The Norwegian Ministry of Government Administration and Reform (FAD)

EXTERNAL REPORT ON COMPETITION INDICATORS AND OTHER RELEVANT METHODS

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Summary

The Norwegian Ministry of Government Administration and Reform has asked Copenhagen Economics to make a report on competition indicators and methods that can be used to report the results of the Norwegian Competition Authority, and to visualise the effects of competition policy.

The Norwegian Ministry of Government Administration and Reform has specifically asked Copenhagen Economics to:

- Give a summary of national and international experience in using competition indicators and other tools in empirical analyses of the effects of competition policy.
- Review literature about competition indicators and other tools that are suited to visualise the effects of competition policy and to assess the positive and negative characteristics of the different methods.
- Identify and assess competition indicators and other methods that can be used to report the results of the Norwegian Competition Authority and to visualise the effects of competition policy.

In this English-language summary report, Copenhagen Economics presents some of the main results of the study, corresponding to chapter 1 and chapter 3.1 in the Norwegian-language main report.

National and international experience in using competition indicators and other tools
In the report we review and summarise national and international experience in using competition indicators and other tools in empirical analyses of the effects of competition policy.

Competition indicators are quantitative indicators, such as market concentration, that measure the degree of competition intensity in an industry. By other tools, we understand tools, such as statistical and simulation models, that can be used to study and assess the effects of specific policy variables or competition policy initiatives. The relevant competition policy initiatives are mostly interventions related to the core activities of the competition authorities, i.e. merger decisions, intervention against abuse of dominant position or intervention against cartels or other agreements reducing competition. However, they can also be other initiatives of the competition authorities, for instance sector inquiries and information campaigns.

Firstly, we conclude that so far relatively few studies have been undertaken internationally on the effects of specific competition policy initiatives. Most of the studies have been made within the last 5-10 years.

Secondly, we conclude that until now only three countries, namely the US, the UK and the Netherlands, have summarised the effects by estimating an economic value of all initiatives

undertaken by a competition authority. In all three countries, relatively simple calculations have been made that have encountered strong criticism for indicating the expected effects rather than the actual effects of the competition authorities' actions.

Thirdly, we conclude that most of the studies on specific initiatives that have been carried out until now have been isolated *ex post* studies. These *ex post* studies assess the effects of a specific competition policy initiative a few years after they have been carried out.

Most of these studies deal with the effects of mergers or intervention against cartels. Only a few have investigated the effects of intervention against abuse of dominant position. The methods used in the studies are quite different. In most of them, relatively simple methods are used, but there are also examples of more advanced methods. Only a few studies provide concrete quantitative assessments of the interventions' effects. The majority of the studies are qualitative studies where the interview survey is the primary tool.

Theory and empirical knowledge about the use of competition indicators
We undertake a thorough review of the theoretical and empirical literature on how different competition indicators are suited to visualise the effects of concrete competition policy initiatives.

We present a significant number of possible competition indicators. In this report, we study 57 of the most common competition indicators in the economic literature that can be divided into eight groups: concentration, entry barriers, mobility, innovation, product quality, prices, productivity, and or profit.

Based on an assessment of the positive and negative characteristics of the different competition indicators, we select 31 indicators that we consider to be more suitable than others in order to indicate the competition intensity in a market. The selection is based on two criteria: the theoretical characteristics of the indicators and their practical applicability, cf. Table 1.

Table 1: The chosen ones: 31 relevant competition indicators

Concentration	**Prices**
2 N-firm concentration indices	32 Price changes in a sector
3 Herfindahl-Hirschman Index (HHI)	33 Purchasing power parity (PPP)
4 Import-total sale ratio	35 Number of price changes
5 Public authorities' market share	**Profits**
6 Change in concentration ratio	36 Return on assets
7 Change in HHI	37 Return on capital employed
Barriers to entry	38 Return on invested capital
8 Capital–total cost ratio	39 Return on equity
9 Marketing cost ratio	40 Return on sales
11 Cost disadvantage of smaller firms	41 Gross residual income
14 Establishment rates	42 Net residual income
16 Churn rates	**Productivity**
19 Growth in sales ratio	46 Change in labour productivity
Mobility	47 Spread of labour productivity
21 Concentration variance coefficient	50 Change in total factor productivity
22 Market share stability coefficient	51 Spread of total factor productivity
Innovation	**Product quality**
25 R&D ratio	55 Consumer complaints
27 Patent ratio	

Source: Copenhagen Economics.

Other tools to visualise the effects of competition policy initiatives
We also explain what other tools can be used to identify and visualise the effects of competition policy.

First, we explain the common challenge which exists in all studies on the effects of competition policy initiatives. The challenge is to predict how the market would have developed without the

specific initiative that was carried out. For example, how the market would have developed if a merger was not approved, or if there was no intervention against an abuse of dominant position. This hypothetical market situation is called the *'but-for'* situation in the economic literature.

Second, we present six different tools that can be used to predict how the market would have developed in this *'but-for'* situation.

The most common tool is probably qualitative interviews. Here, we study the effects of the initiative by asking clients and competitors on their assessment of the evolution before and after a competition policy initiative. By conducting interviews, it is fairly easy to obtain many answers: however, it is important to bear in mind that these answers are subjective since clients and competitors may have an interest in bringing to the fore certain answers.

Besides interviews, five different economic (and more quantitative) tools are used. The name of these tools often varies, but they are best known as the *'before-and-after'* method, benchmark method, cost structure method, statistical method and simulation method. These quantitative tools have in common that it can be costly to achieve precise answers, but in return often provide more objective answers than what is the case for interviews, cf. Table 2.

Table 2: The five economic tools to predict *'but-for'* situations

Method	Short description
Before and after	Compare the market before and after a competition policy initiative
Benchmark	Compare the market with other comparable markets, but without the same competition policy initiative
Cost structure	Predict how the market would have looked like without the competition policy initiative based on cost structure, observed costs and profit level
Statistical	Predict how the market would have looked like without the competition policy initiative, based on a statistical relationship between prices and other data that can explain the price setting on the market
Simulation	Simulation of the market price without the competition policy initiative based on modelling the price setting on the specific market.

Source: Copenhagen Economics.

Recommendations on reporting and visualising the competition policy effects
Finally, the report includes Copenhagen Economics' recommendations to the Norwegian Ministry of Government Administration and Reform on how competition indicators and other tools should be used for results-based reporting and visualisation of the impact of competition policy.

We clearly separate *ex ante* from *ex post* effects. The difference is that the former is an assessment which takes place before the competition policy initiative has brought visible effects while the latter takes place after the initiative has brought visible effects.

This gives a fundamental difference between an *ex ante* assessment and an *ex post* one. An *ex ante* assessment assumes that the concrete competition policy initiative is a correct decision based on a correct assessment on how the market really looks like. An *ex ante* assessment assumes right decisions.

This is not the case for an *ex post* assessment. An *ex post* assessment finds a positive relationship between the competition policy initiative and the effects if the decision has been based on correct assumptions. But it can give a negative relationship if the decision has been based on wrong assumptions.

We recommend that the Norwegian Competition Authority should carry out both types of assessments. There are two important reasons why *ex ante* assessments should be carried out. First, highlighting and visualising the *expected effects* of the competition policy initiatives are necessary to argue why the initiatives should be approved and carried out. Second, it is an important condition in order to appropriately highlight and visualise the actual effects after the concrete initiative has been carried out.

