation following the acquisition. In particular, there are some evidence suggesting that the firms involved in the acquisition did reduce their sales. We are not able to determine empirically the toughness of price competition in this industry.

^ΦThe authors are grateful to Annika Evensen for good research assistance with the data set. This research is financed by The Norwegian Shipowners Association through SNF, The Foundation for Research in Economics and Business Administration.

1. INTRODUCTION

A merger or an acquisition in an oligopolistic industry is expected to affect product prices and total sales in the industry. However, there are only a limited number of empirical studies of the effects of mergers and acquisitions.¹ The purpose of this paper is to test empirically the effect of an acquisition in the ferry market in the North Sea and Skagerrak, a market with a dominant firm and high concentration.

Theory predicts that in an oligopolistic industry a merger (or acquisition) would result in a reshuffling of sales. The merging parties would reduce their total sales. By doing so prices would go up. The non-merging firms, on the other hand, would respond by increasing their sales somewhat. This would dampen the price increase following the merger. Our first test would then be to investigate whether the acquisition resulted in such a reshuffle of sales as theory predicts.

Given that a merger has an effect as described above, we may proceed by testing for the competitive regime. If firms compete on both price and capacity in this industry, we expect something a la Cournot. Then the firms are expected to adjust their capacity to the change in total sales. If the acquisition has no effect on capacity utilisation, this would then be consistent with what we have labelled a competitive regime. Alternatively, the firms may collude on prices and compete on capacities. Then each firm is expected to invest in capacities to attract consumers. The firms taking part in an acquisition is then expected to coordinate their investments in capacity. We expect them to reduce their total capacity, while the other firms would partly replace this capacity by increasing its own capacity. If we observe an increase

¹Kim and Singal (1993) and Singal (1996) are two studies of the price effect of mergers in the U.S. airline industry, while Prager and Hannan (1998) and Akhavein *et al* (1997) studies the price effect of mergers in the U.S. banking industry. However, there are numerous indirect studies of the price effect of a merger. For example, a comparison of different geographical markets for the same product reveals the relationship between prices and the number of firms. For a review of the empirical literature, see Bresnahan (1989) and Schmalensee (1989).

in capacity utilisation for the firms taking part in the acquisition and the opposite for other firms, then this would be consistent with what we have labelled a semicollusive regime.

The article is organised as follows. In section 2 we describe the industry in question, the ferry market in the North Sea and Skagerrak, and Color Line's acquisition of Larvik Scandi Line. In section 3 we discuss the predictions from theory concerning changes in capacities and the number of passengers following the acquisition. In section 4 we test empirically how capacities and the number of passengers changed as a result of the acquisition. Some concluding remarks are presented in section 5.

2. THE FERRY MARKET

As a starting point, consider the sailings in the North Sea and Skagerrak in 1995. These are shown in Figure 1.

[Figure 1 approximately here]

As can be seen from Figure 1, only five ferry companies operated in the North Sea and Skagerrak in the mid 1990s. An empirical study indicates that the sailings between Western Norway and Denmark can be defined as a separate market segment (see Steen and Sjørgard, 1999). In line with this we assume that the relevant market for the case in question can be no larger than the sailings between Southern and Eastern Norway and Denmark. Then there were only four active firms in the relevant market in 1995: Color Line, Larvik Scandi Line, Stena Line and DFDS.

In 1996 we observed some changes in the sailings.² Stena Line announced in February 1996 that its route Oslo-Moss-Frederikshavn would be replaced with a direct sailing from Oslo to Frederikshavn. One week later Larvik Scandi Line announced that its direct route from Larvik to Frederikshavn would be replaced with a route Larvik-Moss-Frederikshavn. In early summer 1996 Larvik Scandi Line started a sailing with a fast ferry from Larvik to Skagen, while Color Line started sailings with a fast ferry on the route Langesund-Frederikshavn-Gøteborg. In Table 1 we list the sailings summer 1996, except for the new fast ferry routes.

Table 1. Sailings in summer 1996.

