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“Vertical Market Power” in a Systemic Concept of Market Power

**- The relevance of up-stream and down-stream
concentration to the performance of industries with special
regard to Austrian data**

CONTEXT - BACKGROUND

- **OPERATIONALISATION OF
OLIGOPOLY POWER**
- **DICHOTOMY OF COMPETITION AN
MONOPOLY (OLOGOPOLY)**

Actually we see an all-time-high in merger activities in Europe

(former) standard industrial economics analyses:

market structure => performance

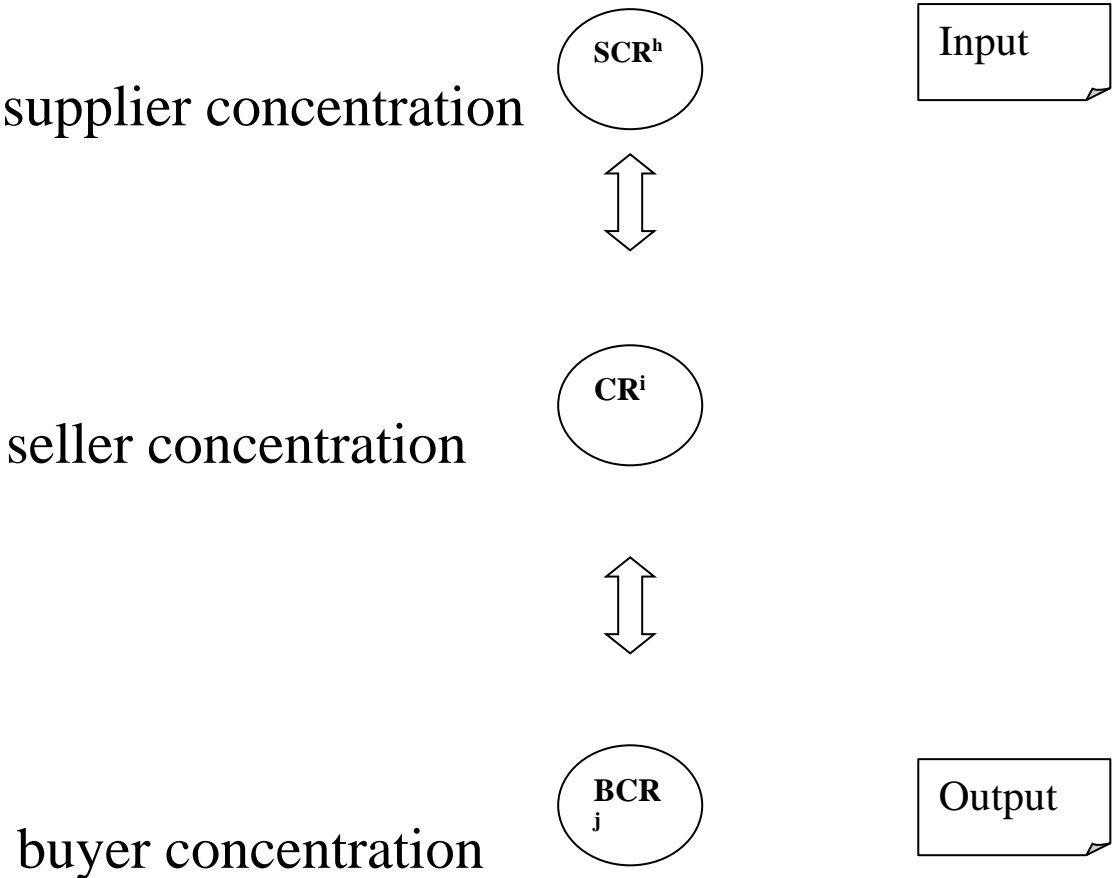
(concentration and centralization of capital => oligopoly profits)

methodological problems like “What is the relevant market?”

There is a great variety of empirical results on the correlation of market structure and performance. This suggests that there are missing variables.

