Kilde: Hjemmeside til Lars Sørgard (1997), *Konkurransestrategi*, Fagbokforlaget

Kjell G. Salvanes, Frode Steen and Lars Sørgard:

Hotelling in the air? Flight departures in Norway

Point of «departure»:

Theory of location:

- Locate close to your rival to capture customers
- Locate in a niche to dampening price competition

We observe virtually no price competition in the business travellers' segment between SAS and Braathens SAFE in Norway.

→ Theory predicts clustering of flights in Norway

We test the time location of flight departures in the Norwegian airline industry.

We find tendency of clustering of flights

→ Competition rather than collusion on time location of flights

A related study:

Borenstein and Netz (1999): 'Why do All the Flights Leave at 8 a.m.? Competition and Departure-Time Differentiation in Airline Markets', *IJIO*, 17: 611-640.

Time scheduling of flights in US in 1975 and 1986

- The more airlines on a route, the more clustering is observed

But when comparing 1975 and 1986, a puzzling result:

- An increase in the number of firms reduced differentiation more in 86 than in 75

Why such a result, which is contrary to predictions?

- A result of the move from direct flights to a hub-and spoke system?

The deregulation of the Norwegian airline industry

Prior to 1987: Only monopoly routes

October 1987: «Step 1»

A second carrier on some specified routes was allowed a maximum of four flights each day

April 1994: «Step 2»

Free entry for *domestic* firms

Firms free to set prices and time schedules

Prior to step 2: SAS threatened to cut prices if ....

And some competition in prices has been observed;

- The *anniversary* tickets (very low prices on a limited number of flights, only in 1996)
- «*Norges*»- and the «*budget*» tickets.

***However**: The full fare ticket-price has not changed*

→ The deregulation has not led to competition on prices in the business segment.

Why 1: The market characteristics favours collusion

(i) Large companies with long term objectives.
(ii) Only two companies and legal restrictions to entry
(iii) Possible deviation easy to observe by rival.

Why 2: Prior to the deregulation the companies shared the market between them.

- In 1994 each firm had a market share of 50%
- At 24 out of 32 routes: The incumbent remained being monopolist
- At 8 routes: The incumbent reduced its market share with only 13 % on average

→ *The companies kept their «natural territories»*

Why 3: Co-ordination of prices is institutionalised;

SAS and Braathens SAFE discuss full fare prices regularly

The argument: Need identical prices to have an interline ticket system

Why 4: The firms signal aggressive response to any move by its rival

Braathens SAFE introduced *Billy* to match SAS' rebate ticket *Jackpot* and set a price NOK 5 below *Jackpot* .

SAS responded immediately by reducing its *Jackpot* price by NOK 5.

SAS reduced the necessary number of bonus points to be eligible for bonus flights by 50%

Braathens responded by doubling the number of points earned on each flight.

This seems to be a deliberate policy:

'*We will match any offer by SAS within an hour, and we can not accept that SAS has cheaper rebate tickets than what we have' [C. Fougli to Dagens Næringsliv, 20/1/94].*

→ A de facto *meet-competition clause*.

Or, as Audun Tjomsland, Braathens SAFE, state it:

'The two Norwegian firms on Norwegian routes are of equal size and can follow each other during a price war. The firm that starts a price war will quickly be followed by the rival firm, so that the firm that starts a war will have an advantage only a day or two. Accordingly, the firms are reluctant to trigger a price war.' (our translation) [Bergens Tidende, 31/7/95].

→ de facto *PRICE CARTEL in this market*

Hotelling in the air?

Starting point: collusion on prices

Then two outcomes concerning location

- Collusion (or monopoly) on location
- Competition on location

1. Collusion (or monopoly) on location

There is no 'business stealing effect' to gain by locating close to the rival.

→ *No incentives to locate departures near each other [Steiner (1952)]*

2. Competition on location

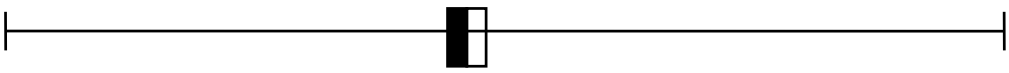
Two firms

One product each

Prices exogenously given

Consumers are uniformly distributed on the time-line

→ HOTELLING (1929), *EJ* [with fixed prices]