Line ¹	Company	Port: from – to	Sailing time (hours)	Market share ³
CLOK	Color Line	Oslo – Kiel	19.5	0.09
CLOH	Color Line	Oslo – Hirtshals	12.5	0.09
CLKH	Color Line	Kristiansand – Hirtshals	4.5	0.22
LSLF	Larvik Line ²	Larvik – Frederikshavn – Moss	---	0.24
LSSS	Scandi Line ²	Sandefjord – Strømstad	2.5	0.12
STOF	Stena Line	Oslo – Frederikshavn	12.5	0.11
DFOØ	DFDS	Oslo – København	16.25	0.13

¹ The two first letters denote company and the latter two denote ports (from – to).

² Owned by Larvik Scandi Line

³ Share of total number of passengers.

As can be seen from Table 1, Color Line had a very dominant position in the market in the summer of 1996. It had three out of seven sailings in the relevant market, and a market share of 40%.

The introduction of fast ferries by both Color Line and Larvik Scandi Line in the summer of 1996 indicates more intense rivalry on capacity between the two companies. Further escalation of the rivalry on capacity was expected to take place. Color Line announced in July 1996 that it next summer would replace its fast ferry sailings from Langesund with fast ferry sailings from Kristiansand to Hirtshals.

²For more details concerning the changes that took place in 1996, see the Appendix in Steen and

Furthermore, it announced that it would start sailings with a conventional ferry on the route Langesund-Frederikshavn on October 20 1996. Larvik Scandi Line announced that it would triple its fast ferry capacity between Larvik and Frederikshavn summer 1997, and threatened to start sailings with a fast ferry from Kristiansand to Northern Denmark summer 1997.

In September 1996, Color Line acquires Larvik Line. Olav Nils Sunde becomes the majority shareholder in Color Line, as well as Larvik Scandi Line. As a result, the companies Color Line, Larvik Line and Scandi Line operates de facto as one company. When a formal agreement was reached in mid October 1996, some important changes in the sailing structure were implemented. The announced opening of the sailing Langesund-Hirtshals was cancelled. The sailing Larvik-Frederikshavn-Moss was replaced with a direct route from Larvik to Frederikshavn, and Color Line opened a new sailing on the route Moss-Hirtshals. After the acquisition Color Lines market share increased from 40 to 76%. The new sailing structure that was announced in mid 1996 is still in place in the summer of 2000.

3. THEORETICAL PREDICTIONS

Our main purpose is to examine the competitive effect of Color Line's acquisition of Larvik Line. To be able to test for the effects of the acquisition, we first have to formulate theoretical predictions about how an acquisition is expected to affect the market outcome. Let us use a two-stage procedure for testing the effects of the acquisition. First, we test for whether the acquisition had any effect at all. Given that it had any effect, we test for the nature of competition in the market in question.

Sørgard (1999).

Had the acquisition any effect at all? Let us assume that this is an oligopolistic market. Moreover, we assume that there are no substantial reductions in marginal costs following the acquisition. Then the theory has a rather robust prediction about the changes in sales following an acquisition:³ The firms involved in the acquisition would sell less than its total sales before the acquisition. The motivation for such a reduction in sales is that it results in higher prices. On the other hand, the firms not involved in the acquisition would sell more than before. The intuition is that they partly replace the reduction in sales by the firms involved in the acquisition. They would then be free riders on the acquisition, facing both higher prices and higher sales. Then we have the following prediction:

Hypothesis 1: The acquisition would result in lower sales by the firms involved in the acquisition and higher sales by the firms not involved in the acquisition.

Let us now consider more in detail the nature of competition. In the market in question, firms obviously have more than one choice variable at hand. First, the firms can set prices, as in all other markets. In addition, they have other choice variables such as location of harbours and capacity. As reported above, the acquisition did not result in any changes in the location of harbours. Let us therefore focus on how the acquisition may affect prices and capacities. We distinguish between two different competitive regimes, called *competition* and *semicollusion*.

In the regime *competition*, we assume that the firms in the market in question compete on both prices and capacities. In such a scenario, we expect that an

³These are well known results from theory of mergers. For example, Farrell and Shapiro (1990) show this for the case of Cournot competition, where by definition sales are identical to capacities in each firm. Analogous results can be found in the case of Bertrand competition with differentiated products, see Deneckere and Davidson (1985).

acquisition would result in higher prices and a reduction in total capacity and total sales (number of passengers) in the industry. Changes in capacity are expected to be distinctly different for the firms participating in the acquisition and for the firms not participating. We expect that the first group of firms would reduce their sales and capacity, while the second group of firms is expected to increase their sales and capacity. Then we have the following prediction:

Hypothesis 2: If competition, an acquisition would result in

- (i) lower capacity and sales for the firms involved in the acquisition,*
- (ii) higher capacity and sales for the other firms*
- (iii) lower total sales and total capacity, and*
- (iv) no changes in capacity utilization.*

We see that some important predictions in Hypothesis 1 would be valid also in Hypothesis 2. But to distinguish between competition and semicollusion, we have to investigate more carefully the relationship between sales and capacity.