In general (Marxian) framework with the focus on the capital-labour-relations this would be only one story - but it is a relevant story

Basic scheme vertical market power



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Example:
Economic food chain
“Big Food”

Ignoring of the power relations in the vertical axis:

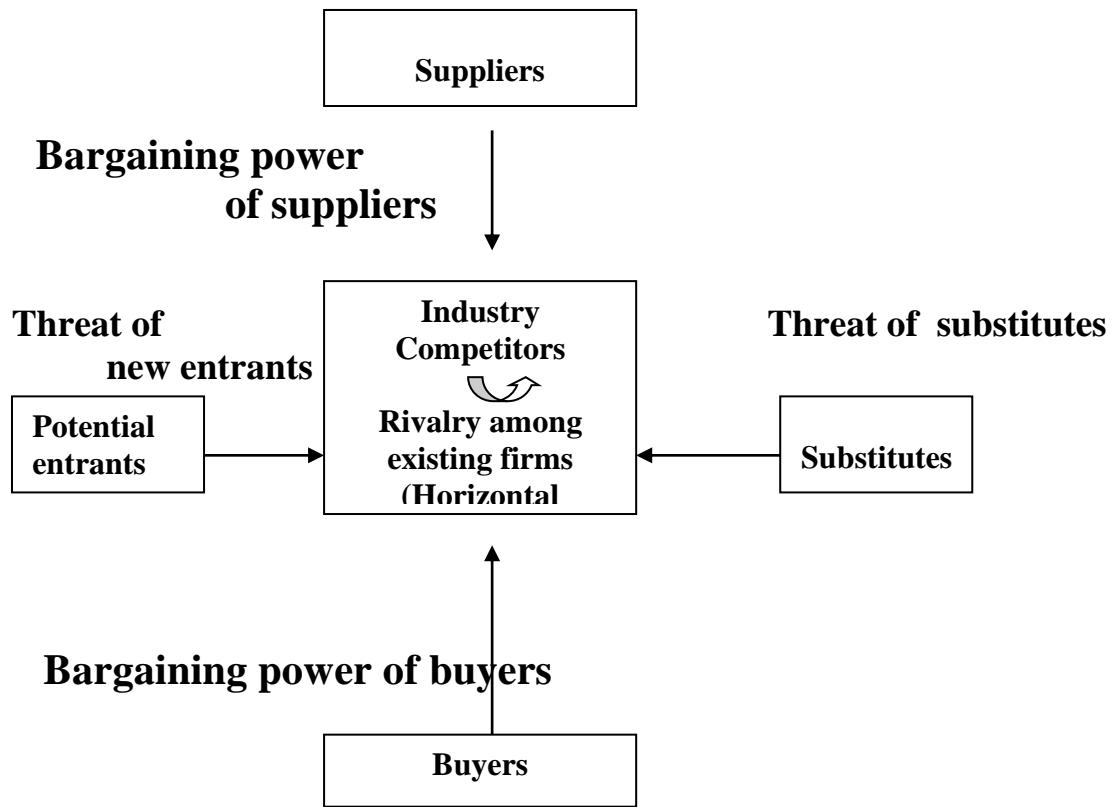
Dobson (1999) stated “*remarkably few empirical studies which have attempted to assess the impact of buyer power on prices, profits or any other measures of firm behaviour or ‘performance’*. In that sense, we tread more or less virgin territory.”¹

„*What is surprising is that bilateral oligopoly, which would seem to be a more realistic case, has attracted little theoretical or empirical interest.*”²

Problems of availability of data

¹ **Dobson Consulting** (1999): Buyer Power and its Impact on Competition in the Food Retail Distribution Sector of the European Union – Prepared for the European Commission – DG IV Study Contract No. IV/98/EDT/078, Nottingham, p. 32

² **Azzam** A. M. (1996a): Estimating the degree of dominance in a bilateral oligopoly, Applied Economics Letter, 1996, p. 209



(diagram of Porter modified)

Results of literature on vertical market power

In a screening of theoretical-empirical literature – we find single elements of vertical market power – referred to as “buyer power”, “buyer/seller/supplier concentration”, and “vertical organization”:

