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Economics of Oligopoly:

An Introduction for Lawyers

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ECONOMICS OF OLIGOPOLY: An Introduction for Lawyers

Sigrid Stroux¹

“One can hardly escape from the conclusion that a lawyer who not has studied economics [...] is very apt to become a public enemy”²

1. Introduction

“An industry is oligopolistic when so large a share of its total output is in the hands of so few relatively large firms that a change in the output of any one of these firms will discernably affect the market price”.³ In 1516, Sir Thomas Moore, who first coined the term “oligopoly” in his Utopia already noted that prices need not fall to competitive levels simply due to the presence of more than one supplier.⁴

Market power, defined as “the ability of a firm or group of firms to raise prices, through the restriction of output,⁵ and maintain them for a significant period of time above the level that would prevail under the competitive conditions and thereby to enjoy increased profits from the action”,⁶ can be exerted anti-competitively by dominant firms or by multiple firms which, although not individually dominant, form a cartel.⁷ Modern western antitrust laws however forbid either way.⁸ The main problem of oligopolies is that they can, apparently,

¹ Ph.D. researcher at the European University Institute, Florence. I wish to thank Professors G. Amato and M. Motta for their comments on the paper.

² US Justice Louis D. Brandeis, 1934, p. 325. For interesting discussions on the relationship between competition law and economics, see Jenny, Enforcements: Is Economic Expertise Necessary?, 1998, Ch. 11; Nicolaides, An Essay on Economics and the Competition Law of the European Community, 2000

³ Sullivan, Handbook of the Law of Antitrust, 1977, at 331

⁴ For this reference I rely on Schumpeter, J., History of Economic Analysis, 1954

⁵ More precisely, market power requires a reduction in the industry output, Baker, Review on Economics and Antitrust Policy, 1989, p. 925

⁶ Bishop, Walker, Economics of EC Competition Law, Concepts, Application and Measurement, 1999, pp. 27-28; 1992 US Department of Justice and Federal Trade Commission Horizontal Merger Guidelines, Section 0.1. Economists have developed indexes in order to measure market power, the most famous being the Lerner Index, expressing the mark-up of price over marginal costs: Lerner, The Concept of Monopoly and Measurement of Monopoly Power, 1934, 1 pp. 137-175

⁷ (Collective) exertion of market power through collusion by oligopolists pays when market elasticity is low.

⁸ E.g. under EC competition both ways of exerting market power are controlled by, respectively, Article 81 and 82 of the EC Treaty; under US antitrust law by Section 1 and 2 of the Sherman Act and Section 5 of the Fair Trade Commission Act; in the UK by Chapter I

collectively exert market power without having to turn to an explicit agreement. This phenomenon has intrigued economists and lawyers in the past, and still does intrigue them nowadays. To get an insight into the “oligopoly problem”, in this paper the main economic views concerning oligopolistic markets will be set out.

2. Neo-classical economic theory

According to neo-classical economic theory, consumer welfare is maximised when a market is perfectly competitive.⁹ Already in 1776 Adam Smith, in his secular work “Wealth of Nations”,¹⁰ proclaimed that the forces of competition, driven by private, self-interested behaviour, referred to by him as the “The Invisible Hand”, in general generate a socially desirable result.¹¹ The concept of “perfect competition”, which was introduced by Marshall in 1890 in his work “Principles of Economics”¹², can be seen as a modern version of Smith’s Invisible Hand.

2.1. Paradigm of perfect competition

In a perfectly competitive market - i.e. a market with a large number of sellers and buyers, who each sell or buy a relatively small quantity of homogeneous products, free entry into and exit out of the market and perfect information - no one competitor possesses any market power, and prices will equal marginal costs.¹³ The effects of a market being perfectly competitive are that both productive efficiency and allocative efficiency are maximised.¹⁴ The result is that both consumer welfare and producer welfare are maximised and could not

and II of the 1998 Competition Act and the monopoly provisions Sections 6-8 of the 1973 Fair Trading Act; and in Germany by Paragraphs 1-8 and 19-20 of the Gesetz gegen Wettbewerbsbeschränkungen (German Act against Restraints of Competition)

⁹ Asch, Industrial Organization and Antitrust Policy, 1983, Ch. 1

¹⁰ Smith, An Inquiry into the Nature and Causes of the Wealth of Nations, 1776

¹¹ “[E]very individual necessarily labours to render the annual revenue of society as great as he can. He generally, indeed, neither intends to promote the public interest, nor knows how he is promoting it. By preferring the support of domestic to that of foreign industry, he intends only his own security; and by directing that industry in such a manner as its produce may be of greatest value, he intends only his own gain, and he is in this, as in many other cases, led by an invisible hand to promote an end which was no part of his intention. Nor is it always worse for the society that it was no part of it. By pursuing its own interest he frequently promotes that of society more effectively than when he really wants to promote it”. Smith, *supra* note 10

¹² Marshall, Principles of Economics, 1890

¹³ The model furthermore presupposes exogeneous factors, such as the level of technology and input prices, to be fixed.

¹⁴ Productive efficiency is maximised as products are produced at the lowest possible cost: less efficient firms, having higher marginal costs, are forced out of the market. Allocative efficiency, relating to the difference between the costs of producing a marginal product and the value consumers would attribute to that product, is maximised.

be improved upon even by an omniscient regulator.¹⁵ If the assumptions hold true, competition is held to regulate itself.

It is also being claimed by economists that perfect competition will enhance dynamic efficiency by stimulating innovation, as competitors strive to produce new and better products for consumers.

2.2. Paradigm of monopoly

In the other extreme benchmark model, i.e. the monopolistic market, the monopolist possesses maximum market power, having full control over the price and output level. A monopolist will set his output, in order to maximise his profits, at the level where the marginal revenue he draws from selling an extra product will equal its marginal costs, resulting in a suppressed output and prices raised above the competitive level.