In the regime *semicollusion*, we assume that firms do not compete on prices. Then an acquisition is expected to have no effect on prices. However, it is still expected to be a battle over market shares. Firms are expected to compete on capacities to attract passengers. The larger the share of total capacity, the larger the share of total sales in the industry. However, an acquisition is expected to dampen the rivalry on capacities in an analogous manner as is the case with competition on both capacities and prices. The firms participating in the acquisition is expected to coordinate their activities and due to this reduce their joint capacity. The firms not participating in the acquisition, though, are expected to expand their capacities.

Hence, we expect changes in capacities that are analogous to what we observe in the competitive regime.⁴ On the other hand, there are no changes in sales (the number of passengers) caused by price changes since prices are by definition not affected by the acquisition. Changes in capacity, though, can result in some changes in sales. But it is reasonable to assume that changes in capacities are larger than the changes in sales. In line with this reasoning, we expect that the acquisition affects the capacity utilization in the industry. In particular, we expect higher capacity utilization for the firms taking part in the acquisition and lower capacity utilization for the firms not taking part in the acquisition. Then we have the following prediction:

Hypothesis 3: If semicollusion, an acquisition would result in

- (i) higher capacity utilization for the firms involved in the acquisition,*
- (ii) lower capacity utilization for other firms,*
- (iii) lower total capacity, and*
- (iv) higher total capacity utilization.*

3. EMPIRICAL TESTING AND RESULTS

Based on the three hypotheses in section 2, we now proceed to undertake econometric tests. First, we test whether the acquisition had a significant effect on *sales*. Then we proceed by testing which competitive regime we observe after the acquisition.

According to Hypothesis 1, the acquisition should result in lower sales for the firms involved in the acquisition and higher sales for all other firms. To be able to say something about possible shifts in sales after the merger we need a model that

⁴Barros and Sjørgard (2000) analyse the effect of mergers in an advertising-intensive industry. If we assume that advertising has the same effect as capacity in our semicollusion model – it is a market sharing device – we can extend their results to this setting. They find that a merger in a semicollusive

explains the development in sales. To do this we have collected a panel of passenger data for 8 different routes for the period January 1991 to December 1998. Our data includes all routes that depart from the coast of South-East Norway, and that represents the ferry market that most likely should have been affected by the merger.⁵ To explain the development in passengers (“*PASS*”) over time we constructed demand variables that can explain the development in demand. We include the inhabitants (“*INHAB*”) and available hotel beds (“*HOTELB*”) that corresponds to the different routes, *i.e.*, the demand variables corresponding to the route between Oslo and Copenhagen is the total number of available hotel beds and inhabitants in those two regions/cities.⁶ We include a trend variable (“*TREND*”) to account for general growth on these routes. Finally, we have constructed a seasonal variable (“*HIGH*”) to account for the summer season (June, July and August) when the traffic is substantial larger than the rest of the year.

We construct two dummy variables, one that control for a possible shift effect in the two routes that was the focus of the merger: Kristiansand-Hirtshals and Larvik-Frederikshavn. This dummy variable takes the value one after October 1996 (“*MERG*”) for these two routes. The second dummy variable accounts for possible shift effects in the passenger development on the remaining routes (“*OTHER*”). We estimate the following model:

regime leads to a reduction in the total investment in advertising, but the firms taking part in the merger advertise less and the firms not taking part in the merger advertise more.

⁵The 8 routes consist of Larvik-Frederikshavn, Kristiansand-Hirtshals, Oslo-Hirtshals, Moss-Hirtshals, Oslo-Kiel, Sandefjord-Strömstad, Oslo-Fredrikshavn and Oslo-Copenhagen. We did collect data also for the routes from Bergen (Bergen-Newcastle and Bergen-Hanstholm). However, in an earlier report (Steen and Sjørgard, 1999) we used econometric cointegration techniques to statistically define the relevant markets, and found that Western Norway represented a separate market relative to the other 8 routes operating on the South/East coast of Norway.