Table 1 Performance-determinants with special regard to vertical market power

	Author	year publication	data - year	Per- formance- variable	industries , firms F	input- AND outputside	buyer concentration	Supplier concentration	horizontal concentration
1	Collins-Pr.	1969	1963 u.1958	PCM					+
2	Porter	1974	1963 - 1965	ROE					~
3	Buzzell-G.-S.	1975	1970 - 1972	ROI	F		-		+
4	Brooks	1973	1963	ROA			-		+
5	Lustgarten	1975	1963	PCM			-		+
6	Guth-Sch.-W.	1976	1963	PCM			(-		(+)
7	McGuckin-Ch.	1976	1967(1963)	PCM			-		+
8	Campbell-C.	1977	1963 + 1967	ROA		yes	-	~	+
9	LaFrance	1979	1963	PCM			-		+
10	Waterson	1980	1963 u. 1968	PCM	F		-		+
11	Gabel	1983	49,'58,'63,'67	ROE			~		+
12	Galbraith-St.	1983		ROS	F	yes	-	+	+
13	RavenscraftLB	1983	1975 ('74,'76)	ROS	F)	yes	+	(-)	-
14	Ravens.Branch	1983	1975 ('74,'76)	ROS		yes	(-)	-	~
15	Bradburd	1982	1972	PCM					~
16	Bradburd-C.	1987	1972	Price					(+)
17	MacDonald	1985	1977, IO 1972	Vert,Integr			(+)		(+)
18	Farber	1981	1958 u. 1963	RD			(-)		(-)
19	Cowley	1986	1973-1976	ROS	F		-		+
20	Cowley	1986a	1973-1976	PCM	F		-		+
21	Cowley	1988	1973-1976.	ROS	F		-		+
22	Martin	1979	1967 (1963)	several			(-)		~
23	Martin	1982	1967	PCM			~		+
24	Martin	1983	1972	PCM		yes	-		+
25	Martin	1986	1972 ('67)	PCM					~
26	Newmark	1989	1963	PCM					+
27	Boulding-St.	1990	70er Jahre	P,C	F		~	~	
28	Gaitanides-W.	1990	-1988	ROS	F		-		
29	Schumacher	1991	1977, z.T.'82	PCM			-		+
30	Messinger-N.	1995	1961-1987	ROA			-	-	+
31	Cool-Henderson	1998	1993	ROE	F	yes	(-)	(-)	
	<i>direction of impact - sum</i>		<i>31 research results</i>				<i>15- 1+</i>	<i>2- 1+</i>	<i>18+ 1-</i>

Towards a systemic concept of market power

Cowling-Watson (1976) mention the effects of **missing of variables of elasticity** in most structure-performance-tests. Implicitly then there is the (strong) assumption that elasticities in various industries do not differ.

But because usually data for elasticities for demand and supply are available only seldom although they are crucially for oligopoly power we therefore use **measures of dispersity** and relevance of delivery as proxies for elasticities.

Combining and generalizing elements of the set of concentration measures out of literature to a scheme for systemic market power including vertical market power was developed classifying **horizontal concentration as an important special case of concentration**.

There are introduced **indicators for the relevance of delivery relations** to up-stream and down-stream industries and the dispersity of output of up-stream and dispersity of input of down-stream industries (proxies for possibilities of substitution); and also the performance in these up-stream and down-stream industries.

