
Chapter 4: Models of Competition

Quantitative Methods for Regulation and
Competition

Today's Lecture

- Analysis of competition:
 - Price/concentration analysis
 - Diversion ratios
 - Bidding studies

Price/Concentration Analysis

- What is the relationship between price and concentration?
- Based on the structure-conduct-performance paradigm:
 - Market shares (structure) influence performance (prices)
- Applied to mergers:
 - If concentration has a significantly negative impact, then mergers increasing market concentration are problematic
 - If not, then they should be allowed
- Useful when data on several areas available (e.g. local markets for supermarkets)

Description

■ Estimate:

$$\text{Price}_i = \beta_0 + \beta_1 \text{Concentration Measure}_i + \sum_{j=2}^K \beta_j \text{Other}_{j,i} + \varepsilon_i$$

- Concentration measures: HHI, CRk
- Sometimes, one can also include $(\text{HHI})^2$
- Other variables may include import levels, barriers to entry:
 - Product differentiation (proxied by advertising-to-sales ratio)
 - Economies of scale (proxied by estimates of Minimum efficiency scale of production)
- Data can be cross-section (different local markets) or time series (different points in time) or panel data (different local markets at different points in time)
- Why computing simple correlations may lead to errors?

Example: US Petroleum Industry

■ GAO (2004):

$$\text{Price}_i = \beta_0 + \beta_1 \text{HHI}_i + \beta_2 \text{Inventories Ratio}_i + \beta_3 \text{Utilization Rates}_i + \beta_4 \text{MW Crisis}_i + \beta_5 \text{WC Crisis}_i + \varepsilon_i$$

- Price: difference between conventional gasoline rack price and spot price of crude oil
- Data (panel): weekly, from February 1994 until December 2000, for approx 500 racks
- Increased market concentration resulted in higher wholesale gasoline prices

Example: US Petroleum Industry

Table 18: Effects of Market Concentration on Conventional Wholesale Gasoline Prices (1994-2000)

	<u>Market concentration (HHI)</u>			Estimated change in wholesale price margin due to increase in HHI (cents per gallon) ^b
	1994	2000	Increase in HHI	
All regions^a				
Branded	803	1101	298	0.15 ^c
Unbranded	803	1101	298	0.33 ^c
Geographic area				
Eastern United States (PADDs I, II, III)				
Branded	773	1090	317	0.25 ^c
Unbranded	773	1090	317	0.10
Western United States (PADDs IV, V)				
Branded	1032	1180	148	0.56 ^c
Unbranded	1032	1180	148	1.29 ^d

Extensions

- Are particular rivals important to maintain low prices?
 - Are prices lower when this rival is present or has large sales?
 - Important for merger cases but more generally to find competitive constraints

- Margin/concentration analysis: use price-cost margins instead of prices:
 - Important when costs differ from region to region
 - However, cost data is difficult to obtain

- Further extensions:
 - Price indexes if more than one product is analysed

Application: Retail Merger (Lexecon, 2005)

- Do merging parties exert competitive restraint to each other?
 - Regress prices of the acquirer firm on the presence of the target and other variables (differences in local costs,...)
 - Given that effect was not significant... merger does not remove an effective competitive constraint
 - Robustness check with other definitions of local market

Interpretation

- In absence of a strong relationship between concentration and prices...
 - Market not well-defined, should be wider or
 - Market well defined but there are constraints to the exertion of market power
 - Not necessary to decide on which: in both cases, no problem!
- Additional problem:
 - In merger cases, efficiency gains are not taken into account

Diversion Ratio

- Differentiated products in many markets (cars, PCs,...)
- Then, price set is such that $MR(q) = MC(q)$
- Merged firms may have incentives to raise the price of (at least) one product above pre-merger levels:
 - Part of the lost sales may be recouped by new partner
 - Which part of customers of a partner would switch to the other partner in the event of a price increase?
- This technique...
 - Measure sales diversion between two competing products
 - Makes strong assumptions but uses readily available data