⁶The regions are based on a division of local municipalities into regions according to closeness and commuting pattern around the corresponding ferry port. We have 10 different regions; (Norway)

$$(1) \quad \begin{aligned} PASS_{i,t} = & \alpha_i + \beta_{MERG}MERG_{i,t} + \beta_{OTHER}OTHER_{i,t} \\ & + \beta_{INHABIT}INHABIT_{i,t} + \beta_{HOTELB}HOTELB_{i,t} + \beta_{TREND}TREND_t + \beta_{HIGH}HIGH + \varepsilon_{i,t} \end{aligned}$$

$\varepsilon_{i,t}$ is the error term and has the standard properties. The constant term α_i is allowed to vary according to route to account for possible route specific effects not accounted for in the other control variables – we estimate a so-called fixed effect model.

The model in (1) is estimated using OLS, and the results are presented in Table 2. The model shows a reasonable good fit. The control variables *HIGH* and *TREND* are as expected significant and positive. Only *HOTELB* is significant of the inhabitants and hotel beds. The significant negative parameter on *HOTELB* is due to the inclusion of the positive trend effect.

We see from Table 2 that the dummy variable *MERG* is significant. It predicts a reduction in sales after the acquisition by the two “merging” routes. This is as predicted by Hypothesis 1, and suggest that the acquisition had an impact on the competition. The other dummy variable – *OTHER* – had no significant effect in the regression. It suggests that the remaining routes did not increase their total sales after October 1996 due to the acquisition. Several explanations for this result can be put forward. The market might be more segmented than what we thought originally, *i.e.*, routes outside the Kristiansand/Larvik region is not influenced as much by the acquisition. An alternative explanation could be that the direct effect within Larvik Line and Color Line is more important than the “indirect effect” on the other routes, and thereby easier to pick up econometrically.

Bergen, Kristiansand, Oslo, Larvik/Sandefjord, Moss, (Denmark) Copenhagen, Northern Jylland, (Sweden) Strömstad, (Germany) Kiel and (the UK) Newcastle.

Table 2 Test for a possible shift in sales (passengers) after the acquisition in October 1996 (period 1991-1998, n=696)

Parameter	Coefficient	Standard Error
β_{MERG}	-18971.89*	4608.03
β_{OTHER}	-2942.11	4233.94
β_{HIGH}	42426.88*	2014.86
$\beta_{INHABIT}$	-0.04	0.08
β_{HOTELB}	-2.98*	1.01
β_{TREND}	5236.66*	892.75
<u>Fixed effect dummies</u>		
<i>Lar-Fred</i>	85574.22*	36556.43
<i>Krs-Hirt</i>	98620.60*	25977.52
<i>Osl-Hirt</i>	112598.40	100871.20
<i>Mos-Hirt</i>	7732.71	27537.39
<i>Osl-Kiel</i>	59208.94	82939.96
<i>Osl-Frd</i>	118189.00	100871.20
<i>Osl-Cop</i>	193620.10	200729.10
<i>Constant</i>	-10400000*	1765059
\bar{R}^2	0.566	

*Significant on a 2.5% level

[Figure 2 approximately here]

In Figure 2 we graph the development in passengers in “OTHER” and “MERGER” group, respectively. As can be seen, the picture indicates a reduction in capacity in the two routes involved in the merger, but this can be observed primarily in the peak periods. The most striking feature is the increase in the passengers on the other six routes after 1996. This effect did not show up in our econometric model and might be due to several factors. First, we excluded 1999 because of the lack of control variables (*HOTELB* and *INHABIT*) for 1999. Second, the effect is more pronounced in the summer – the *HIGH* - season. The latter has been checked by including also an interaction term between *HIGH* and *MERG* (*HIGHxMERG*) and *HIGH* and *OTHER* (*HIGHxOTHER*) in equation (1). This did not alter our econometric predictions. Even

though the pattern we observe for the OTHER-group in Figure 2 is consistent with a competitive effect resulting from the acquisition, we are thus not able to find that when we control for the demand factors in our econometric model.