One effect of a monopolistic market is that it causes allocative inefficiency, as the resources of both consumers and producers could have been applied more efficiently, leading both to consumer and producer welfare loss. The loss in value to consumers who at the competitive price would buy the product, but who at the monopoly price are deflected to ‘inferior’ substitutes is referred to by economists as “deadweight loss”¹⁶. Consumer and producer welfare loss taken together constitutes the social welfare loss. Posner has pointed out that welfare losses from monopoly is even larger than just the consumer and producer welfare loss taken together, as it does not take into account the costs resulting from rent-seeking activities, i.e. the costs of competition in order to obtain a monopoly position.¹⁷

As to the productive efficiency, the absence of competitive pressure can give rise to slack and inefficiency while enjoying a ‘quiet life’, known as X-inefficiency¹⁸ or managerial inefficiency, which leads to further welfare loss.¹⁹

¹⁵ Bishop, Walker, *supra* note 6, p. 16

¹⁶ The loss itself is known as the welfare cost of monopoly

¹⁷ Posner, *The Social Costs of Monopoly and Regulation*, 1975, elaborated in: Posner, *Antitrust Law, an Economic Perspective*, 1976, p. 15

¹⁸ Term first used by Liebenstein, *Allocative Efficiency vs. X-Efficiency*, 1966, pp. 392-415

¹⁹ In his seminal article Harberger tried to quantify the total loss from monopoly industries in the U.S. His conclusion was that it amounted to 0.1% of the Gross National Product: Harberger, *Monopoly and Resource Allocation*, 1954, p. 77. Graphically, this loss is shown by a triangle, also known as the ‘Harberger triangle’. His findings led to a lively debate. Nowadays, Harberger’s outcome is seen as a lower boundary, as more recent studies have come up with figures of deadweight losses of 4% up to 20% of the national income: see e.g. Bergson, *On Monopoly and Welfare Losses*, 1973, pp. 853-870; Comanor, Liebenstein, *Allocative Efficiency, X-Efficiency and the Measurement of Welfare Losses From Monopoly in the American Economy*, 1966, pp. 221-236.

Another question, however, is whether perfect competition does in fact maximise consumer welfare in the long run. Various economists have argued that another type of efficiency, i.e. dynamic efficiency, cannot be maximised under perfect competition. Dynamic efficiency embraces activities of innovation, research and development, which can, in the long run, lead to better products and possibly lower prices, thereby increasing consumer welfare. Schumpeter²⁰, for example, argued that short-term monopolies are the best market form for dynamic efficiency, as they have easiest access to outside financing. The “perennial gale of creative destruction” will, however, protect the public interest. Some authors even argue that an oligopolistic market form optimises the possibility for innovation.²¹

3. Theories of oligopolies

In conventional economic theory, therefore, perfect competition is held to maximise consumer welfare. The assumptions upon which the models rest cannot, however, be found in the real world.

Several economists questioned and criticised the model of perfect competition as a realistic benchmark. Chamberlin²² and Robinson²³ have contemporarily, albeit independently, studied the imperfectly competitive markets, developing upon an earlier study by Sraffa.²⁴ Clark in his work “Towards a Concept of Workable Competition”,²⁵ observed that perfect competition “does not and cannot exist and has presumably never existed”. In his article he coined the term “workable competition”, being the “the most desirable form of competition, selected from those that are practically possible, within the limits set by conditions we cannot escape”.²⁶ He argues that if one of the conditions essential to perfect competition is lacking, then it no longer follows that we are necessarily better off for the presence of the rest of the conditions.²⁷ In Clark’s concept of workable competition, welfare may increase by the addition of

²⁰ Schumpeter, *Capitalism, Socialism and Democracy*, 1976; See however Scherer, Ross, *Industrial Market Structure and Economic Performance*, 1990, Ch. 17. See also Posner, *The Economic Theory of Monopoly and the Case for Antitrust*, 1979, p. 53 on the creation of temporary monopolies by way of patents.

²¹ See e.g. Clark, *Competition as a Dynamic Process*, 1961; Kantzenbach, see Möschel, *Das Recht der Wettbewerbsbeschränkungen*, 1989, p. 45; Areeda, Solow, Hovenkamp, *Antitrust Law*, Volume IIA, 1995, p. 34; Sylos Labini, *P. Oligopolio e Progresso Tecnico*, 1979

²² Chamberlin, *The Theory of Monopolistic Competition*, 1933

²³ Robinson, *The Economics of Imperfect Competition*, 1933

²⁴ Sraffa, *The Laws of Returns under Competitive Conditions*, 1936, pp. 535-550

²⁵ Clark, *Towards a Concept of Workable Competition*, 1940, p. 241. Sosnick, *A Critique of Concepts of Workable Competition*, 1958, pp. 380-423, See also Clark, *supra* note 21

²⁶ Clark, *supra* note 25, p. 253

²⁷ This theory is referred to as “remedial imperfections theory”, or, in German, “Gegengiftthese”.

imperfect conditions to an imperfect market situation. If perfect competition is not achieved in many sectors of the industry, the one possible response is the attempt to identify “workable competition”, being the “second best” solution.²⁸

Another theory worth mentioning is that of the “contestable markets”. According to the developers of the theory, Baumol, Panzar and Willig,²⁹ firms will be forced to ensure optimal allocation of resources provided that the market is perfectly contestable, i.e. entry and exit are costless and immediate, which will have as a result that prices will be set at the competitive level. Such a market is subject to “hit-and-run entry”, i.e. firms enter the market, take short-term advantage of the profit opportunities, and leave without costs.

4. Economics of oligopoly

As stated above, the danger of oligopoly lies in the fact that they can apparently collectively exert market power without having to turn to a formal cartel agreement.³⁰ The difference between the two benchmark models of perfect competition and monopoly, set out above, and oligopolies is that in an oligopolistic market competitors individually interact with each other, whereas in a perfectly competitive market competitors interact with the market as a whole, while monopolists, by definition, are not subject to any interaction. Oligopolists, in their choice of behaviour in the market, will necessarily have to take into consideration the behaviour of their competitors.

Although oligopoly fits conceptually between the extremes of perfect competition and monopoly, it cannot be studied by these static models. The study of oligopoly requires instruments that take into account the interaction between the competitors. This is provided for by game theory, developed by the economic current of New Industrial Organisation. Nevertheless, it is useful to first get an insight into static models of oligopolistic competition, as they remain influential, the contemporary view on oligopolies (and are in any case consistent with game theory).

²⁸ See Lipsey, Lancaster, *The General Theory of the Second Best*, 1956-1957, pp. 11-32; Scherer, Ross, *supra* note 20, pp. 33-38, Asch, *Industrial Organisation and Antitrust Policy*, 1983, pp. 97-100; Bain, J., *Workable Competition in Oligopoly: Theoretical Considerations and Some Empirical Evidence*, 1950, pp. 37-38

²⁹ Baumol, Panzar, Willig, *Contestable Markets and the Theory of Industry Structure*, 1982; See Bailey, *Contestability and the Design of Regulatory and Antitrust Policy*, 1981, pp. 178-183

³⁰ Competition need not be excluded on all parameters, some competition on e.g. quality, service and innovation remains possible

4.1. Static models of Oligopoly

4.1.1. Cournot

The most famous model, and up to date most used as the benchmark model of oligopoly, stems from the French mathematician Augustin Cournot, in 1838.³¹ He assumes that oligopolists compete by means of setting output. In his model, only two suppliers are present in the market, firm A and firm B, who can set their quantities only once. Both firms assume their rival's output to be fixed. For every level of output, set by firm B, it is assumed that there is a unique output to be set by firm A to maximise its profits, and vice versa; the price level is then determined by the point where the two output curves meet, called the 'Cournot equilibrium'. The outcome of the application of the model is that the price set for a product is higher than the one which would be set in a perfectly competitive market. However, the higher the number of firms present in the market, the more the overall output will increase, and prices will thus move towards the competitive level, i.e. marginal costs.³² The price level, however, will always remain higher than the level in a perfect competitive market, where competitors are not influenced by interaction between them.