There are three important reasons to carry out *ex post* assessments. Firstly, the Norwegian Competition Authority is politically obliged to highlight and visualise the effects of their work. Secondly, it is increasingly important to document how the Norwegian society gains by the resources used in public administration. Thirdly, it is necessary in order to give priority between the uses of public means for different purposes.

We recommend that the Norwegian Competition Authority should determine what consequences are expected in connection with the case-handling of a competition policy initiative. In this connection, the Authority should pick out the competition indicators that are expected to be most suitable for highlighting and visualising the actual effects. These competition indicators can be used to highlight and visualise the *expected* effects of the current initiative, and the same indicators can be used after implementation of the current initiative in order to highlight and visualise the *actual* effects. Moreover, making a choice already in connection with the case-handling, will make it easier to undertake an *ex post* assessment later on.

We recommend that the Norwegian Competition Authority should use, as far as possible, the competition indicator *Price changes* to assess both the expected and the actual effects of competition policy initiatives. Otherwise, we will *not* recommend any other competition indicators for general use. Many competition indicators are ambivalent in the sense that it is not unambiguous whether an increase or a decrease in this indicator expresses an increase in competition intensity. This can only be determined in the specific case.

When assessing the effects of competition policy initiatives, it is natural to differentiate between two groups of cases or initiatives. The first group comprises the core activities of the competition authorities, i.e. intervention against mergers, cartels and abuse of dominant position. The other group includes all the other decisions and initiatives that come from and are implemented by the Competition Authority. These are for instance sector inquiries, information campaigns, and the publication of guidelines.

In *core activity cases*, we recommend using *simulation models* to visualise the *expected effects (ex ante)* of the competition policy initiatives on price. Simulation models can be simple or more advanced IO models. What is important is to model how the market would have developed if the specific initiative had not been carried out, for example if a merger that was prohibited had been instead authorised without any conditions.

However, not all core activity cases of the competition authorities are suitable for simulating the effects of a specific competition policy initiative. In these cases, we recommend as far as possible using *ad hoc methods* to assess and predict the effects on the market. Such *ad hoc methods* may include any of the four other economic tools mentioned in Table 2. They have in common that they take advantage of specific characteristics of each individual case and each individual market to assess the expected effects. For instance, there may have been previous episodes which resulted in changes to competition intensity, and that can be used to predict the effects of new competition policy initiatives.

In certain *core activity* cases of the competition authorities, we cannot rule out that it can be relevant to use *rules of thumb* to visualise the expected effects on price or other competition

indicators. In such cases, we recommend using the same rules of thumb as as being used for example in the Netherlands or the UK, for example that an intervention against mergers has an expected effect on one per cent of the turnover in the relevant market for one or two years.

Basically, we also recommend that the Norwegian Competition Authority should use the same methods to assess the expected *ex ante* effect of *other policy initiatives*. The biggest difference between the two groups of initiatives is that it will often be much more difficult to assess an expected *ex ante* effect of other competition policy initiatives than what is normally the case for initiatives within the core activities of the Competition Authority.

Specifically, this means that it may be too resource demanding to use simulation models, and at the same time it would make no sense using a simple rule of thumb. Instead, we recommend that the case-handlers point out relevant competition indicators, that expectedly will be influenced by the competition policy initiative in the short and long run. Based on these competition indicators, we propose that the Competition Authority evaluates the effects of those initiatives using the *'before and after'* method.

Concerning the visualisation of the actual effects of the Norwegian Competition Authority's initiatives, we recommend that the methods and tools should be the same, regardless of whether we deal with initiatives within the *core activities* of the Competition Authority or *other policy initiatives.*

In all the cases, we are talking about *ex post* assessments: the task consists in evaluating the actual effects of the specific initiative for the development we have observed since the initiative was implemented. The challenge is to control for other factors that have also influenced the market in the relevant period and that therefore make it difficult to assess the impact of a specific competition policy initiative.

In order to take into account this challenge, we recommend that the Norwegian Competition Authority should use one or several of the economic tools listed in Table 2. As a starting point, there is no reason to use advanced methods. The amount of noise on the specific market is decisive when choosing the best method. In this context, noise has a double meaning: firstly, other factors than the concrete initiatives may have contributed to changes in the market conditions. Secondly, there may be a lack of quality in available data on prices and quantities on the market.

If there is noise from neither other factors nor lack of data, the simplest methods will always be preferred. They will give a better picture even without using many resources. If other factors than the specific initiative can explain the observed development, more advanced tools may be needed to isolate the effect from the specific initiative we are interested in.

We recommend that the choice of *ex post* method should be based on the specific initiative. For instance, there will be a difference between the *ex post* methods that are relevant according to whether the authorities have decided to intervene against something, such as a merger, or to approve something, such as a merger.

If the authorities allow a merger, the market changes. Hence, it will be relevant to assess whether the situation on the market has changed following a merger in comparison with the situation before the merger.

On the contrary, if the authorities have prohibited a merger, nothing changes on the relevant market as a result of the decision. Therefore, it will be significantly more difficult to assess whether the intervention was correct and, thus, has had positive effects. Instead of comparing the development on the market before and after the merger, it will be relevant to study the

assumptions that led to the decision. For instance, a merger will often be prohibited because the authorities judge that there is high entry barriers on the relevant market.

Just as for *ex ante* assessments, we consider that *ex post* assessments will require much less resources if they are already used in the case-handling phase. Specifically, when a case is closed and a decision made, we should already think of how it would be possible in the future to measure and evaluate the actual effects of the initiative in the years to come. The best insight on available data is obtained in connection with case-handling. Thus, this will be the best moment to assess what methods can give an insight on the actual effects in the coming years.

Competition indicators – theory and empirical knowledge

Competition indicators are indicators trying to measure how fierce competition is on a market or, in other words, competition intensity. There is no specific indicator, unit or measuring technique one can use to observe and measure competition intensity directly. For this purpose, competition intensity is too complex and multidimensional a phenomenon.

Instead, we can describe the complexity of competition intensity using a number of indicators, each of them capturing some parts of the complexity. We define eight different groups of indicators, each of them describing one of the following dimensions of competition intensity: concentration, barriers to entry, mobility, innovation, prices, productivity, profits and product quality.

We focus now on describing the intellectual framework applied for the development and interpretation of competition indicators.

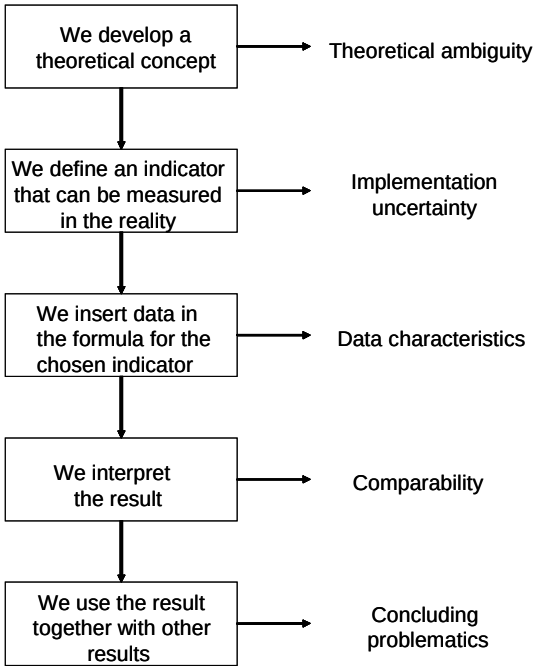
Intellectual framework for competition indicators

In order to develop relevant competition indicators we go through the following five-stage process:

Theory development ➔ implementation ➔ insertion of data➔ interpretation ➔ conclusion.