Our next question is whether we can determine which kind of competitive regime the firms are in. We have different predictions for the development in capacity utilisation following an acquisition for the two regimes competition (Hypothesis 2) and semi-collusion (Hypothesis 3), respectively. In particular, we would anticipate a positive shift in the capacity utilisation for the firms involved in the acquisition and a negative shift for the other firms only if we observe semi-collusion (Hypothesis 3). To test this we specify a model where we test the development in capacity utilisation along the same lines as our passenger equation in (1). All variables on the right hand side have the same definition as in (1), but capacity utilisation (“CU”) is the dependent variable. The new regression equation is given in (2):

$$(2) \quad CU_{i,t} = \alpha_i + \beta_{MERG}MERG_{i,t} + \beta_{OTHER}OTHER_{i,t} + \beta_{INHABIT}INHABIT_{i,t} + \beta_{HOTELB}HOTELB_{i,t} + \beta_{TREND}TREND_t + \beta_{HIGH}HIGH + \varepsilon_{i,t}$$

Hypothesis 3 suggests that $\beta_{MERG} > 0$ and $\beta_{OTHER} < 0$ if we observe semi-collusion.

Hypothesis 2 defines the alternative of competition; $\beta_{MERG} = \beta_{OTHER} = 0$. Equation (2)

is now estimated using OLS. The results are presented in Table 3.

The model behaves well in terms of explanation power, and even marginally better than equation (1). The *HIGH* and *TREND* parameters are still positive and significant. In addition, the significant effect from inhabitants; $\beta_{INHABIT}$, is now positive. However, our two dummy variables are both non significant. Hence, if anything we find competition verified also after the acquisition.

[Figure 3 approximately here]

In Figure 3 we graph the development in capacity utilisation for the “OTHER” group and the “MERGER” group. It indicates a change in the CU-pattern. After 1996 the capacity utilisation in the peak periods decreases and it approaches the same pattern as the OTHER-group. However, the trend in both the CU series seem to change from slightly downward to marginally upward after 1996. This is the effect that we pick up in equation (2) with the two small positive point estimates. Since we are unable to pick up these effects as significant in our econometric model, we should be careful when interpreting our results.⁷

Table 3 Test for a possible shift in capacity utilisation (CU) after the acquisition in October 1996 (period 1991-1998, n=696)

Parameter	Coefficient	Standard Error
β_{MERG}	0.026	0.023
β_{OTHER}	0.028	0.021
β_{HIGH}	0.167*	0.010
$\beta_{INHABIT}$	9.46E-07*	3.98E-07
β_{HOTELB}	-5.72E-06	4.96E-06
β_{TREND}	-0.015*	0.004
<u>Fixed effect dummies</u>		
<i>Lar-Fred</i>	-0.084	0.179
<i>Krs-Hirt</i>	-0.084	0.127
<i>Osl-Hirt</i>	-0.931***	0.494
<i>Mos-Hirt</i>	-0.303*	0.135
<i>Osl-Kiel</i>	-0.643	0.406
<i>Osl-Frd</i>	-0.748	0.494
<i>Osl-Cop</i>	-1.962**	0.982
<i>Constant</i>	30.448*	8.636
\bar{R}^2	0.618	

*Significant on a 2.5% level, **Significant on a 5% level,

***Significant on a 10% level

⁷In a model where we exclude HOTELB and INHABIT (thereby including also the 1999 observations), and only analyse the “HIGH”-periods, we find that the MERG parameter is negative but not

To see whether different specifications of the market and the models mattered to our results we have estimated also logarithmic models, as well as included also the routes from Western Norway. Our results do, however, not change significantly.

To sum up, from the descriptive figures we do observe shifts in passengers and capacity utilisation after 1996. Also econometrically we find some evidence for passenger shift, and the CU model estimates for MERG and OTHER are positive, indicating some (non significant) increase in capacity utilisation for both groups. In general, though, we are careful with concluding anything in general on the competitive regime from these weak results.