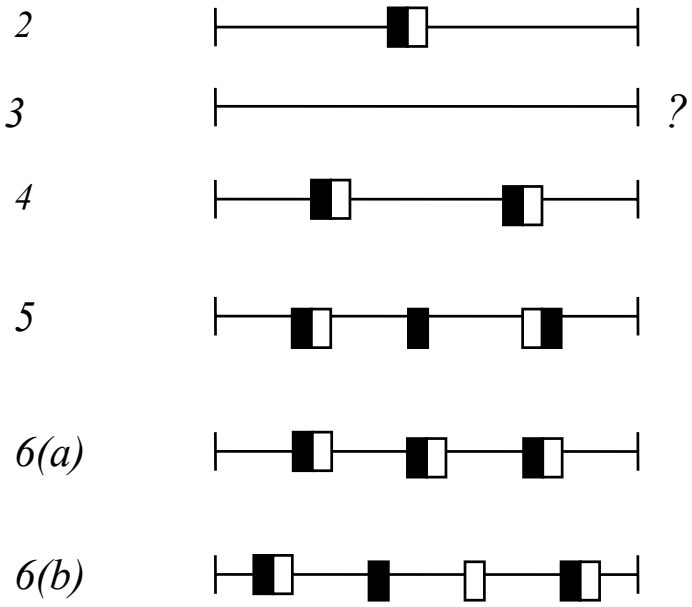
→ *Tendency of 'clustering'*

EATON & LIPSEY (1975), *RES*, test the robustness with regards to changes in

- number of firms
- distribution of consumers
- two rather than one dimension
- the response pattern by its rival

The effect of more than one firm [from Eaton/Lipsey]*:*

Number of firms



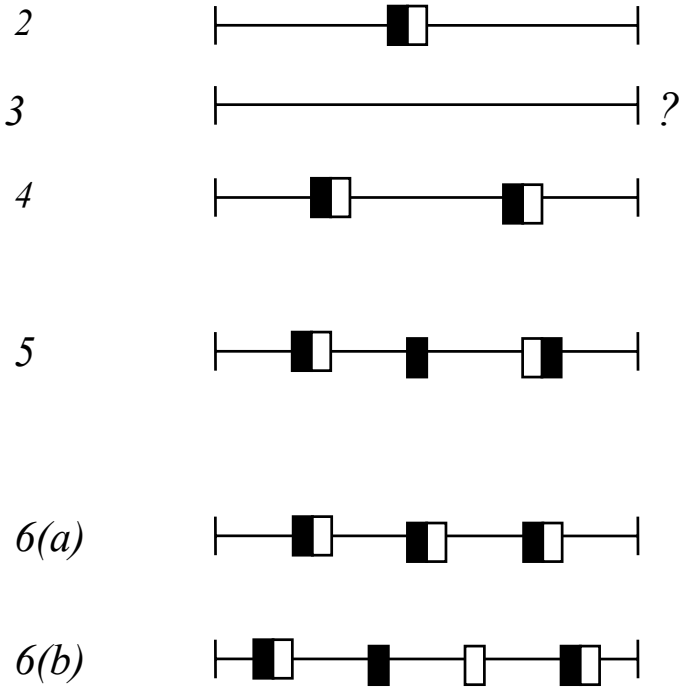
(1) If 2, 4 or 5 firms, there is a unique Nash-equilibrium in pure strategies

(2) If 3 firms, there are no Nash equilibria in pure strategies

(3) If six firms or more, there is an infinite number of Nash equilibria [6(a) and 6(b) are extremes]

→ *Tendency to local clustering*

BUT: What if two firms with n number of flights each?



Distinction from EATON/LIPSEY:

(1) No Nash equilibrium in pure strategies with 5 dept.

→ *The large firm has incentives to 'squeeze' the small firm*

(2) Only one Nash-equilibrium with 6 departures

→ *Parallel departures with even number of flights*

Tendency to 'local clustering' in this case as well, but more instability

THUS, our hypothesis:

Given

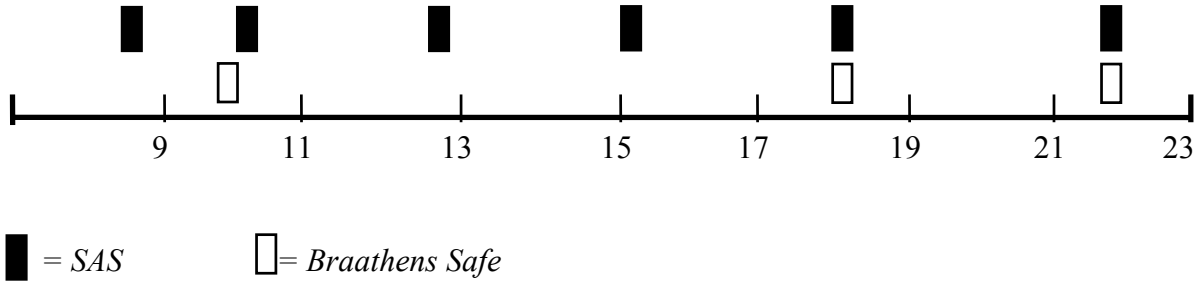
(1) collusion on prices and

(2) competition on location,

we expect more clustering of flights in duopoly than in monopoly

Is clustering an important phenomenon in the Norwegian airline industry?