4.1.2. Bertrand

The assumption that firms compete by setting their outputs instead of setting prices does not, however, seem to reflect reality.³³ 45 years later, in 1883, Joseph Bertrand reviewed Cournot's model, assuming that oligopolists compete by means of setting their prices.³⁴ Again, firms have only one opportunity to set their prices. Suppose again that there are only two firms present in the market. For any price set by firm A, firm B can slightly undercut this price, detracting the whole market demand, and again vice versa. The limit is however reached if one of the firms charges prices that equal marginal costs, meaning that undercutting this price is not profitable. The final outcome of this model is thus that the price in a market with oligopolistic competition is similar to that in a market with perfect competition, i.e. equal to marginal costs.³⁵ This result remains unchanged when the number of firms present in the market increases.

³¹ Cournot, *Recherches sur les Principes Mathématiques de la Théorie des Richesses*, 1938

³² The price level in the equilibrium is proportionally linked to the market shares of the firms present in the market, and inversely linked to the demand elasticity.

³³ A more sensible interpretation of Cournot competition would be that firms first choose capacity and then prices, subject to capacity restraints. Bishop, Walker, *supra* note 6. p. 25

³⁴ Bertrand, *Review of Recherches sur le Principe Mathématique de la Théorie des Richesses*, 1883, pp. 499-508

³⁵ The difference between the outcomes of Cournot's and Bertrand's models can be explained by the fact that with Cournot's quantity competition, each firm realises that the other is committed to producing its announced quantity; with Bertrand's pricing competition, instead, each firm recognises that it can take the entire market from its rival if it offers a lower price, leading to more aggressive behaviour: Shapiro, *Theories of Oligopoly Behaviour*, 1989, p. 349

While this model seems to be based on a more realistic assumption, i.e. that oligopolists compete on prices, it is however subject to many assumptions, which in reality do not hold true: it is, for example, implied that goods are perfectly substitutable, marginal costs are constant and equal for both firms and that firms are not subject to capacity restraints, with the result that for now Cournot's model remains the workhorse oligopoly model.³⁶

4.1.3. Stackelberg

Stackelberg has developed a model in response to Cournot's oligopoly model.³⁷ While in the Cournot model each firm takes the other's action as given, in the Stackelberg model, one firm takes the other firm's reactions as given. In his model he analyses whether it pays more for a firm to either be a follower or a leader in the setting of output. If one firm decides to be a follower and the other a leader, the outcome is called a 'Stackelberg equilibrium'. If each chooses to be a follower, and each firm expects the other firm to be a follower, the Cournot equilibrium will be the outcome. If both firms, however, choose to be a leader, the outcome is indeterminate; this situation is called Stackelberg warfare.

4.1.4. Edgeworth

Edgeworth argues that the oligopoly outcome is indeterminate, and that any equilibrium reached is not necessarily stable. Since each firm has an incentive to undercut its rival's price when that price is high, but raise prices when the rival is pricing at marginal cost, Edgeworth suggested that the market would fail to settle down, and rather that prices would cycle between high and low values. This theoretical pricing pattern is known as an "Edgeworth cycle".³⁸

4.1.5. Conjectural variations

Many studies have been done on oligopolistic markets and their outcome. The most common method of studying reactions in static homogeneous goods models is by the use of the concept of "conjectural variations", as developed by Bowley in 1924.³⁹ A firm's conjectural variation is defined as the response it 'conjectures' about rivals' outputs if the initial firm alters its own output. A conjectural variation value of -1 reflects the fact that the first moving firm expects, when introducing an increase of output, that its rival will react actively and also increase its output. The first firm will thus find it unattractive to increase its output. A conjectural variation of $+1$, on the other hand, indicates that the first firm expects that its rival will passively accommodate, i.e., decrease its output as a reaction to an output increase of the first firm. An output increase

³⁶ *Ibid.* p. 346

³⁷ Stackelberg, von, Marktform und Gleichgewicht, 1934, see Scherer, Ross, *supra* note 20, pp. 231-233

³⁸ Edgeworth, The Pure Theory of Monopoly, 1925, pp. 118-120

³⁹ Bowley, Mathematical Foundations of Economics, 1924

is then expected to be profitable. A conjectural variation of 0 can be found in the Cournot model, i.e. the output-increasing firm expects his rival's output to remain unchanged.

4.1.6. Kinked demand curve

Another approach to oligopolistic behaviour is the well-known 'kinked demand curve' theory of oligopoly developed by Sweezy⁴⁰ and Hall and Hitch⁴¹. They suggest that oligopolists expect their rivals to match any price decrease, but not price increases. The 'kink' in the demand curve at the level of the prevailing price reflects the more elastic demand curve for price increases than for price decreases. Therefore, price reductions do not result in an increase of market share, and are thus unprofitable, while a price increase, on the other hand, results in a large loss of customers. Prices are, therefore, held to be 'sticky' on the upward.

5. Different schools of thought

On how such a supra-competitive result is reached and maintained there are various schools of thought differ in opinion. Although the crude division these various schools of thoughts suggest have largely broken down under the influence of more modern economic analysis, there remains some value in the distinction, and it is still common to find them applied to either personalities or approaches.

5.1. Structuralists

The Structuralist or Harvard⁴² school, basing itself on the Structure-Conduct-Performance paradigm, retains that when the Structure of the market is concentrated, the Conduct, i.e. way of competing, of the few competitors present in the market is interdependent, which leads to a Performance of decreased output and supra-competitive prices, leading to supra-competitive profits. The structuralists in their studies thus retain that concentration almost inevitably leads to supra-competitive pricing due to the adaptation of oligopolists to each other's behaviour.⁴³ However, the adequacy of many studies has, subsequently, been disputed by scholars of the Behaviouralists' school and the soundness of

⁴⁰ Sweezy, Demand under Conditions of Oligopoly, 1939, pp. 568-573

⁴¹ Hall, Hitch, Price Theory and Business Behaviour, 1939, pp. 12-45

⁴² This school of thought emerged at Harvard University when, in the thirties, researchers such as Bain, Kaysen and Turner conducted empirical surveys into specific industries.