4. SOME CONCLUDING REMARKS

The purpose of this article has been to test empirically the effect of Color Line's acquisition of Larvik Line in September 1996. The acquisition took place in an industry that apparently is oligopolistic, since only a few firms dominate the market for ferry transport between Norway and Denmark (and Norway and Germany). Theory predicts that in such a case we would observe some reshuffling of sales. The firms taking part in the acquisition is expected to reduce their total sales, while the opposite is expected for other firms in the industry in question. We do find some econometric evidence that the firms taking part in the acquisition reduced their total sales after the acquisition. Although descriptive statistics suggests that the other firms did increase their total sales, we do not find any strong econometric evidence for such an effect. Then we conclude that the acquisition had no significant effect on sales or capacity utilisation, and therefore we cannot conclude anything about the nature of competition in this industry.

significant, and that the OTHER parameter is positive and significant on a 12% level. Hence, the

If the acquisition had no significant effect on sales, a natural question is then why the acquisition took place at all. There are no indications that the acquisition was motivated by potential cost savings. On the other hand, there are some indications that a status quo would not be the alternative if no acquisition. Color Line has stated that it did fear an intense rivalry on the route Kristiansand-Hirtshals if no acquisition took place.⁸ It suggests that even if we have not found any clear evidence that the acquisition affected sales market power may have been the motive for the acquisition. In fact, simulations reported in Mathiesen and Sjørgard (2000) suggest that when we take this into account then the acquisition had a substantial effect on prices.

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pattern in Figure 3 can nearly be "replicated" for the HIGH-seasons.

⁸Independent sources argued that Color Line paid a high price for the acquisition. Then Color Line responded by arguing that they feared intense rivalry on the route from Kristiansand to Hirtshals (see Dagens Næringsliv, 4.10.1996).

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Figure 1. The Ferry Market in 1995