For each of the five stages, we apply several assumptions that are necessary to operationalise the theoretical idea, but which can also be critical for the reliability and credibility of each individual indicator. We first review the five-stage process and then the critical assumptions, cf. Figure 1.

Figure 1: Overview of intellectual framework for competition indicators



Source: Copenhagen Economics.

Firstly, we put forward a theory on the link between competition intensity and the corresponding dimension. For instance, we argue that a higher concentration on the market amounts to a lower competition intensity. This argument is naturally based on textbook models of perfect competition and monopolies.

Secondly, we define several specific indicators, each of which captures some aspects of the connection between the dimension and competition intensity. Thus, we set up specific formulas to measure the concentration using for example the Herfindahl Hirschman Index and a C4-concentration index.

Thirdly, we choose the data sources and the data to be inserted in the formulas for each indicator, and assess the concrete value of the indicator. For instance, we can choose to use data from Statistics Norway, which has turnover figures for more than 500 Norwegian NACE sectors, in order to assess the overall turnover as well as that for all the companies on a market. By doing so, we get HHI and C4 for the sector in question.

Fourthly, we will interpret the result of our assessments. We will define a *benchmark* that can tell us if the indicator signifies high or low competition intensity. We can for example choose to use the threshold values that the European Commission and the US competition authorities have developed to decide whether a given HHI-value indicates low, medium or high concentration and therefore high, medium or low competition intensity. We can also compare with HHI-values in the same sector in other countries, or with other sectors in Norway. Furthermore, we can just assess changes in indicators since it is often easier to interpret changes in the indicator rather than the level.

Fifthly, we will decide how to handle and interpret the overall result once we have collected results for up to 57 different indicators. One thing is what the individual indicator tells us, but what about the whole picture? Here, there are several possibilities. For instance, one can construct an aggregate competition indicator where each individual indicator is given a specific

weight. Or you can choose a more selective way by evaluating competition intensity for each individual sector using an idiosyncratic set of indicators.

For each of the five stages, we make a series of simplifying assumptions that may lead to interpretation problems we should be aware of when using the individual competition indicators, cf. Table 3.

Table 3: Extended overview of the intellectual framework for competition indicators

Stage	Starting point	Example	Problem	Example of problems
1 **We develop a theoretical concept**	We define a theoretical concept and specify a causality between this concept and competition intensity (or part of it).	Concentration Causality: The higher concentration is, the lower competition intensity is.	*Theoretical ambiguity* Other theories can indicate a different causality, for instance opposite causality.	For instance high concentration can express very effective and active competition or a *bidding* market..
2 **We define an indicator which can be measured in reality**	We set up a formula and choose the variables that will, in practice, measure the theoretical concept.	Cn =Sum(C1,C2,…Cn) We suppose further causality: The higher Cn is, the higher concentration is.	*Implementation uncertainty* In practice, we have to choose variables for which we can obtain data and which are not necessarily in accordance with the theoretical concept.	For example, Cn will only take into account the size of the n largest companies and their structure. Cn disregards the other players on the market.
3 **We insert data in the formula for the indicator.**	We insert real figures in the formula.	We find statistics on turnover: for example the turnover for the four largest companies as well as the turnover for the whole industry. Thus, we assess the concentration indicator to be for example of 55 %.	*Missing data precision* The relevant competition concept is the relevant market. But, typically, there is a difference between the statistical market and the relevant market. Normally, here is also a difference between the contribution of a company to the relevant market and the total turnover of the company, which can be at a production place level or even at a legal level. A particular issue is that statistics are often national, which can result in a false representation of the relevant geographical market.	A statistical industry is defined at a 4-digit SITC code level, but can include in reality many small markets. Average figures can make it difficult to find a connection that actually exists. The turnover of a company can include turnover from several relevant markets, product / production place (for instance several products from different relevant markets) or legal unit (for instance the turnover from all production places of the companies regardless of the relevant market).
4 **We interpret the result**	We decide whether the resulting figure is high or low	We compare the figure with equivalent figures from other sectors (*cross-sectoral*) or with equivalent figures from the same sectors in other countries (*cross-country*).Then we decide whether our figure is high according to the most comparable sectors and countries. For instance, Cn can be the second highest value among all the sectors in a same country, but on the middle of the scale compared to the same sector in other countries. Another possibility is to see over time, for example whether the value decreases or increases.	*Missing relevance of comparison* Comparisons made regarding sectors or countries can have their own particular issues, which makes it difficult to interpret the result.	Comparing accounting figures between different sectors, in which the total assets stand in the denominator, can be problematic because the level of assets is highly sector-specific. Comparing accounting figures between different countries can be problematic if the accounts are assessed according to different principles.
5 **We use the result together with other results**	We find out how we will use the results based on many different indicators – Shall we reduce or maintain multi-dimensionality?	We can construct one single aggregate indicator by weighing many indicators. Otherwise, we can look at many indicators at the same time or pick out a core of central indicators.	*Simplification problematic* Weighing several indicators requires homogeneous comparisons (i.e. weighing the same indicators) regarding the subject, for instance the data source. This is normally impossible. In that case, it is necessary to limit weighing to a limited number of the total indicators. Moreover, there may be a risk that causality may be predetermined regardless of reality. Weighing can have a large impact. It is also assumed that comparisons between sectors are always relevant. Objective, but potentially misleading. The alternative is to maintain explicitly the multi-dimensionality and from case to case to base the assessment on available and relevant indicators. Subjective, but potentially truer.	The British OFT assesses an aggregate indicator using eight individual indicators either by weighing the classification by ranks (in comparisons of sectors) or by making the selection on the basis of lowest ranking. The Danish Competition Authority maintains the multi-dimensionality.

In *the first stage,* we set up a theory in which we assume a certain causality between the dimension we focus on and competition intensity. For example, we assume that higher concentration leads to less competition intensity. But in certain cases a high concentration will not necessarily amount to low competition intensity. On markets where companies compete on winning contracts on tender, there can be intense competition to acquire the contract in the tender phase. However, when the tender process is over, there is only one winner, who by definition is in charge of the whole contract, and possibly the whole market, for the period of the contract.

In other cases, economies of scale can have such a significant impact that only a few companies are able to survive in case of a very intensive competition. In this case, the causality is therefore inversed, the intense competition has led to high concentration. Thus, a problem may occur because of *theoretical ambiguity*.

In *the second stage,* we present specific formulas that we can use to assess the individual indicators. However, there are many aspects for which we cannot put forward formulas, even if we admit that they have an impact on competition intensity. For instance, we have no indicators measuring the character of the market, i.e. whether there is a market with a lot of tenders or whether the purchasing power is a significantly moderating factor when assessing the impact of concentration on competition intensity.