Time schedule Oslo-Bodø, Oct. 27 1996 - March 29 1997



BUT*:* Does this figure mirror a ***systematic*** clustering pattern on Norwegian duopoly routes**?**

HOW TO MEASURE CLUSTERING?

We assume that consumers are uniformly distributed in terms of departure times; One consumer per minute.

Then we summarise waiting time for all consumers, generating a clustering index; *CLU*.

CLU is used to uncover possible differences in clustering on duopoly and monopoly routes.

CLU is calculated for 12 Norwegian routes; Winter 1987, winter 1992 and winter 1995.

6 routes remained being monopoly routes also after the deregulation, 6 routes changed from monopoly to duopoly.

We exploit this natural experimental feature of our data, and test for both intra-route changes and inter-route differences in time scheduling.

We estimate several models where we try to explain differences in CLU:

We include control variables to account for route- and market size:

- number of departures on each route (*DEP*)
- number of passengers for each route (*PASS*)

We include monopoly dummy variables:

BU: Braathens SAFE is the monopolist (model 1A)
SAS: SAS is the monopolist (model 1A)
MON: BU or SAS is the monopolist (model 2A)

We include duopoly dummy variables (Model 1A - 4A):

REG92: Routes that were duopolies after October 1987
REG95: Routes that were duopolies after April 1994

To account also for different route sizes we estimate models 1B - 4B where we specify cross-products to represent the duopoly dummies:

$$DEP92 = DEP \cdot REG92$$

$$DEP95 = DEP \cdot REG95$$

The 1987 «*Step 1*» deregulation was restricted;

→ We also specify models where we only include *REG95* and *DEP95*.

8 models are estimated: An example (model 2A):

$$\ln CLU_{i,t} = \alpha + \beta_{DEP} \ln DEP_{i,t} + \beta_{PASS} \ln PASS_{i,t} + \beta_{MON} MON_{i,t} + \beta_{REG92} REG92_{i,t} + \beta_{REG95} REG95_{i,t} + \varepsilon_{i,t}$$

The «best» models: 4A and 4B

- The models where *REG92* and *DEP92* were omitted
- The models were we use the combined monopoly dummy; *MON*.

• The statistical properties of *all* the models are good.

• The parameters have the expected signs

• Also the «strategic variables» are significant in our «best» models.

	HYPOTHESES		*RESULTS*
	COMP	COLL	
Control variables			
Departures	-	-	-*
Passengers	-	-	-*
Duopoly variables			
Regime shift 87(REG92)	+	*0*	*0*
Regime shift 94(REG95)	+	*0*	+**
REGxDEP92	+	*0*	*0*
REGxDEP95	+	*0*	+**
Monopoly variables			
SAS	-	*0*	-
BU	-	*0*	-
MON	-	*0*	-**

**= 5% significance level ** = 10% significance level*

→ *We find support for the hypothesis that monopoly results in less clustering of departures than duopoly*

Alternative interpretation 1:

The clustering on the monopoly routes prior to 1987 were due to regulations

→ *What we measure is regulation versus duopoly - not monopoly versus duopoly*

We estimate our two best models where we include a monopoly-regulation-dummy that takes the value one only in 1995.

This monopoly-regulation dummy will uncover potential deregulation effect on the monopoly routes

Result: The monopoly-regulation dummy is not significant but predicts a negative sign;

→ *Less clustering on monopoly routes is not due to public flight schedule regulations*

Alternative interpretation 2:

A spread on monopoly routes to accommodate transfer flights to other destinations.

If this is the case, this effect will be stronger the smaller the routes are.

Hence,

we re-estimated our model skipping one monopoly route at a time.

If some of the monopoly routes have a different structure due to transfer flight this will show up in instability in our models.

Result: Our predictions were stable over the regressions

Alternative interpretation 3:

The apparent clustering is a result of routes being moved from «off-peak» to «peak» schedules?

Such a change will be mirrored by an increase in CLU, which will then be spurious - not measure clustering.

We test for clustering in the business segment on the four largest duopoly routes

As before: *Duopoly leads to more clustering*, but

- Results more significant

These segments have a «cleaner» competitive structure, with no price competition

→ Even stronger support for our hypothesis here:

Monopoly results in less clustering of departures than duopoly

Misguided Public deregulation?

In terms of regulating the flight schedules:

(i) Superfluous prior to 1987 and on today's monopoly routes

(ii) necessary at duopoly routes

Alternatively - and even better:

There are very good reasons to implement a policy that stimulates price competition in this industry

⇒ The consumers will face lower prices
⇒ The consumers will have a larger variety in flight departures

Today's *lesson?*

This is just another semicollusion example: Collusion along one dimension (price) and competition along another dimension (location)

Which *is* reasonable; prices can be changed very quickly (daily), time schedules are changed only twice a year.