⁴³ E.g. Bain, in his empirical research into the American manufacturing industry in the interval 1936-1940, found that the association of concentration to profits was such that there was a rough dichotomy into those with more and less than 70% of value controlled by eight firms. He furthermore concluded that profit rates were not related to the absolute size of a firm in a simple fashion. Bain, Relation of Profit Rate to Industry Concentration: American Manufacturing, 1936-1940, 1951, p. 323

the results of empirical research confirming the link between market structure and profit levels have been questioned.⁴⁴

The Structuralists base themselves on the economics of oligopoly as set out by Edward Chamberlin in 1929, who argued that “[s]ince the result of a cut by any one is inevitably to decrease his own profits, no one will cut, and although the sellers are entirely independent, the equilibrium result is the same as though there were a monopolistic agreement between them”.⁴⁵

Relying on the fact that each oligopolist is aware of this fact, price-cutting may not occur, and the market as a whole can maintain supra-competitive prices without the need for a formal or tacit agreement. This “theory of interdependence”, however, gives no explanation on how the supra-competitive pricing is reached.⁴⁶

5.2. Behaviouralists

The Behaviouralist or Chicago school, on the other hand, challenged the structural school’s view, that supra-competitive pricing in oligopolistic markets is virtually inevitable, as they blame supra-competitive pricing on behavioural factors.⁴⁷ Their ideas are based on the economics of neo-classical price theory. Building upon Stigler’s⁴⁸ seminal article “Theory of Oligopoly” of 1964,⁴⁹ behaviouralists sustain that, in a concentrated market, as in an unconcentrated market, a consensus level of pricing needs to be reached, the adherence thereto monitored, and secret price cutting needs to be prevented by detecting punishing deviations of the consensus-pricing. Stigler suggested that the greatest obstacle to collusion, in absence of entry, would be what he characterised as “secret price cutting”.⁵⁰ Although they recognise that concentration is an important, and perhaps even necessary condition for oligopolists to collude, they argue that other factors in the market, such as the existence of countervailing buyer’s and presence of barriers to entry can inhibit collusion from coming into existence.⁵¹

⁴⁴ See e.g. Weiss, *The Concentration and Profits Issue*, 1974; Brozen, *The Concentration – Collusion Doctrine*, 1977, p. 826. Generally, however, empirical studies tend to favour the existence of such link, see Scherer, Ross, *supra* note 20

⁴⁵ Chamberlin, *supra* note 22, p. 48

⁴⁶ See Whish, *Competition Law*, 2001, p. 464. One explanation offered by some economists is the concept of price-leadership, see *infra* paragraph 8.1

⁴⁷ Bain, the leading industrial organisation economist before Stigler, had already acknowledged that oligopolists may have an incentive to cut prices as a result of “a counter-pull between joint profit-maximizing and independent profit maximizing motives. Bain, *Industrial Organization.*, 1968, p. 120

⁴⁸ At the time professor at the University of Chicago, winner of the Nobel Prize in 1982 in Economic Sciences.

⁴⁹ Stigler, *A Theory of Oligopoly*, 1964, p. 44

⁵⁰ *Ibid.* p. 46

⁵¹ *Ibid.* p. 49

Furthermore, the threat of punishment must be such as to constitute a stabilising factor for collusion. The losses to be incurred from punishment must be severe and credible enough as to outweigh the short-term profits the cheating firm can draw from undercutting the collusive price. Stigler's insight thus led to the recognition that it is far from inevitable that oligopolists behave non-competitively, as firms under certain market conditions will have a powerful incentive to cheat on any co-operative understanding. Stigler's work influenced, and still continues to influence economic thinking concerning oligopolies.⁵²

Furthermore, behavioural scholars point out that market structure should not be taken as exclusively exogeneously determined, but at least partially also influenced endogeneously.⁵³ Large companies should not be condemned per se as they can be the result of superior efficiency.⁵⁴ They thus maintain that the SCP model of the Structuralists also works the other way around: market structure is determined by the performance of firms, and should not be attacked because firms have succeeded.

6. Game theory

With the arrival of the New Industrial Organisation Theory, a new instrument for analysing and predicting oligopolistic, interdependent, behaviour has been developed, i.e. "game theory". Although Neumann and Morgenstern developed the first seminal work in the field of Game Theory in 1944⁵⁵, it did not receive full attention until the 1970's. Since then, game theory has rapidly developed into a useful instrument which can be used to gain insight into the dynamics of oligopolistic interdependence.

Game theorists see the market-play between competitors as a "game", the competitors being rational players in the market, trying to maximise their profits. Everything revolves around the search for a possible equilibrium or equilibria, i.e. a combination of the strategies that represent the best strategy for every player.

⁵² See e.g. Bork, *The Antitrust Paradox, A Policy at War with Itself*, 1978; Posner, *supra* note 17; Calvani, *Silbarium, Antitrust Today: Maturity or Decline*, 1990, p. 123; Shapiro, *supra* note 35

⁵³ Demetz, *Industry Structure, Market Rivalry and Public Policy*, pp 1-16; Sutton, *Sunk Cost and Market Structure: Price Competition, Advertising and the Evolution of Concentration*, 1991

⁵⁴ Harold Demetz and Yale Brozen demonstrated in their research that not all firms in oligopolies enjoyed supra-normal profits. They suggested that companies who did achieve higher returns did so through superior performance, and not through industry-wide co-ordination.

⁵⁵ Neumann, Morgenstern, *Theory of Games and Economic Behaviour*, 1944

A game theoretic perspective differs from earlier economic understandings in part because it assumes that each manager adopts his or her best strategy, based on assessment of competitors' best strategies, not simply that managers in oligopolistic markets attempt to take competitors' likely reactions into account.⁵⁶ It furthermore recognises that the oligopoly game in the market is not a zero-sum game, i.e. somebody's gain is not necessarily somebody else's loss.⁵⁷

Two main branches of game theory exist: co-operative and non co-operative game theory. In co-operative game theory models competitors are allowed to make binding agreements that restrict their feasible strategies.⁵⁸ As the particular problem of oligopoly is that competitors behave independently on the market, co-operative game theory is not generally used to analyse oligopoly games.

Non co-operative game theory is the currently accepted economic mode of analysing oligopoly interactions. This branch of game theory begins with a non-co-operative viewpoint, i.e. it assumes that each firm's independent choice of its best strategy will result in equilibria (of strategies), that are non-co-operatively optimal given the others' similarly calculated optimal strategies.⁵⁹ It is presumed that firms cannot communicate, or they cannot, at least, rely on the contents of the communication.

6.1. Static games

The one-shot game models constitute the simplest form of non-cooperative game theory. In such a static game, every player can move only once, without having knowledge of the move of the other player. It is presumed that both players move contemporarily,⁶⁰ so that there is no possibility of knowing beforehand the move the other player makes. Cournot's and Bertrand's analyses of oligopolies can be seen as a one-shot game, depending on the variable the competitors have chosen to determine their strategies. The choices oligopolists face in the market-game can be illustrated by the so-called "prisoner's dilemma".