Description

- The diversion ratio from 1 to 2 can be defined as....

$$DR_{12} = \frac{\varepsilon_{1,2}}{\varepsilon_1}$$

where ε_{12} and ε_1 are the cross- and own-price elasticities

- It can be computed if one has estimates of the elasticities
- Assuming that all products are “equally close” (IIAA, independence of irrelevant alternatives assumption) then...

$$DR_{12} = \frac{\text{Market share}_2}{1 - \text{Market share}_1}$$

- Diversion ratio increases when, ceteris paribus, market share of either product 1 or 2 is larger
- Example: If $MS_1=20\%$, $MS_2=20\%$, then $DR_{12}=0.25$
If $MS_1=30\%$, $MS_2=20\%$, then $DR_{12}=0.33$
If $MS_1=20\%$, $MS_2=10\%$, then $DR_{12}=0.12$

Description and Data

- Assuming that the elasticity of demand is constant over the relevant price range

$$\Delta\text{Price}(\text{post vs. pre - merger})_1 = \frac{\text{Markup}_1 \text{DR}_{1,2}}{1 - \text{Markup}_1 - \text{DR}_{1,2}}$$

where

$$\text{Markup} = \frac{P - MC}{P}$$

- Example: If $\text{DR}_{1,2}=0.25$ and $\text{Markup}=40\%$ then $\Delta P_1=29\%$
If $\text{DR}_{1,2}=0.33$ and $\text{Markup}=40\%$ then $\Delta P_1=49\%$
If $\text{DR}_{1,2}=0.12$ and $\text{Markup}=40\%$ then $\Delta P_1=10\%$
- Necessary input: only market shares and mark-ups!

Application: Kimberly Clark/Scott

- Merger of the owners of Kleenex (Kimberly Clark) and Andrex (Scott), the two leading brands of toilet tissue in the UK (30% and 15%, resp.)
- Expected price increase of 10%:
 - Estimated diversion ratios: $D_{AK}=0.2$ and $D_{KA}=0.3$
 - Estimated directly from the elasticities, market shares not used
 - Margins of 0.7
- Merged parties obliged to divest a toilet tissue paper brand

Interpretation and Criticisms

- IIAA assumption:
 - Implies cross-price elasticities are all the same
 - Luxury and small cars may be in the same market but cross-price elasticity is not the same
 - With IIAA, models that sell most gets most diverted sales
- Constant own-price elasticity:
 - If it rises with the price, then ΔP is overestimated
 - Example: with linear demand

$$\Delta \text{Price}_1 = \frac{\text{Markup}_1 \text{DR}_{1,2}}{2(1 - \text{Markup}_1)}$$

Bidding Studies

- Sometimes competition is *for* the market, competition for individual contracts
- Example: major infrastructure and capital investment projects (e.g. refineries/power plants and equipment)
- Market shares poor indicators of market power:
 - Market shares reflect past won projects
 - Not necessary to win many projects to exert competitive constraint
- Bidding studies analyse:
 - The effects of a merger between bidders. Which is the impact of a particular merger?
 - How many firms do we need?
 - Did bid rigging take place? (see OFT report)