Furthermore, we assume that the formulas we put forward draw up an adequate picture of what we wish to measure. For example, when we apply indicators on market concentration which consists of market shares, we assume that market shares provide an adequate picture of the market power of a firm. But a certain market share can both underestimate and overestimate market power. Market shares can overestimate the market power in the presence of countervailing purchasing power, and they can underestimate the market power in case a firm has much larger capital reserves than other companies on the market. Thus, problems may occur because of *missing measurement* or *biased measurement* of competition intensity.

In *the third stage,* we choose the data sources and the data that can be inserted in the formula. As the foundation for assessing competition is normally the relevant market, the data should be representative for the market in question and for the firm's activities which take place on this market. This is rarely possible. Data normally comes from data sources where data is collected with other underlying purposes than the assessment of competition intensity. This brings up a lot of practical issues.

Data on turnover from Statistics Norway is typically collected for a NACE sector and not for a relevant market. Data at the sector level will often include data from many relevant markets, and data for a relevant market can be divided into several sectors. Consequently, the indicators we assess can be average indicators for many relevant markets. Thus, they do not necessarily tell anything real about the particular relevant market in which we are interested. If one has both high and low concentration on different relevant markets that are part of the same NACE sector, the average NACE concentration becomes medium and will thus hide the high (as well as the low) concentration in some parts of the NACE sector.

A standard issue of this type is the delineation of the relevant geographical market, since statistical data normally follows national borders and therefore cannot immediately describe markets that are beyond the country's borders. Finally, sometimes, data does not exist or is faulty, so that in practice it is not possible to assess the indicator in question.

Company data is typically collected for a production place or for a legal unit. This creates problems if a firm from the same production place is active on several relevant markets or if a legal firm is active on many relevant markets.

In *the fourth stage,* we will interpret the result. This requires that we can identify an unambiguous scale which can tell us whether the value of the indicator is good or bad. In some cases, a practice with threshold values or rules of thumb has been developed. For instance, the European Commission has fixed thresholds to assess whether a given HHI value signifies high, medium or low concentration.

In other cases, it can be necessary to compare the indicator value to corresponding indicators in other sectors in the same country, or to the same sector in other countries. However, this raises several practical issues that one should be aware of. Firstly, one must be able to assess comparable indicators for the sectors and countries with which one wishes to compare. Secondly, not all the indicators are as suitable for both types of comparisons. For example, it can be difficult to compare indicators based on accounting figures, such as indicators on profits between different countries. The reason is that accountancing practices vary from one country to another. However, it can be difficult to compare indicators between sectors that are based on accounting figures and use assets in the denominator, because different capital structures have an unwanted influence on the indicator values and in reality make them incomparable.

In *the fifth stage,* we will decide how we should use and interpret the result of not only one indicator value, but perhaps 20 or 30 indicators, each of them capturing different aspects of competition intensity. There are several ways to work it out.

Firstly, weighted aggregate competition indicators can be built using index methods. However, this raises several issues. There has to be no theoretical ambiguity, one has to be able to assess each time all the indicators included and the indicators have to be based on comparable data. These requirements may often be impossible to fulfil and, therefore, the aggregate indicator has to be robust against missing data.

To solve this problem, the aggregate indicator can just be built for the indicators which are known not to have incomplete data, but it will of course reduce the value of the aggregate indicator. Besides, the data that is weighted together should describe the same markets, which assumes that the collection method is the same for the indicators included in the aggregate indicator. It is also necessary to confer to each indicator a weight that reflects its impact and credibility as an indicator. However, the impact of each indicator may depend on the situation one wishes to expose. If the case is about aggressive prices, it is not obvious that innovation indicators should be included in any relevant index.

Secondly, one can choose a selective approach in which indicators are selected, in the specific situation, that are considered to be relevant and credible, and that are not theoretically ambiguous. This approach can be especially applicable when studying the markets for specific competition issues that can be different between sectors. Here, it is particularly suitable to consider the indicators that seem to be relevant on each market.

Following this way of thinking, we will, in the main Norwegian-language report, develop and select the best competition indicators, according to our assessment, to measure competition in a sector and to visualise the effects of competition policy.

Our starting point is a gross list of 57 possible competition indicators that we have identified by reviewing the theoretical and empirical literature about competition indicators. The 57 competition indicators are divided into eight different dimensions that can all tell something on how competition works in a sector, cf. Table 4.

Table 4: List of competition indicators

Concentration	Barriers to entry	Mobility	Innovation
1 Number of firms	8 Capital– cost ratio	20 Ratio of customers switching	24 Turnover cost ratio
2 N-firm concentration ratio	9 Ratio of advertising	21 Concentration variance coefficient	25 R&D cost ratio
3 Herfindahl-Hirschmann Index (HHI)	10 R&D cost ratio	22 Market share stability	26 R&D personnel ratio
4 Import-production ratio	11 Cost disadvantage ratio	23 Rank stability	27 Patent ratio
5 The public authorities' market share	12 Minimum Viable Scale		28 Percentage of innovation active firms
6 Change in concentration ratio	13 Minimum Efficient Scale		29 Share of new products
7 Change in HHI	14 Entry rate		30 Share of innovative firms
	15 Exit rate		31 Share of firms with organisational change
	16 Churn rate		
	17 Excess production capacity		
	18 Ratio of customers switching		
	19 Industry growth rate		

Price	Profits	Productivity	Product quality
32 Price changes within a sector	36 Return on assets	45 The labour productivity level	53 Share of turnover by novelty of product
33 Purchasing power parity (PPP)	37 Return on capital employed	46 Change in labour productivity	54 R&D cost ratio
34 Changes in PPP	38 Return on invested capital	47 Labour productivity dispersion	55 Consumer complaints
35 Number of price adjustments within a sector	39 Return on equity	48 Labour productivity dispersion growth	56 Ratio of customers switching
	40 Return on sales	49 Average total factor productivity	57 Number of goods and services
	41 Gross residual income	50 Change in total factor productivity	
	42 Net residual income	51 The spread of total factor productivity	
	43 Internal rate of return	52 Change in the spread of total factor productivity	
	44 Salary premium		

Source: Copenhagen Economics.

Hereafter, we apply our intellectual framework in practice. For each dimension we explain how the logic of the above-mentioned framework is reflected. For each indicator we set up a formula, describe the logic and intuition behind the indicator, discuss the application of the indicator in literature and its relationship with other indicators, and we describe data problems and practical application of the indicator in an international context. Finally, we recommend for each individual dimension which competition indicators are suitable to be used together with other indicators to describe potential competition problems, cf. Figure 2.