⁵⁶ Yao, DeSanti, *Game Theory and the Legal Analysis of Tacit Collusion*, 1993, p. 123. The assumption of the considerable amount of rationality on the part of the competitors is however open to criticism. See e.g. the Prisoner's Dilemma experiments by Flood and Dresher, see Peeperkorn, *Competition Policy Implications from Game Theory: an Evaluation of the Commission's Policy on Information Exchange*, p. 10. The assumption of rationality does, however, appear to have some support from the experimental literature, see e.g. Smith, *Theory, Experiment and Economics*, 1989, p. 151

⁵⁷ A game is a zero-sum game when the algebraic sum of the utilities equals zero

⁵⁸ See for the treatment of both types of game theory e.g. Friedman, *Oligopoly and the Theory of Games*, 1977; Shubik, *Game Theory in the Social Sciences: Concepts and Solutions*, 1982

⁵⁹ Yao, D.A., DeSanti, S., *supra* note 56, p. 123

⁶⁰ The moves can also be made consequently, but without the possibility of apprehending the move of the first player.

Prisoner's dilemma

Suppose two villains are caught in a stolen car after having robbed a bank. Both are being put into separate cells in prison; there is no possibility that they can communicate with each other. The District Attorney lacks the required proof in order to charge the villains with bank-robbery, and would need a confession of one of the crooks. She does however have sufficient proof to charge them with car stealing. The villains, being separately interrogated, are being given the following choice: confess or deny. Do both confess, they will be charged with six years of imprisonment each. If only one of them confesses, he will walk a free man, while the other, who denied, will have to face 10 years in jail. Do both deny, they can only be charged with car stealing, the punishment for which is one year of imprisonment each. The choices can be reproduced in the following “pay-off matrix”, indicating the years in prison:

<i>A\B</i>	<i>confess</i>	<i>deny</i>
<i>confess</i>	6,6	0,10
<i>deny</i>	10,0	1,1

Choosing purely out of self-interest, A is better off confessing, whatever choice B makes. The same holds true for B. The outcome then will be that both confess and both will be imprisoned for six years.

Such a “dilemma” can be transposed to oligopolistic market situations, where firms have to choose between setting a high or a low price (or output, depending on the variable chosen).⁶¹ The outcome of the dilemma is that both firms will prefer not to run the risk of losing demand by being the only one charging the high price, and both firms will set a low price, earning lower profits than would have been possible by both setting the high price. This, i.e. the best strategies of each firm to maximise its profits, given the strategies chosen by the other competitors, is known as the Nash equilibrium.⁶² In this equilibrium, neither of

⁶¹ See e.g. Franzosi, *Oligopoly and the Prisoners Dilemma: Concerted Practices and “As If” Behaviour*, 1988, p. 385

⁶² Called after John Forbes Nash, winner of the Nobel Prize in Economic Sciences in 1994, who formalised the concept: Nash., *Noncooperative Games*, 1951, pp. 286-295. Although different equilibrium concepts exist, the Nash equilibrium is the one generally used in single static models.

the firms has an incentive to change its strategy, given the strategy of the other firm. This outcome is however “Pareto⁶³ inferior”, i.e. it is not collectively the best outcome. The “Pareto optimum” combination would be of both firms charging high prices, leading to the most profitable outcome for both.

6.2. Repeated games

Oligopolists do not play the market game only once, and firms know that they will “play the game” repeatedly with the same competitors. Firms can monitor the strategies of the other firms in the market played in previous games and base their present decisions on the behaviour of their rivals in the past. Past actions do however not affect current feasible actions and pay-offs: any effects arise purely because the oligopolists remember what has happened and condition their actions on that history.⁶⁴ Repeated game theory does not take into account the possibility that firms might make lasting investments or commitments.⁶⁵

In a non-co-operative repeated game with a finite horizon, i.e. the number of periods in the game is known and limited, collusion will not occur if the players know which period will be the last. This result can be explained by backward induction: in a one period prisoner’s dilemma non-co-operative game, we have seen that the best strategy for each player will be to not co-operate. This means that it is rational for both players not to co-operate in the last period. Given the certainty that there will be no co-operation in the last period, then it is not rational to co-operate in the pre-last period, as there will be no rewards of co-operation in the last period, and so on.

In reality however the market game is played infinitely, or at least, competitors have no knowledge of which is the last game.⁶⁶ Firms can either choose to price low, competing vigorously with their competitors, to the detriment of all,⁶⁷ or choose to reduce competition between the competitors. In non-co-operative games with an unknown or infinite number of periods, termed super-games, a plethora of different equilibria, amongst which collusive ones, is possible.

Contemporary economics however suggest that it is typically the difficulties of policing collusion rather than the difficulties of reaching the terms of collusion

⁶³ After the Italian economist Vilfredo Pareto, *Manuale di Economia Politica*, 1906

⁶⁴ Shapiro, *supra* note 35, p. 357

⁶⁵ Yao, DeSanti, *supra* note 56, p. 123

⁶⁶ See generally Kreps, *Game Theory and Economic Modelling*, 1991, p. 97; Fudenberg, Tirole, *Game Theory*, 1991, pp. 145-206

⁶⁷ See e.g. Bishop, *Duopoly, Collusion or Warfare*, 1960, pp. 933-963; Porter, *On the Incidence and Duration of Price Wars*, 1985, pp. 415-426

that inhibit co-ordination in most oligopolies.⁶⁸ It can be seen from the “prisoners’ dilemma” mentioned above that an incentive exists for both firms to “cheat” on the collusion by charging the low price, thus undercutting the other firms’ price. The dynamics of continuous reciprocal price-undercutting, leading to low price level, is unprofitable for both firms.⁶⁹

Whether oligopolists will choose to either stick to the collusion or to cheat depends on whether the short-run returns to cheating outweigh the medium and long-term profits to be drawn from the collusive level of prices.⁷⁰ It is necessary for the stability of collusion that deviation will be detected within a small enough time lapse that the punishment will outweigh the profits to be drawn from deviating, so that the “collusive-equilibrium” can be artificially upheld. Profitability of deviation and detection thereof are dependent on the transparency in the market.

Of further importance in the decision of a firm either to stick to collusion or to defect is the severity of the punishment the cheating firm will receive. While a threat of a fierce price war, resulting in a return to the competitive Bertrand equilibrium might be severe enough to make firms stick to collusion, a mere return to the higher prices of the Cournot-equilibrium might not constitute a sufficiently severe threat to offset the unprofitability of cheating and consequently being caught.