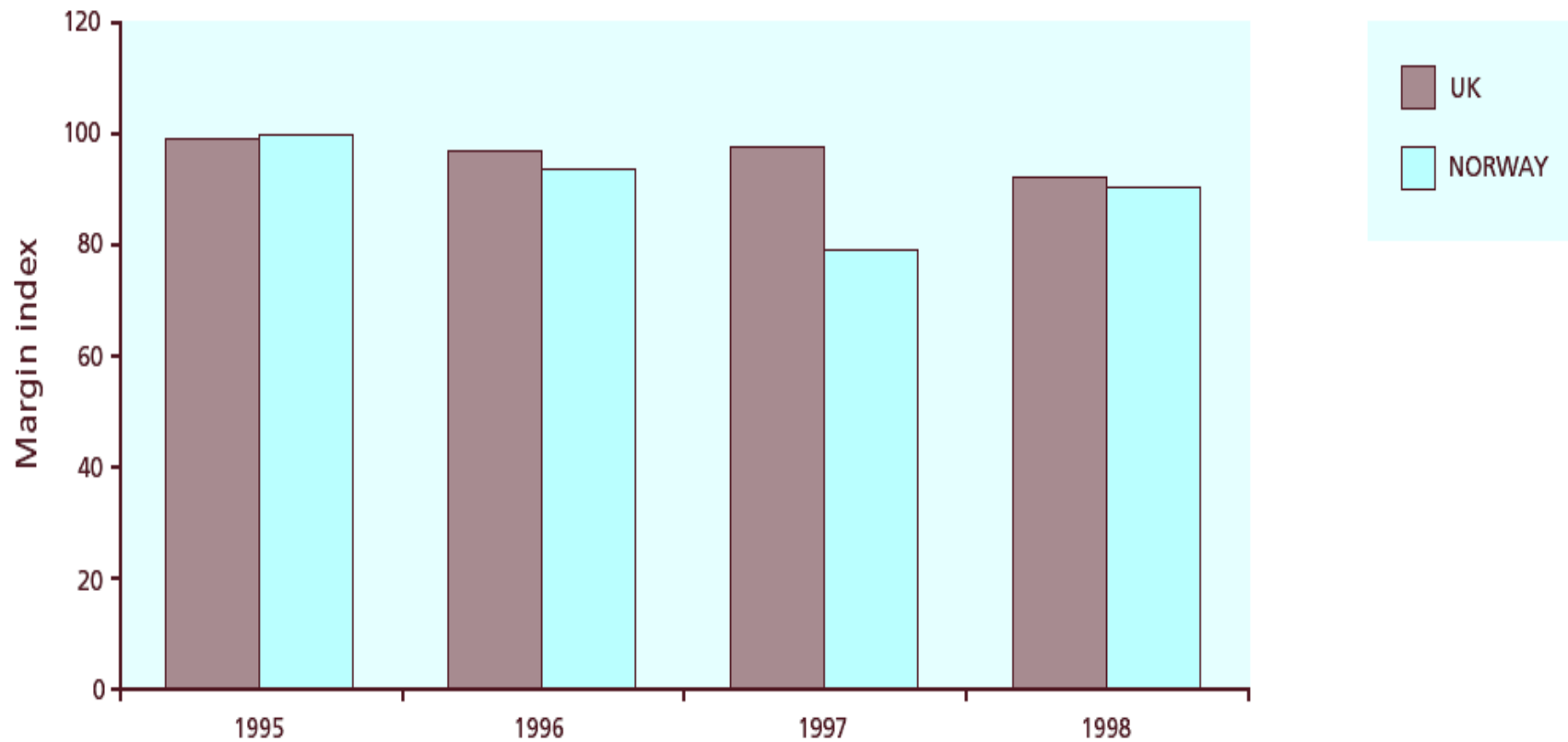
Application: Merger between Helicopter Service Providers

- Merger in the UK Northern Zone of the North sea would imply 2 instead of 3 firms
- In the Norwegian Northern Zone of the North sea there were only 2 firms present
- Comparison of the margins between both zones

- Similar, merger = no problem!

Application: Merger between Helicopter Service Providers

Chart 10.1: Margin per flying hour (Norway 1995 = 100)