Figure 2: Recommended competition indicators and international use of competition indicators

Indicator number	Name of the indicator	Rec	DK	SW	UK	NO	NORD
1	Number of firms						
2	N-firm concentration ratio						
3	Herfindahl-Hirschmann Index (HHI)						
4	Import-production ratio						
5	Public authorities' market share						
6	Change in concentration ratio						
7	Change in HHI						
8	Capital–cost ratio						
9	Ratio of advertising						
10	R&D cost ratio						
11	Cost disadvantage ratio						
12	Minimum viable scale						
13	Minimum efficient level						
14	Entry rate						
15	Exit rate						
16	Churn rate						
17	Excess production capacity						
18	Ratio of customers switching						
19	Industry growth rate						
20	Ratio of customers switching						
21	Concentration variance coefficient						
22	Market share stability						
23	Rank stability						
24	Turnover cost ratio						
25	R&D cost ratio						
26	R&D personnel ratio						
27	Patent ratio						
28	Share of innovation active firms						
29	Share of new product						
30	Share of innovative firms						
31	Share of firms with organisational change						
32	Price changes within a sector						
33	Purchasing power parity (PPP)						
34	Changes in PPP						
35	Number of price changes						
36	Return on assets						
37	Return on capital employed						
38	Return on invested capital						
39	Return on equity						
40	Return on sales						
41	Gross residual income						
42	Net residual income						
43	Internal rate of return						
44	Salary premium						
45	The labour productivity level						
46	Change in labour productivity						
47	Labour productivity dispersion						
48	Labour productivity dispersion growth						
49	Average total factor productivity						
50	Change in total factor productivity						
51	The spread of total factor productivity						
52	Change in the spread of total factor productivity						
53	Share of new products						
54	R&D cost ratio						
55	Consumer complaints						
56	Ratio of customers switching						
57	The number of goods and services						

Note: Recommendations (Rec), DK (Denmark), UK (United Kingdom), Norway (NO), Nordic countries (NORD)
Source: Copenhagen Economics

This recommendation is based on the assessment criteria given in the tender specifications to identify the most suitable competition indicators and methods, i.e. theoretical characteristics, practical applicability, as well as resources needed for operationalisation, maintenance and improvement.

We focus, in reality, primarily on the first two criteria: the theoretical characteristics of the indicators and their practical applicability. This is due to the fact that most indicators are simple and do not need much work to be operationalised, maintained and improved. Therefore, we ignore the last criteria. For each of the two selected criteria, all indicators are classified into three categories: good (three stars), medium (two stars) or bad (one star).

Using these criteria makes up a gross classification. The most important thing is to separate the indicators that cannot be used at all, because of either poor applicability or theoretical characteristics. These are the indicators that got the grade 'bad' for one of the two criteria. In that case, we do not grade for the other criterion since the indicator, anyway, cannot give good information about competition intensity.

We also refer to international experience in using the indicators, cf. Figure 2. This concerns countries that have systematically used competition indicators to pick out markets with (potential) competition issues. A limited number of countries have done this: Denmark, the UK and partly Sweden too.

Among these countries, Denmark stands out as a country with extensive use of competition indicators in its results-based reporting. The Danish government draws up long-term plans with concrete objectives in the field of competition. Since 1997, the Danish Competition Authority has assessed in its annual competition review whether the competition policy objectives have been reached. The Danish Competition Authority uses a series of indicators that collectively can provide a picture of competition development.

The British Competition Authority, OFT, is another authority which uses competition indicators. However, the OFT has mainly used indicators to identify sectors where the probability of finding competition problems is higher than in other sectors.

Sweden is a third country in which measurements of the competition situation is undertaken in different sectors using competition indicators. Strange enough, it is not the Swedish authorities but the Confederation of Swedish Enterprise that in 2003 and 2005 published two reports on a competition index consisting of several qualitative and quantitative competition indicators.

Other countries and authorities have also used some of the indicators, such as concentration, price and profits indicators. This also applies to Norway. However, these have been limited individual assessments of the competition situation in individual cases and markets. We focus on the three countries which have used the indicators systematically. However, for illustrative purposes we also include some recent experience from the Norwegian and Nordic competition authorities.

References – used in the main text

Acs and Audretsch (1987) 'Innovation, Market Structure, and Firm size'. The review of Economics and Statistics (69) no. 4

Allen (1969) 'Concentration and economic progress'. American Economic Review (59)

Baldwin and Gorecki (1985) 'The determinants of small plant market share in Canadian manufacturing industries in the 1970s'. Review of economics and statistics, (67) 156-161

Caves, Khalizadeh and Porter (1975) 'Scale economics in statistical analyses of market power'. Review of economics and statistics, (57) 133-140

Christensen and Hoffmann (2000) 'De dynamiske effekter af øget konkurrence', Working group of the Ministry of Economic and Business Affairs. Copenhagen

CIS (2004) 'Innovation in Europe. Results for the EU, Iceland and Norway'. Data 1998–2001. Eurostat, Office for official publications of the European Communities. Luxembourg

Comanor and Wilson (1967) 'Advertising market structure and performance'. The review of economics and statistics, (49), no. 4, 423-440, November 1967

Copenhagen Economics (2005) 'Economic assessments of the barriers to the Internal market of the Service directive'. Report prepared for the European Commission. January 2005

Creusen, et.al. (2005) 'Dutch retail trade on the rise? Relation between competition, innovation and productivity'. CPB Netherlands Bureau for Economic Policy Analysis

Dalen and Riis (2005) 'Konkurranse for innovasjon'. Norwegian School og Management BI

Danish Competition Authority (1997) 'Konkurrenceredegørelsen 1997'

Danish Competition Authority (1998) 'Konkurrenceredegørelsen 1998'

Danish Competition Authority (1999a) 'Konkurrenceredegørelsen 1999'

Danish Competition Authority (1999b) 'Måling af konkurrenceintensitet'

Danish Competition Authority (2000) 'Konkurrenceredegørelsen 2000'

Danish Competition Authority (2001a) 'Konkurrenceredegørelsen 2001'

Danish Competition Authority (2001b) 'Konkurrenceredegørelsen 2001. Dokumentation til Konkurrenceredegørelsen'

Danish Competition Authority (2002) 'Konkurrenceredegørelsen 2002'

Danish Competition Authority (2003a) 'Konkurrenceredegørelsen 2003'

Danish Competition Authority (2003b) 'Konkurrenceredegørelsen 2003. Dokumentation til Konkurrenceredegørelsen'

Danish Competition Authority (2004a) 'Konkurrenceredegørelsen 2004'

Danish Competition Authority (2004b) 'Konkurrenceredegørelsen 2004. Dokumentation til Konkurrenceredegørelsen'

Danish Competition Authority (2005) 'Konkurrenceredegørelsen 2005'

Danish Competition Authority (2006) 'Konkurrenceredegørelsen 2006'

Davies and Majumbar (2002) 'The development of targets for consumer savings arising from competition policy'. Economic Discussion Paper 4, Office of Fair Trading. http://www.oft.gov.uk/Business/Economic+research/completed.htm

Disney, Haskel and Heden (2003) 'Entry, exit and establishment survival in UK manufacturing'. The Journal of Industrial economics (51) March 2003, 91-112

Esposito and Esposito (1974), 'Excess capacity and market structure'. Review of economics and statistics (56) 188-194

European Commission (2001) Guidelines on the applicability of Article 81 of the EC Treaty to horizontal cooperation agreements. (2001/C 3/02)

European Commission (2004) Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings. (2004/C31/03)

European Commission (2005a) Merger Remedies Study. DG Competition http://ec.europa.eu/comm/competition/mergers/others/remedies_study.pdf

European Commission (2005b) Mergers: Commission analysis of past merger remedies provides guidance for future cases. Press release IP/05/1327. Brussels, 21 October 2005.