Another prerequisite is that the threat of punishment has to be credible. As punishment is costly also for the punishing firms, the punishing firms need to possess or be able to produce low cost excess capacity in order to lower the prices.⁷¹ While below cost pricing might not constitute a credible threat for punishment, as the punishing firms also have to suffer losses, the threat to return to competition instead might be convincing.⁷² This strategy is however only

⁶⁸ Baker, Two Sherman Act section I dilemmas: Parallel Pricing, the Oligopoly Problem, and Contemporary Economic Theory, 1993, p. 163; Jenny, Economic Analysis, Anti-Trust Law and the Oligopoly Problem, 2000, p. 43

⁶⁹ Several economic theorists have shown that co-operation can emerge again after a period of cheating and punishment, see e.g. Jacquemin, Slade, Cartels, Collusion and Horizontal Merger, 1989, pp. 416-173. Several economics have suggested that, under certain circumstances, periods of price wars are necessary for the long-run sustainability of collusive behaviour, so that the fact that price wars take place is an indication of the existence of collusion.: Green, Porter, Non Cooperative Collusion under Imperfect Price Information, 1984, pp. 94-95

⁷⁰ A firm will also have to take into account losses resulting from a possible breakdown of the cartel.

⁷¹ See Jenny, *supra* note 68, p. 44

⁷² See e.g. Ross, Cartel Stability and Product Differentiation, 1992, p. 1; also US 1992 Merger Guidelines, *supra* note 6, at 2.12

credible if it is more profitable for the punishing firms to return to competition than to passively accommodate, i.e. allowing the cheating firm to deviate.⁷³

To enhance the credibility of punishment, firms can tie their hands by making irreversible (sunk) investments, i.e. in order to acquire excess capacity, or commit themselves to most favoured customer clauses⁷⁴ or meeting competition clauses⁷⁵ in sales contracts. Another way of enhancing credibility of punishment is when firms agree upon a trigger price level, studied by Green and Porter in their quantity-setting super-game model.⁷⁶ If the price drops below this level, all firms will revert to a static Cournot equilibrium for some period of time.⁷⁷

6.3. Dynamic games

Brief mention should also be made of the concept of dynamic games. Unlike in normal repeated games, in dynamic games, strategic interactions take into account the history of the game, as past actions affect current feasible actions or pay-offs. Prediction of the strategy of a firm is slightly more complicated than in a one-shot game. In a dynamic game, moreover, the Nash equilibrium concept cannot deal with sequential moves in a satisfactory way.⁷⁸

Stigler's core insights also remain important in repeated-game theory: in order to co-ordinate in repeated game theory models firms firstly need to determine the terms of their co-ordination, then monitor adherence and punish deviations. As to reaching the terms of agreement, game theory cannot (yet?) explain how oligopolists can, without explicitly colluding, reach coordinative outcomes. Game theory, moreover, does not make a distinction between explicit and tacit collusion; it would suggest that both be maintained because it is in the individual

⁷³ Passive accommodation is however unlikely to be more profitable than a return to competition: Baker, *supra* note 68, p. 159

⁷⁴ With the inclusion of a most-favoured-customer clause in a sales contract provides the buyer with the insurance that the seller cannot offer a lower price to another customer.

⁷⁵ With the inclusion of a meeting competition clause in a sales contract the seller commits himself to match a lower price offered by one of its competitors in the market.

⁷⁶ See Porter, *Optimal Cartel Trigger-Price Strategies*, 1983, p. 313

⁷⁷ A punishment strategy would lose its credibility if it is in the interest of the parties to renegotiate, once an occasion arises that the punishment must be implemented, that is when both the punished and the punishing firms have an interest in not fully applying the punishment.

⁷⁸ The economist Reinhard Selten, Nobel-Prize winner in Economic Sciences in 1994, has developed the concept of Sub-Game Perfect Nash Equilibrium, which can be found by moving "backwards" in the game: first one has to find the equilibrium at the last stage of the game, and subsequently move to the earlier stages: Selten, *A Simple Model of Imperfect Competition where Four are Few and Six are Many*, 1973, p. 141. This procedure can be rationalised by thinking that players commit themselves to long-run decisions, so that they know what is going to happen in later stages of the game can anticipate the future.

competitor's self-interest to do so. The critical issue is to analyse whether market characteristics are such as to prevent, or enhance such co-operative behaviour, resulting in a high price rather than in a low price.

7. Market characteristics

Many authors before have drawn up lists of market characteristics facilitating and stabilising collusion, affecting incentives for firms in choosing their strategies.⁷⁹ A paradox exists in that the characteristics which lead to perfect (excessive) competition frequently are the same as those that increase the likelihood of cheating on any collusive agreement that evolves. Shapiro refers to it as the “topsy-turvy” principle of collusion: “anything ... that makes more competitive behaviour feasible or credible actually promotes collusion”.⁸⁰

Neither game theory nor conventional economic theory can provide a detailed qualitative answer that encompasses all characteristics. What is usually done in game-theoretic models is that the influence of one or two factors is analysed while applying rather rigid assumptions concerning the other factors. A list of the main market characteristics enhancing and/or stabilising (tacit) collusion will be given here.

7.1. Number of competitors and concentration

7.1.1. Number of competitors

The first factor influencing the probability of collusion is how the supply side in the market is structured, i.e. the number of suppliers in the market.⁸¹ Adam Smith already observed that independent action might occur with only two sellers, but was more likely to occur with 20 or more sellers.⁸²

It is obvious that it is easier for a few suppliers to co-ordinate their behaviour than if there were dozens of competitors present in the market.⁸³ The number of paired relationships rapidly grows with the increase of the number of firms present in the market, according to the formula $N(N-1)/2$.⁸⁴ Among a limited

⁷⁹ See e.g. Carlton, Perloff, *Modern Industrial Organization*, 1999, pp. 208-238; Scherer, F.M., Ross, D., *supra* note 20, pp. 235-315, Salop, *Practices that (Credibly) Facilitate Oligopoly Co-ordination*, 1986; see also Chicago scholars such as Stigler, *supra* note 49, p. 44; Posner, *Price Fixing and the Oligopoly Problem*, in his *Antitrust Law, An Economic Perspective*, 1976

⁸⁰ Shapiro, *supra* note 35, p. 357

⁸¹ Cf. Ash, Seneca, *Characteristics of Collusive Firms*, 1975, pp. 233-235

⁸² Smith, *supra* note 10, p. 342

⁸³ Note however that a presumed cartel in the EC case *Vereniging van Samenwerkende Prijsregelende Organisaties in de Bouwnijverheid (SPO) v Commission* (T-29/92 [1995] ECR II-289), involved thousands of undertakings

⁸⁴ Scherer and Ross point furthermore out that in a market with a high number of suppliers, the possibility increases that among those suppliers there will be one maverick, pursuing an

number of suppliers interdependence is more acutely felt: the larger the number of suppliers, the lower oligopolistic interdependence generally becomes, as the awareness of collective interest is lowered. In a market with a large number of suppliers, apart from making co-ordination of behaviour more complex, the possibility of detection of price undercutting is also reduced, as cheating will give rise to relatively smaller quantity changes in the demand each firm faces. Moreover, as the number of firms in an industry increases, generally, the price elasticity each individual firm faces increases.⁸⁵