**So we get 3 types of indicators for vertical market power:
(numbers referring to diagram 3)**

3 concentration ratios in a narrow sense:

- **horizontal concentration (=seller concentration)
(Nr°4)**

vertical::

- **supplier concentration (Nr°1)**
- **buyer concentration (Nr°9)**

4 measures of dispersity:

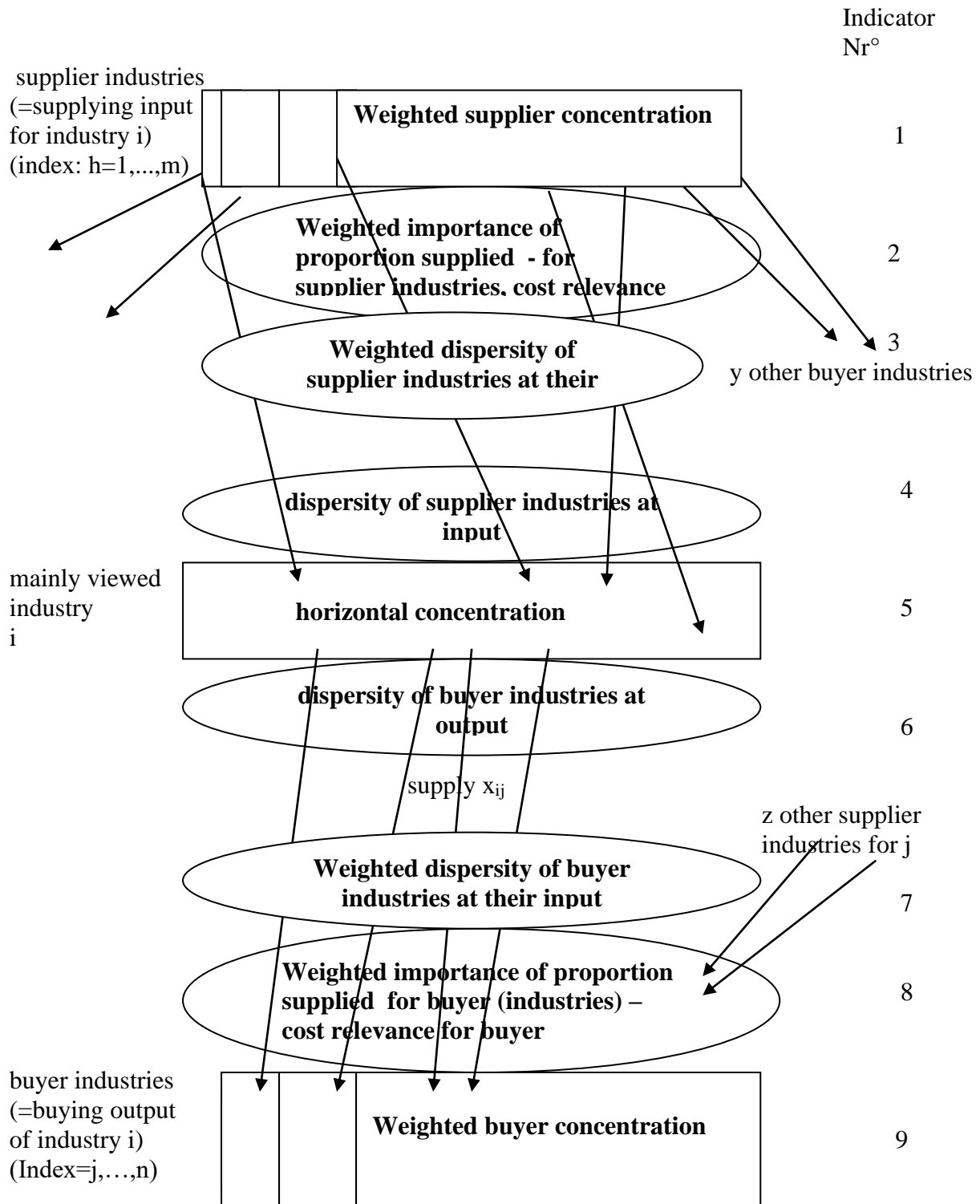
- **dispersity of supplier industries at their output (Nr°3)**
- **dispersity of supplier industries at input (Nr°4)**
- **dispersity of buyer industries at output (Nr°6)**
- **dispersity of buyer industries at their input (Nr°7)**

2 indicators of cost relevance:

- **cost relevance of supplies for supplier (Nr°2)**

cost relevance of supplies for buyer (Nr°8)