Fama and French (1992) 'The Cross-Section of Expected Stock Returns'. Journal of Finance (47) 427-465

FTC (1999) Performance and accountability report, fiscal year 1999. www.ftc.gov

FTC (2000) Performance and accountability report, fiscal year 2000. www.ftc.gov

FTC (2001) Performance and accountability report, fiscal year 2001. www.ftc.gov

FTC (2002) Performance and accountability report, fiscal year 2002. www.ftc.gov

FTC (2003) Performance and accountability report, fiscal year 2003. www.ftc.gov

FTC (2004) Performance and accountability report, fiscal year 2004. www.ftc.gov

FTC (2005) Performance and accountability report, fiscal year 2005. www.ftc.gov

FTC (2006) Federal Trade Commission performance plan fiscal years 2007 and 2008. www.ftc.gov

Green and Mayes (1991) 'Technical Inefficiency in Manufacturing Industries'. Economic Journal (101) 523-538

Hagen and Hoppe (2004) Konkurranse og konkurransepolitikk i innovative næringer. Working paper no 26/04. SNF project 4276

Katz and Shapiro (1986) 'Technology Adoption in the Presence of Network Externalities'. Journal of political economy (94) 822-841

Kleinknecht, Montfort and Brouwer (2002) 'The non-trivial choice between innovation indicators'. Economics of Innovation and New Technology (11) 2

Koeller (1995) 'Innovation, market structure and firm size: a simultaneous equations model'. Managerial and Decision Economics, (16) 259-269

Koller, Goedhart & Wessels (2005) 'Valuation – Measuring and managing the value of companies'. John Wiley & Sons, New Jersey

Lear (2007) 'Ex-post review of merger control decisions: A study for the European Commission'. European Commission

Lee and Hahn (2002) 'Bid Rigging in Auctions for Korean Public- Works Contracts and Potential Damage'. Review of Industrial Organisation (21)

Mansfield (1962) 'Entry, Gibrat's law, innovation and the growth of firms'. American economic review (52) 1023-1051

Mueller (1986) Profits in the long run

Nelson and Sun (2002) 'Consumer savings from merger enforcement: A review of the antitrust agencies' estimates'. Antitrust Law Journal (69) part 3, 921-960

Nickell (1996) 'Competition and corporate performance'. Journal of political economy, (104) 41, 724-746

Nilsson and Strand (2005) 'On simulation and reality: An example'. Swedish Competition Authority

NMa (2002) 'Annual report for the NMa and DTe for 2001'. www.nmanet.nl

NMa (2003) 'Annual report for the NMa and DTe for 2002'.www.nmanet.nl

NMa (2004) 'Annual report for the NMa and DTe for 2003'. www.nmanet.nl.

NMa (2005) 'Annual report for the NMa and DTe for 2004'. www.nmanet.nl

NMa (2006) 'Annual report for the NMa and DTe for 2005'. www.nmanet.nl.

Nordiske konkurransemyndigheter (2003) 'A powerful competition policy. Towards a more coherent competition policy in the Nordic market for electric power'. Report from the Nordic competition authorities. No. 1/2003

Norwegian Competition Authority (2004) 'Årsberetning 2003'. Norwegian Competition Authority

Norwegian Competition Authority (2005) 'Konkurranse til fordel for forbrukerne'

Norwegian Competition Authority (2006a) 'Effektene av friere bokpriser'. Norwegian Competition Authority's publication 1/2006, June 2006

Norwegian Competition Authority (2006b) 'Rapport om skadesforsikring'

Norwegian Competition Authority (2006c) 'Årsberetning 2005'. Konkurransetilsynet

Norwegian Ministry of Government Administration and Reform (2006), Statsbudsjettet 2006 – Tildelingsbrev, 23 February 2006

O'Mahony (1999) Britain's productivity performance 1950-1996. London. NIESR

OECD (2005) 'Evaluation of the Actions and Resources of Competition Authorities'. http://www.oecd.org/dataoecd/7/15/35910995.pdf.

OECD (2006) 'Annual report on competition policy developments in the Netherlands'. DAF/COMP(2006)/21/15

Office of Fair Trading (2004) 'Empirical indicators for market investigations, Part 1+2+Summary'. Report no. OFT749, September 2004.

Office of Fair Trading (2005a) 'Ex-post Evaluation of mergers. A report prepared for the Office of Fair Trading', Department of Trade and Industry and the Competition Commission by PricewaterhouseCoopers LLP. http://www.oft.gov.uk/Business/Economic+research/completed.htm.

Office of Fair Trading (2005b) 'Positive impact-An initial evaluation of the effect of the competition enforcement work conducted by the OFT'. http://www.dti.gov.uk/files/file13299.pdf.Oulton (1998) 'Competition and the dispersion of labour productivity amongst UK companies'. Oxford economic papers (50) 23-38

Oxera (2004) 'Cost and benefits of market regulators'. Report for the Dutch Ministry of Economy, October 2004

Porter (1990) The Competitive Advantage of nations. London: Macmillan

Röller (2005) 'Economic Analysis and Competition Policy Enforcement in Europe', in Modelling European Mergers: Theory, Competition Policy and Case Studies (Edward Elgar, ed.), 2005

Schmalensee (1989) 'Inter-Industry Studies of Structure and Performance', in Handbook of Industrial Organisation, Schmalensee and Willig (eds.), North Holland

Schumpeter (1942) Capitalism, Socialism and Democray. New York: Harper

Stiglitz (1987) 'Competition and the Number of Firms in a Market: Are Duopolies More Competitive than Atomistic Markets?'. Journal of Political Economy (95) 5, Oct. 1987, 1041-1061

Sutton (1991) 'Sunk Costs and market Structure'. MIT press

Svenskt Näringsliv (2003) 'Svenskt konkurrensindex – åtta konsumentnära branscher granskade'. May 2003

Svenskt Näringsliv (2005) 'Svenskt konkurrensindex - åtta konsumentnära branscher granskade'. Annual report 2005

Swedish Competition Authority (2001) 'Utvärdering av Optirocs förvärv av Stråbruken'. Report from the Swedish Competition Authority

Symeonidis (2003) 'In which industries is collusion more likely? Evidence from the UK'. Journal of industrial economics (51) 1, 45-74

Sørgard (2006) 'Competition and Welfare: The Norwegian Experience'. Norwegian Competition Authority

Tirole (1990) 'The theory of industrial organisation'. MIT press

Twynstra Gudde (2005) 'Research into the Anticipation of Merger Control'. Report prepared for the NMa. October 2005. http://www.nmanet.nl/engels/home/news_and_publications/publications/research_into_the_anticipation_of_merger_control.asp

US Department of Justice (1992) 'Horizontal Merger Guidelines'

US Department of Justice (2007) 'Congressional submission FY 2008 performance budget'. February 2007

Vickers and Harris (1986) 'Racing with Uncertainty'. The Review of Economic Studies (54) 1

Weiss (1976) 'Optimal plant size and the extent of suboptimal capacity', in Mason and Quall's Essays in honour of Joe S. Bain. Cambridge. Ballinger

Williamson (1965) 'Innovation and Market structure', Journal of Political Economy (73) 67-73

Zitzewitz (2001) 'Competition and long run productivity growth in the UK and US tobacco industries, 1879-1939'. Journal of industrial economics (51) 1, 1-33

References – Background literature

AC Nielsen (2000) 'A Report into International Price Comparisons'. Report prepared for the Department of Trade and Industry, United Kingdom

Adelman (1969) 'Comment on the H concentration measure as a numbers equivalent'. Review of economics and Statistics (51)

Agarwal and Gort (1996) 'The Evolution and Entry, Exit and Survival of Firms'. The Review of Economics and Statistics (78)

Aghion, Dewatripont and Rey (1997) 'Corporate governance, competition policy and industrial policy'. European Economic Review (41) 797-805

Ahn (2002) 'Competition, innovation and productivity growth. A review of theory and evidence. OECD Economic department working papers (317) januar 2002

Aiginger (2001) 'Measuring the Intensity of Quality Competition in Industries'. WIFO-Quarterly, 2001/1. Austrian Institute of Economic Research, Vienna

Bagwell and Ramey (1994) 'Coordination Economies, Advertising, and Search Behavior in Retail Markets'

Bain (1956) 'Barriers to New Competition', Cambridge, Mass.