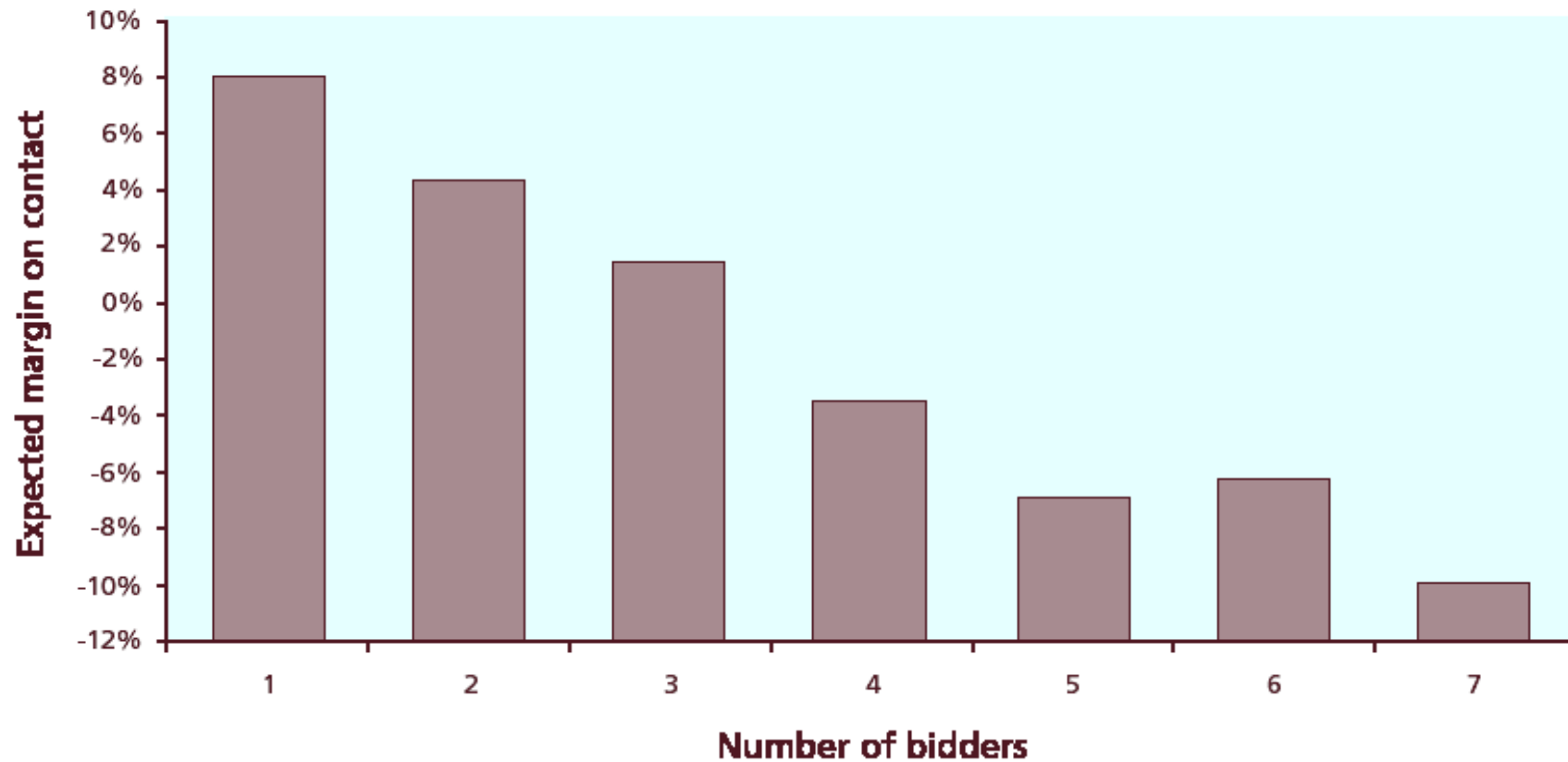
Source: Lexecon 2005

Application: Utility Merger

- What is the impact of the number of bidders on the bid price?
- Data on bid prices and expected costs, and therefore on expected margins
- Positive and statistically significant relationship:
 - Merger would create problems!
- Further, participation of the target has a significant effect on the price:
 - Margin was lower in the presence of the target than in the present of another bidder

Application: Utility Merger

Chart 10.2: Average margin and number of bidders



Source: Lexecon 2005