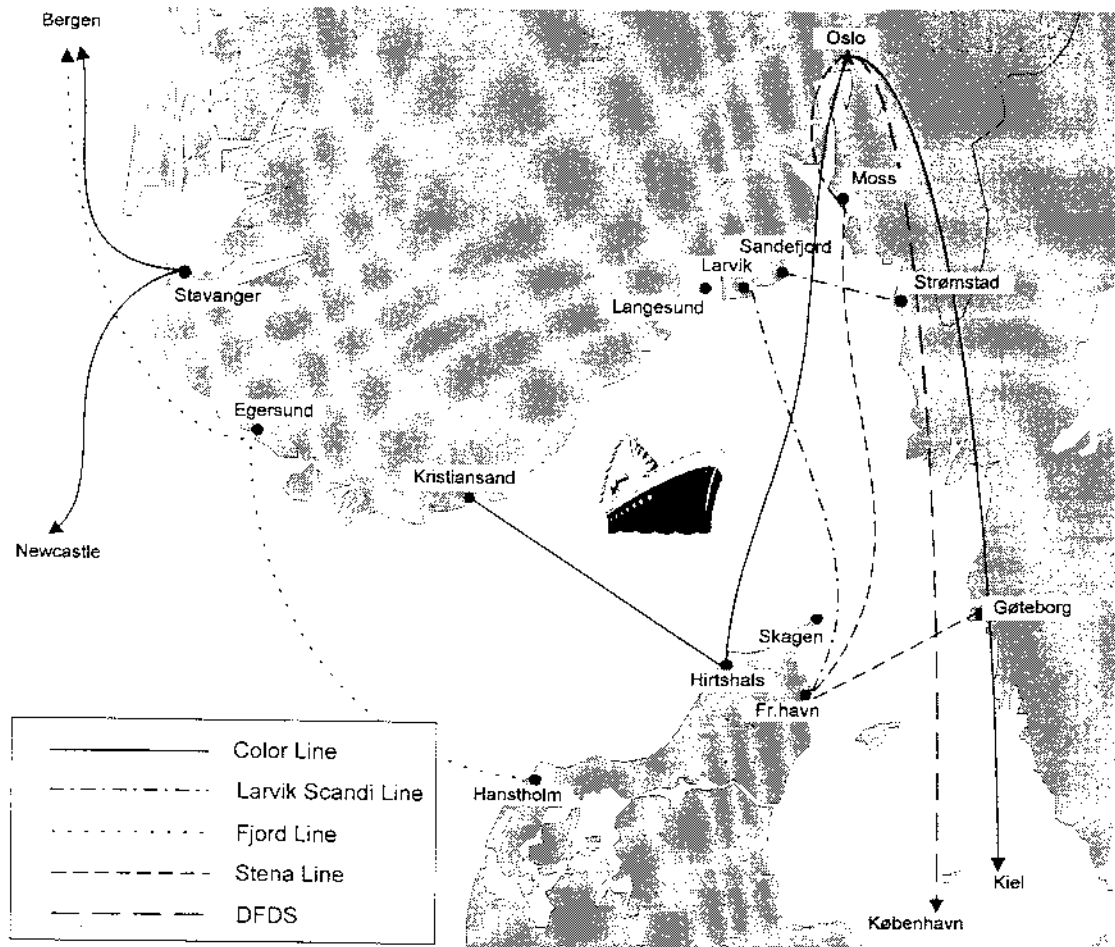


Figure 2 Passenger development

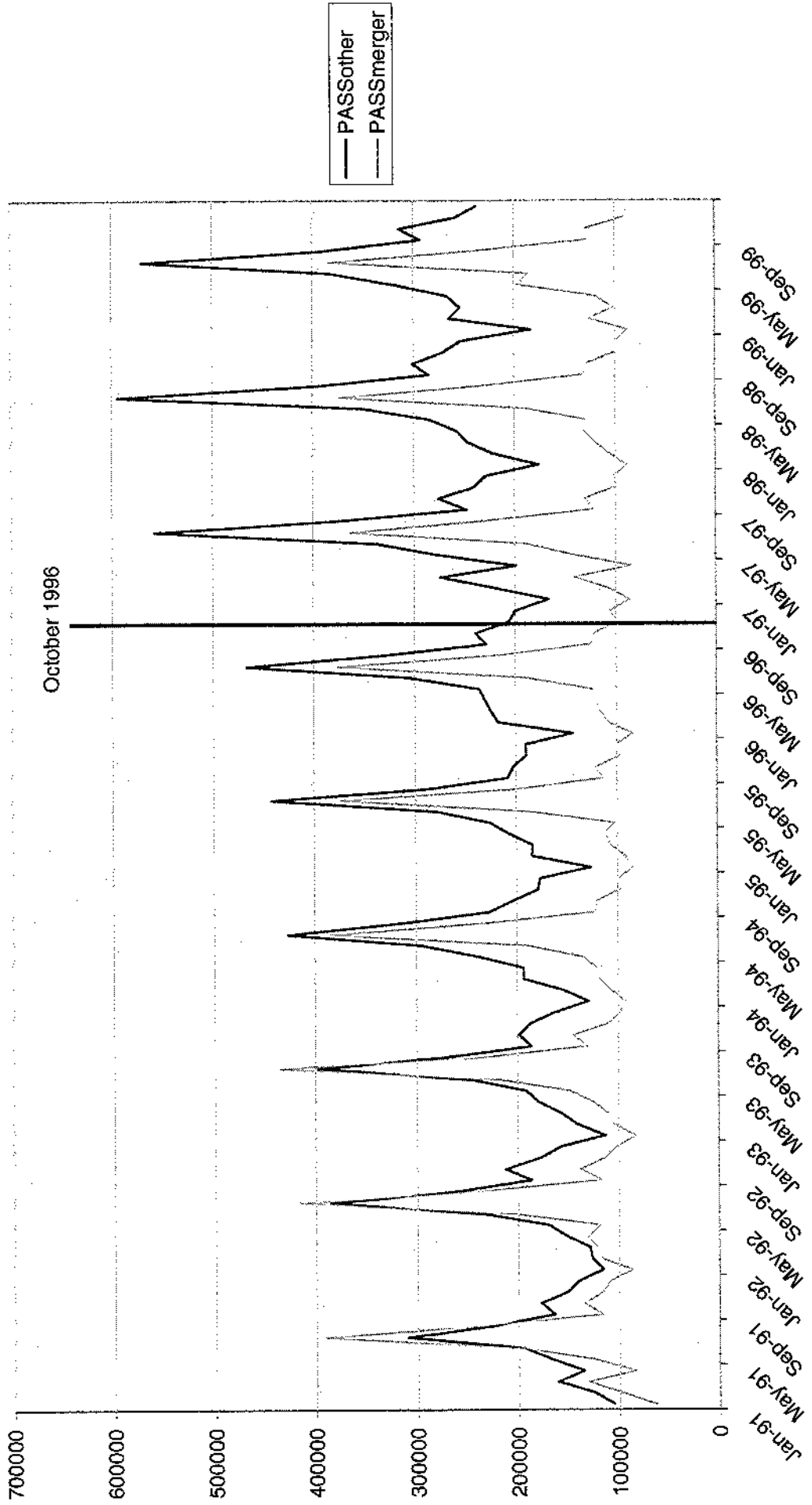


Figure 3 Capacity utilisation