Baker (2003) 'The Case for Antitrust Enforcement'. The Journal of Economic Perspectives (17) 4, 27-50

Baker and Bresnahan (1985) 'The Gains from Merger or Collusion in Product Differentiated Industries'. Journal of Industrial Economics (33)

Baldwin (1995) 'The Dynamics of Industrial Competition', Cambridge University Press

Barreda et.al. (2000) 'Experimental Economics and Political Decision Making', LINEEX 11/00

Baumol and Wilig (1981) 'Fixed costs, sunk costs, entry barriers and sustainability of monopoly'. The Quarterly Journal of Economics. August 1981, 405-431

Block and Feinstein (1986): 'The Spillover Effect of Antitrust Enforcement'. The Review of Economics and Statistics (68) 1, 122-131

Block, Nold and Sidak (1981) 'The Deterrent Effect of Antitrust Enforcement'. Journal of Political Economy (89) 3, 429-445.

Brealey and Myers (2003) Principles of Corporate Finance, 7th ed., McGrawHill/Irwin, Boston

Caves (1998) 'Industrial organisation and new findings on the turnover and mobility of firms'. Journal of economic literature, (36) 4, December 1998, 1947-1982

Caves and Porter (1978) 'Market structure, oligopoly and stability of market shares'. The Journal of industrial economics (26) June 1978, 289-312

Clarke (1984) 'Profit margins and market concentration in U.K. manufacturing industry'. Applied Economics (16) 57-71

Competition Commission (2000) 'Supermarkets: A report on the supply of groceries from multiple stores in the United Kingdom', Report no. Cm 4842

Competition Commission (2003) 'Market Investigation References: Competition Commission Guidelines'

Competition Commission (2006) 'Estimated costs to the consumers of ther mergers which the CC took action between March 2005 and March 2006', evaluation report from the Competition Commission, juli 2006.

Competition Commission (2007) 'Understanding past merger remedies: report on the case study research', evaluation report from the Competition Commission, januar 2007.

Connor and Bolotova (2005) Cartel Overcharges: Survey And Meta-Analysis, Purdue University working paper

Connor and Lande (2005) How High Do Cartels Raise Prices? Implications for reform of the Antitrust Sentencing Guidelines, American Antitrust Institute Working Paper

Copenhagen Economics (2000) Labour Market Dispersion in Scania

Copenhagen Economics (2000) Åbningstider I detailhandlen – en økonomisk analyse

Copenhagen Economics (2002) Modelling Framework for the Quantitative Analysis of the Global Environmental Issues

Copenhagen Economics (2005) Market opening in networking industries. Report prepared for the European Commission. September 2005

Copenhagen Economics (2005) The Economic effects of Services Liberalisation in Switzerland

Cowling and Waterson (1976) Price-cost margins and market structure. Economica, (43) 267-274

Crandall and Winston (2003) 'Does Antitrust Policy Improve Consumer Welfare? Assessing the Evidence'. Journal of Economic Perspective (17) 4, 3-26.

Crooke et.al. (1999) 'Effects of Assumed Demand Form on Simulated Postmerger Equilibria', Review of Industrial Organisation (15)

D'Aspremont and Motta (2000) 'Tougher Competition or Lower Concentration: A Trade-off for Antitrust Authorities?' i Market Structure and Competition Policy: Game-Theoretic Approaches, Norman and Thisse, eds.

Damme and Pinkse (2005) 'Merger Simulation Analysis: An Academic Perspective' i Modelling European Mergers: Theory, Competition Policy and Case Studies, Bergeijk and Kloosterhuis (2005), Cheltenham and Northhampton: Edward Elgar

Dansk Økonomisk Råd (2005) Dansk økonomi. Autumn 2005. Copenhagen

Davies (1980) Minimum Efficient Scale and Seller Concentration: An Empirical Problem. Journal of Law and Economics, 287-301

Davis and Wilson (2003) Differentiated Product Competition and the Antitrust Logit model: An Experimental Analysis

Demsetz (1973) 'Industry Structure, Market Rivalry and Public Policy'. Journal of Law and Economics (16) 1-10

Department of Trade and Industry (2000) Switching Suppliers. Consumer Affairs Report Series Executive Summary No. 2

Dixit and Pindyck (1994) Investment under Uncertainty. Princeton University Press

Domowitz, Hubbard and Petersen (1986) 'Business Cycles and the Relationship between Concentration and Price-Cost Margins'. RAND Journal of Economics, (17) 1, 1-17

Dubé (2005) 'Product Differentiation and Mergers in the Carbonated Soft Drink Industry'. Journal of Economics and Marketing Strategy (14) 4, 879-904

Dunne and Hughes (1994) 'Age, Size, Growth and Survival: UK Companies in the 1980s'. The Journal of Industrial Economics (42)

Dunne, Roberts and Samuelson (1989) 'Patterns of Firms Entry and Exit in US Manufacturing Industries'. RAND Journal of Economics (19)

Duso, Gugler and Yurtoglu (2005) EU Merger Remedies: A Preliminary Empirical Assessment. WZB working paper, http://ideas.repec.org/p/trf/wpaper/81.html

Duso, Gugler and Yurtoglu (2006) How Effective is European Merger Control? WZB Discussion Paper, SP II 2006-12

Evans (1987) 'The Relationship between Firm Growth, Size and Age: Estimates for 100 Manufacturing Industries'. The Journal of Industrial Economics (35)

Fama and French (1995) 'Size and Book-to-Market Factors in Earnings and Returns'. Journal of Finance (50) 131-155

Farrell (1957) 'The measurement of productive efficiency'. Journal of the Royal Statistical Society. Series A general (120) 3, 253-290

Farrell and Saloner (1986) 'Installed Base and Compatibility: Innovation, Product Preannouncement, and Predation'. American economic review (76) 940-955

Forfas (1999) Annual Competitiveness Report 1999. Annex 1. National Competitiveness Council

Fraas and Greer (1974) 'Market Structure and Price Collusion: An Empirical Analysis'. Journal of Industrial Economics (26) 21-44

Froeb, Koyak and Werden (1993) What is the effect of bid rigging on prices? Economic Letters (42) 3

FTC (1999) 'A study of the Commission's divestiture process', report prepared by the Staff of the Bureau of Competition of the Federal Trade Commission, 1999.