Indicators of vertical market power in systemic context



Results of literature on various indicators of vertical market power

	indicator	abbreviation (h:upstream; i: mainly viewed industry; j:downstream)	expected direction of impact on performance of industry i	evidence in literature: significant pro, not significant pro, not clear, insignificant con, significant con
1.	supplier concentration	SCR ^h	<0	2:2:2:0:1
2.	importance of proportion supplied - for supplier industries	REL ^h	< >	0:2:0:0:0
3.	dispersity of supplier industries at their output	DPO ^h	>0	0
4.	dispersity of supplier industries at input	DPI ⁱ	<0	3:0:0: 0:0
5.	horizontal concentration	CR ⁱ	>0	18:1:5:0:1
6.	dispersity of buyer industries at output	DPO ⁱ	<0	6:1:1:0:1
7.	dispersity of supplier industries at their input	DPI ^j	>0	0
8.	importance of proportion supplied for buyer (industries)	REL ^j	< >	3:2:0:0:0
9.	buyer concentration	BCR ^j	<0	15:4:3:0:1

If all available work with different indicators is together-regarded, then a **relatively consistent picture** altogether actually results:

Indeed a large confirmation for the negative effect of indicators of vertical market power and at the same time a positive effect of the horizontal concentration.

Some authors critically comment special concepts of indicators for vertical market power but it is remarkable that not in one of the 31 considered studies the concept of vertical market power is altogether rejected.

Definitions:

CR (CR_x) measure for concentration (e. g. Herfindahl); or concentration ratio: share (of x-greatest companies) on output of industry

$\sum_{j=1}^n x_{ij}$ output industry i: sum of supplies of industries i to all industries j (j=1,...,n)

$\sum_{z=1}^s x_{zj}$ input industry j: sum of all supplies of industries z the industry j (z=1,...,i,...,s)

$\sum_{y=1}^r x_{hy}$ output industry h: sum of supplies of industry h to all industries y (y=1,...,i,...,r)

$\sum_{h=1}^m x_{hi}$ input industry i: sum of supplies of input industries h (h=1,...,m) to industry i

$a_{hy}^h = x_{hy} / \sum_{y=1}^r x_{hy}$ share of supply of industry h to industry y in relation to total output in industry h

$a_{hi}^i = x_{hi} / \sum_{h=1}^m x_{hi}$ share of supply of industry h to industry i in relation to total input in industry i

$a_{ij}^i = x_{ij} / \sum_{j=1}^n x_{ij}$ share of supply of industry i to industry j in relation to total output in industry i

$a_{zj}^j = x_{zj} / \sum_{z=1}^s x_{zj}$ share of supply of industry z to industry j in relation to total output in industry j

So we can construct

Relevant indicators for vertical market power:

$$1. SCR^h = \sum_{h=1}^m a_{hi}^i CR_h$$

$$2. REL^h = \sum_{h=1}^m (a_{hi}^i (x_{hi} / \sum_{y=1}^r x_{hy}))$$

$$3. DPO^h = \sum_{h=1}^m (a_{hi}^i (\sum_{y=1}^r a_{hy}^h)^2) \text{ (specified al la Herfindahl)}$$

$$4. DPI^i = \sum_{h=1}^m a_{hi}^i{}^2 \text{ (specified al la}$$

Herfindahl)}

$$5. CR^i$$

$$6. DPO^i = \sum_{j=1}^n a_{ij}^i{}^2 \text{ (specified al la}$$

Herfindahl)}

$$7. DPI^j = \sum_{j=1}^n (a_{ij}^i (\sum_{z=1}^s a_{zj}^j)^2) \text{ (specified al la Herfindahl)}$$