In assessing the absolute number of suppliers in a market, several economists have laid down indicative numbers beneath which oligopolistic dependence with a danger of collusion is presumed to exist. Hay and Kelley in their empirical survey consider 10 or fewer in 79% of the cases they studied. They found that the average number of firms involved in conspiracy was 7.25.⁸⁶ Scherer and Ross hold that as a very crude general rule, if evenly matched firms supply homogeneous product in a well-defined market, they are likely to begin ignoring their influence on price when their number exceeds ten or twelve.⁸⁷ Empirical studies employing US data suggest that co-ordinated behaviour is unlikely if co-ordination of more than four firms is required to control 50% of the market.⁸⁸ More recently, Bresnahan and Reiss suggested that three firms were enough for effective competition.⁸⁹ Discussion exists on whether, in some industries, even the co-existence of only two firms in a market is enough to ensure effective competition.⁹⁰

Game theoretic research by Selten, built upon by Philips, has led them to conclude that “4 are few and 6 are many”. The outcome of their models is that when four or fewer firms operate in a market the likelihood of collusion will be one, while it drops to zero with six or more firms.⁹¹

independent, aggressive policy, making it hard for the other suppliers to maintain prices at a supra-competitive level: Scherer, Ross, *supra* note 20, p. 277

⁸⁵ Bishop, Walker, *supra* note 6, p. 34

⁸⁶ Hay, Kelley, Empirical Survey of Price Fixing Conspiracies, 1974, pp. 13-38

⁸⁷ Scherer, Ross, *supra* note 20, p. 277

⁸⁸ Dalton, Penn, The Concentration-Profitability Relationship: Is There a Price-concentration Ratio?, 1976, pp. 133-142; Geithman, Marvel, Weiss, Concentration, Price and Critical Concentration Ratio's, 1981, pp. 346-353

⁸⁹ See Bishop, Walker, *supra* note 6, p. 34

⁹⁰ *Ibid.* Chapter 13

⁹¹ Selten, R., *supra* note 78, pp. 141-201, Philips, Competition Policy, A Game-Theoretic Perspective, 1995; *Idem*, On the Detection of Collusion and Predation, 1996, pp. 495-510. However, these models are of limited relevance, as Selten in his model excluded the possibility of cheating. Each company decides beforehand whether it will cheat or not, and sticks to its promise. His model resembles more a situation of a co-operative game with enforceable agreements. See also the game theoretic research by Brock and Scheinkman into how the degree of sustainable collusion relates to the number of firms: Brock, Scheinkman,

7.1.2. Concentration of competitors

The number of firms, however, does not always provide a reliable indication of how the market is structured: if there are a large number of firms operating in the industry, but only a few firms account for a large proportion of the industry sales, then these firms may be able to co-ordinate their behaviour without taking into account the numerous other smaller firms. A more sophisticated way of appraising the market structure on the supply side is by taking into consideration the size and the size distribution of the suppliers, measured in terms of market shares, either by the value or by the volume of the output.

Several instruments for measuring concentration, such as concentration ratios and indexes, have been developed. A concentration ratio takes into account the market share of a certain number of the largest firms in the market. An example of concentration ratios can be found in German competition law: If two or three firms have a market share of 50% or over, or five or less firms have a combined market share of two-thirds or over, they are assumed to be market dominating.⁹² Concentration ratios, however, do not give any indication on the relative size of the companies.⁹³ Another shortcoming in the use of concentration ratios is that the total number of firms present in the market is not taken into account. Concentration indexes might therefore constitute a more reliable instrument of measuring concentration. The Herfindahl-Hirschmann Index (HHI),⁹⁴ calculated as the sum of the squares of the market shares of the firms in the market, is

Price-Setting Supergames with Capacity Constraints, 1985, pp. 371-382. It has also been held that in a market with a limited number of firms, e.g. Selten's four, the game theoretical situation may be one of a non-cooperative game without Prisoner's dilemma, in which cooperation is the dominant strategy for each company, as the extra gain of deviation does not outweigh the loss that results from having to lower its, even when the cheating would go undetected. Once the number of firms increases the situation changes into the Prisoner's Dilemma, with an incentive for each competitor to cheat: See Peeperkorn, *supra* note 56, p. 8

⁹² Section 19(3) of the "Gesetz gegen Wettbewerbsbeschränkungen" (German Act against Restraints of Competition), as amended in 1998, entered into force in January 1999

⁹³ Concentration ratios have been developed beyond which interdependence is not accurately felt. See e.g. structural scholars Kaysen and Turner, in their empirical research into oligopolistic industries, divide oligopolies into Type One and Type Two oligopolies. In Type One oligopolies, i.e. the first eight firms have at least 50 percent, and the first twenty firms have at least 75 percent of total market sales, recognition of interdependence is extremely likely and the responses by smaller sellers will not limit the behaviour of the larger firms. Beyond the Type Two oligopolies, i.e. the first eight firms hold a market share of at least 33 percent, while the rest of the market is relatively unconcentrated, interdependence is not accurately felt anymore. In: Antitrust Policy, An Economic and Legal Analysis, 1959, p. 27.

⁹⁴ On its history, see: Hirschman, The Paternity of an Index, 1964, p. 761

being used in US merger control,⁹⁵ providing indicative levels of concentration above which serious doubts that competition is threatened are raised.⁹⁶

Firms can purposefully manipulate the number and concentration of firms in a market. This can for example be achieved through acquiring a competitor or forming a perfect cartel, in such a way that the members, in adopting the same conduct on the market, will act as one entity.⁹⁷

7.2. Homogeneity of suppliers

The homogeneity of suppliers is a factor that can often provide a first indication of equal market prominence and a commonality of interests, while reducing the degree of uncertainty each competitor faces concerning the costs and demand conditions of the others.⁹⁸ One can look at homogeneity of size, market share, costs, capacities, degree of vertical integration etc.⁹⁹ When producers are homogeneous, there is an adequate balance in gains to be had from collusive practices. Discussion however exists on whether symmetry in market shares is a prerequisite for collusion.¹⁰⁰

7.2.1. Cost structure

An important factor determining the homogeneity of suppliers is the structure of the costs of the different suppliers. Different cost structures might be a factor

⁹⁵ 1992 US Merger Guidelines, *supra* note 6, Section 1.5

⁹⁶ A market is considered to be highly concentrated if the HHI is above 1800, moderately concentrated if the HHI is between 1000 and 1800, and unconcentrated when the HHI is under 1000. Mergers which produce an increase in the HHI of more than 50 points in a highly concentrated market, and of more than 100 points in a moderately concentrated market potentially raise significant competitive concerns, depending however also on the other factors set out in the guidelines.