Geroski (1981) 'Specification and testing the profits-concentration relationship: some experiments for the UK'. Economica, (48) 279-288

Geroski (1982) 'Simultaneous equations models of the structure-performance paradigm'. European Economic Review (19) 145-158

Geroski (2004) 'Is competition policy worth it?' Competition Commission, UK, September 2004

Geroski and Toker (1996) 'The Turnover of Market Leaders in UK Manufacturing Industry, 1979-86'. International Journal of Industrial Organisation (14)

Gisser (1982) 'Price Leadership and Dynamic Aspects of Oligopoly in US Manufacturing'. Journal of Political Economy (92) 1035-1048

Gort (1963) 'Analysis of stability and change of market shares'. Journal of political economy (71) 51-63

Gupta (2004) 'The Effect of Bid Rigging on Prices: A Study of the Highway Construction Industry'. Review of Industrial Organisation (19) 4

Hart and Morgan (1977) 'Market structure and economic performance in the United Kingdom'. The Journal of Industrial economics (25) 3, mar 1977, 177-193

Haskel (1991) 'Imperfect Competition, Work Practices and Productivity Growth'. Oxford Bulletin of Economics and Statistics (53) 265-279

Haskel, Martin and Small (1995) 'Price, Marginal Cost and the Business Cycle'. Oxford Bulletin of Economics and Statistics (57) 25-41

Haskel and Wolf (2000) From Big Macs to iMacs – What Do International Price Comparisons Tell Us?'. World Economics

Hay and Morris (1991) Industrial economics and organisation. Oxford university press 1991

Hitris (1978) 'Effective Protection and Economic Performance in UK Manufacturing Industry, 1963 and 1968'. Economic Journal (88) 107-120

Holterman (1973) 'Market Structure and Economic Performance in UK Manufacturing Industry'. Journal of Industrial Economics (22) 119-139

Jovanovic (1982) 'Selection and the Evolution of Industry'. Econometrica (50)

Jørgensen (2005) Boosting Growth through Better Competition in Denmark, OECD Working Paper no. 431

Kessides (1986) 'Advertising, Sunk Costs, and Barriers to Entry'. The Review of Economics and Statistics (68)

Kessides (1990) 'Market Concentration, Contestability and Sunk Costs'. Review of Economics and Statistics (72) 4, 614-622

Kessides (1990) 'Toward a Testable Model of Entry: A Study of the US Manufacturing Industries'. Economica (57) 2, 219-238

Khalizadeh-Shirazi (1974) 'Market structure and price-cost margins in UK manufacturing industries'. Review of Economics and Statistics (56) 67-76

Klepper and Graddy (1990) 'The Evolution of New Industries and the Determinants of Market Structure'. RAND Journal of Economics (21)

Klette (1998) 'Market Power, Scale Economy and Productivity: Estimates from a Panel of Establishments'. The Journal of Industrial Economics (47)

Klette and Raknerud (2005) Heterogeneity, Productivity and Selection: an empirical study of Norwegian manufacturing firms. Discussion Papers No. 401, January 2005 Statistics Norway, Research Department

Kovacic (2004) Achieving better practices in the design of competition policy institutions. Remarks before the Seoul Competition Forum 2004. FTC April 2004

Kwoka and Ravenscraft (1986) 'Cooperation vs. Rivalry: Price-Cost Margins by Line of Business'. Economica (53) 211, 351-363

Levenstein and Suslow (2002) What Determines Cartel Success? University of Michigan Business School

Liebenstein (1966) 'Allocative Efficiency versus X-inefficiency'. American Economic Review (56) 392-415

Liegey (2003) Hedonic Quality Adjustment Methods: For Clothes Dryers in the UK CPI. Bureau of Labor Statistics, Department of Labor, Washington D.C.

Mankiw and Whinston (1986) 'Free Entry and Social Inefficiency'. RAND Journal of Economics (17) 48-58

Masson and Shaanan (1986) 'Excess capacity and limit pricing. An empirical test'. Economica (53) 365-378

McMillan (1991) Dango: Japan's Price-Fixing Conspiracies, Economics and Politics, vol. 3

Mookherjee (1984) 'Optimal Incentive Schemes with Many Agents'. Review of Economic Studies (51) 433-446

Morrison and Elliott (2005) *Ex post* evaluation of mergers. Office of Fair Trading

Nakao (1979) 'Profit Rates and Market Shares of Leading Industrial Firms in Japan'. Journal of Industrial Economics (27) 371-383

Nalebuff and Stiglitz (1983) 'Prices and Incentives: Towards a General Theory of Compensation and Competition. Bell Journal of Economics (14) 21-43

Nickell, Nicolitsas and Dryden (1997) 'What Makes Firms Perform Well? European Economic Review (41)

Nickell, Wadhwani and Wall (1992) 'Productivity Growth in UK Companies 1975-1986'. European Economic Review (36)

Nordic Competition Authorities (2005) Nordic Food Markets – a taste for competition. Report from the Nordic competition authorities, 1/2005

Orr (1974) 'An Index of Entry Barriers and its Application to the Market Structure-Performance Relationship'. Journal of Industrial Economics (23) 39-50

Peltzman (1977) 'The Gains and Losses from Industrial Concentration'. Journal of Law and Economics (20) 229-263

Pessendorfer (2000) 'A study of Collusion in First-Price Auctions'. Review of Economic Studies (67) 3

Porter (1983) 'A Study of Cartel Stability: The Joint Executive Committee 1880-1886'. Bell Journal of Economics and Management (14) 2

Postema, Goppelsroeder and Bergijk (2006) 'Cost and Benefits of Merger Control: An applied Game Theoretic Perspective'. Kyklos (59) 1, 85–98

Salinger, Caves and Peltzman (1990) 'The Concentration_Margins Relationship Reconsidered'. Brookings Papers on Economic Activity. Microeconomics

Scherer (1967) 'Market Structure and the Employment of Scientists and Engineers'. American Economic Review

Selten (1984) 'Are Cartel Laws Bad for Business?', in Hauptmann, Krelle and Mosler, 'Operations Research and Economic Theory', Springer, Berlin

Shapiro (1995) Mergers with differentiated products, speech at the American Bar Association, Washington DC, November 9

Smith (2000) Innovation Indicators and the Knowledge Economy: Concepts, Results and Policy Challenges. STEP group

Sproul (1993) 'Antitrust and Prices'. The Journal of Political Economy (101) 4, 741-754

Stallibrass and Gordon (2005) Positive impact: An initial evaluation of the effect of the competition enforcement work conducted by the OFT. Office of Fair Trading

Sutton (1997) 'Gibrats Legacy'. Journal of Economic Literature (35)

Sutton (1998) Technology and Market Structure, MIT Press Cambridge

US Department of Justice (2000) Antitrust Division Congressional Submission for Fiscal Year 2001. Washington D.C.

Waterson (1980) 'Price-cost margins and successive market power'. The Quarterly Journal of Economics (94) February 1980, 135-150

Weiss (1974) 'The Concentration-Profitability Relationship and Antitrust', in Industrial Concentration, Goldschmidt, Mann and Watson (eds.), The New learning. Boston

Werden (2004) The effects of Antitrust Policy on Consumer Welfare: What Crandall and Winston Overlook. AEI-Brookings Joint Center for Regulatory Studies

Wilig, Salop and Scherer (1991) 'Merger analysis, industrial organisation theory, and merger guidelines'. Microeconomics, 281-332, Brooking papers on economic activity