$$8. REL^j = \sum_{j=1}^n (a_{ij}^i (x_{ij} / \sum_{z=1}^s x_{zj}))$$

$$9. BCR^j = \sum_{j=1}^n a_{ij}^i CR_j$$

Expected direction of impact of vertical market power to profit-performance	
1.	$\partial \text{ performance} / \partial \text{SCR}^h < 0$
2.	$\partial \text{ performance} / \partial \text{REL}^h > < 0$
3.	$\partial \text{ performance} / \partial \text{DPO}^h > 0$
4.	$\partial \text{ performance} / \partial \text{DPI}^i < 0$
5.	$\partial \text{ performance} / \partial \text{CR}^i > 0$
6.	$\partial \text{ Performance} / \partial \text{DPO}^i < 0$
7.	$\partial \text{ performance} / \partial \text{DPI}^j > 0$
8.	$\partial \text{ performance} / \partial \text{REL}^j > < 0$
9.	$\partial \text{ performance} / \partial \text{BCR}^j < 0$

Basic hypothesis:

a negative impact of vertical market power (up-stream and down-stream concentration) on industry performance.

At an upswing phase:

(vertical) market power tends to be less effective due to a more dynamic demand.

In the literature there are **contradictory expectations only for 2. und 8.** depending on implicit assumptions on substitution elasticities:

+ high relevance for the partners: dependence – partners will not resist (Galbraith-Stiles 1983, Cool-Henderson 1998)

- considerations of transaction costs: switch of partner more useful if supplies become higher, partners will resist

(Bradburd 1982, Cowley 1986 in relation to Stigler 1964)

A model integrating horizontal and vertical market structure

The performance of companies or industries often is typically explained by structure-performance models using price-cost-margins:

$$\mathbf{PCM} = f(\mathbf{COMP}, \mathbf{BE}, \mathbf{D})$$

With

PCM ... price-cost-margin; $(\mathbf{PCM} = (\mathbf{P}-\mathbf{C})/\mathbf{P})$, P ... price, C... cost

COMP ... vector for competition structures

BE vector for barriers of entries and barriers of exit

D vector for demand

Barriers of entries and barriers of exit can be considered in the sense of sunk costs and measured by capital intensity.

For determining the performance by market power we can use the Lerner equation: The Lerner-index indicates that the impact of oligopoly power can be reduced by high elasticities

$$\mathbf{PCM} = \frac{H}{-\eta} (1 + \lambda)$$

With

H Herfindahl-Index

$\lambda = 0$ Cournot, linear

$\lambda = F(H)$ strategic conduct; not linear

So we get a generalization of the standard Cournot-model for homogenous goods:

$$\mathbf{PCM}_i = f(\mathbf{CR}_i, \eta_i^d, \eta_i^s)$$

\mathbf{PCM}_i price-cost-margin industry i

\mathbf{CR}_i concentration measure industry i

η_i^d elasticity of demand industry i

η_i^s elasticity of supply industry i (flexibility for production switch)

Empirical results for a model integrating horizontal and vertical market structure

This basic systemic concept of market power is modified, operationalized and tested by econometric analyses using Austrian cross industry and input-output-data from 1976 to 1988.

Evidence was found for a negative impact of vertical market power (up-stream and down-stream concentration) on industry performance. These results have still more weight, as available data originate from years of upswing when (vertical) market power tends to be less effective due to a more dynamic demand.

Previous contradictions in the results using data of Austrian industries could be illuminated and partly clarified. In particular, often negative and varying signs of horizontal concentration in the results of former studies with Austrian data vanished when vertical market power was included, and **when the industry profits were corrected by the calculatory “employer’s salary”**, which has to be calculated especially for small firms: A positive effect of horizontal concentration on performance can mostly be observed when the indicators for vertical market power are used also as explanatory variables and when the industry profits are corrected by calculatory “employer’s salary”.

Finally it could be demonstrated that the **gap of the price-cost-margins of the four largest firms in relation to the other firms can be explained by the level of industry profitability and by the horizontal concentration.**

Summary

The performance of an industry is influenced by a set of concentration measures reflecting market power.

The horizontal concentration is mostly used but this horizontal concentration of the own industry (market) is only one (important) element of market power relations of industries.

The vertical impact of concentration in up-stream and down-stream industries, dispersity variables and also the performance in these industries are often forgotten variables.

So a systemic concept of market power is useful to analyse oligopoly power

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