⁹⁷ A perfect cartel would be one in which the group as a whole set production where marginal cost for the group would equal marginal revenue, which is to say that the cartel would collectively behave exactly like a single firm monopoly. Such cartel however is unlikely to be found in real life.

⁹⁸ Neven, Nuttall, Seabright, *Mergers in Daylight, The Economics and Politics of European Merger Control*, 1993, p. 20

⁹⁹ Briones, *Oligopolistic Dominance. Is there a Common Approach in Different Jurisdictions? A Review of Decisions adopted by the Commission under the Merger Regulation*, 1995, p. 344

¹⁰⁰ It is being argued that even when producers hold comparable market shares, there may yet be substantial disequilibrium in competitive positions: See the Kantzenbach, Kottmann, Krüger, *Report for the European Commission, New Industrial Economics and Experiences from European Merger Control; New Lessons about Collective Dominance?*, 1995, p. 60; Ridyard holds that size distribution is not an obvious predictor of co-operative behaviour, in: *Economic Analysis of Single Firm and Oligopolistic Dominance under the European Merger Regulation*, 1994, p. 260. Alternatively, asymmetry in market shares may increase the ability of the largest competitor to act as a price leader: Sleuwagen, *On the Nature and Significance of Collusive Price Leadership*, 1986, pp. 177-188

reducing the probability of collusion, as companies facing different cost situations could have a very different view on the prices that they would like to prevail in the market. High cost firms will be reluctant to agree upon substantially decreased output.¹⁰¹ In such a situation it obviously becomes more difficult to co-ordinate the behaviour of the suppliers.

It is furthermore important to look at how the costs of the suppliers are structured.¹⁰² It is in general easier to sustain collusion where the marginal costs are relatively inelastic or when marginal costs are high in relation to the total costs, as an increase of output causes a large increase of marginal costs, reducing the gains of cheating.¹⁰³ In contrast, when the marginal costs of a firm are low in relation to the fixed costs, gains from cheating are high, which makes collusion unstable. Paradoxically, low marginal costs in an industry can also have a stabilising effect on collusion, as the threat of punishment in such cases is credible, since it is for other firms less costly to increase output in order to punish a deviator.

7.2.2. Capacity

Homogeneity of suppliers depends also on their capacities, as equal capacities will enhance collusion.¹⁰⁴ Differences in capacity utilisation which lead to different average costs instead make collusion more difficult to attain and maintain.¹⁰⁵ An ambiguous factor affecting the likelihood of collusion is excess capacity: under-utilisation of capacity provides an incentive to cheat,¹⁰⁶ as competitors are eager to exploit more of their capacity. The danger in cheating on collusion however is that, when more competitors possess excess capacity, it can lead to deep price cuts.¹⁰⁷ High excess capacity of competitors in the market can, furthermore, constitute a barrier to entry, deterring new firms from entering the market.

¹⁰¹ See Fellner, *Competition Amongst the Few, Oligopoly and Similar Market Structures*, 1949, pp. 218-220, 232

¹⁰² Scherer, Ross, *supra* note 20, p. 248

¹⁰³ Bishop, Walker, *supra* note 6, p. 85

¹⁰⁴ Compte, Jenny, Rey, in *Capacity Constraints, Mergers and Collusion*, have developed a model with homogeneous goods where firms differ in their capacities. According to them, in such a situation the large firm has a stronger incentive to deviate whereas the smaller firms are capacity constrained. By consequence they cannot credibly threaten the large firm with punishing it. A more equal distribution of capacities would help to enhance collusion.

¹⁰⁵ Briones, *supra* note 99, p. 343

¹⁰⁶ European Commission, *supra* note 100, p. 62

¹⁰⁷ Scherer, Ross, *supra* note 20, p. 245

7.3. Countervailing competitive power

7.3.1. Real competition

Profitability, and thus attractiveness of collusion, can be limited in the exertion of market power by the existence of other competitors in the market. These “fringe” competitors can, in response to a price raise by the firm(s) exerting market power, increase their outputs, thus impeding the price increase from leading to a profit increase for the former. A prerequisite is that they possess excess capacity or that it is not too costly for them to significantly increase their output.

The factor of competitive countervailing power can also be manipulated, either by absorbing a (maverick) competitor¹⁰⁸ through acquisition, or by forming a cartel, forcing competitors to abstain from competing.

7.3.2. Potential competition

Firms that threaten to enter the market, attracted by the supra-competitive profits that can be earned furthermore constitute a competitive constraint. Two different types of entry can be distinguished: short-term and long-term entry.

The first type of entry, the so-called hit-and-run or uncommitted entry,¹⁰⁹ can occur in contestable markets, as no, or only low, sunk costs are required. Normative suggestions can be taken from the ‘theory of contestable markets’,¹¹⁰ developed by Baumol, Panzar and Willig mentioned in paragraph 3.¹¹¹ Baker refers to this kind of entry as “trump”.¹¹² Entry of this type constitutes a credible threat or remedy against supra-competitive pricing, and a disincentive for collusion. The possibility of hit-and-run is however rare, as in reality some kind of investments will always be required.

Hit-and-run entry might be possible for firms already operating in neighbouring markets, which can readily divert their production to producing the product in the market where supra-competitive profits can be earned. This phenomenon is

¹⁰⁸ A maverick firm is a firm that has “a greater economic incentive to deviate from the terms of co-ordination than do most of its rivals”: 1992 US Merger Guidelines, *supra* note 6, Section 2.12

¹⁰⁹ See 1992 US Merger Guidelines, *supra* note 6, section 0.2

¹¹⁰ The notion “contestable market” in juridical language is used to indicate markets in which potential competition by entrants constitutes a significant competitive restraint.

¹¹¹ The theory, however, is held to be not very robust, as it relies on the assumption that entrants to a market can set up in competition with incumbents faster than the latter can alter their prices, see e.g. Schwartz, Reynolds, *Contestable Markets: An Unprising in the Theory of Industry Structure: Comment*, 1983, pp. 488-490

¹¹² Baker, *The Problem with Baker Hughes and Syufy: On the Role of Entry in Merger Analysis*, 1997, pp. 353-374

referred to as supply-side substitution. The prerequisite however is that the opportunity costs of substituting out of the current product is low.

The second type of entry is constituted by entry requiring significant sunk costs, which will only be undertaken by firms that plan to remain in the market in the long term. In order for such entry to form a countervailing restraint, entry must occur timely, likely and sufficient in its magnitude, character and scope.¹¹³ The US 1992 Merger Guidelines refer to this type of new competition that requires expenditure of significant sunk costs of entry and exit as “committed entrants”.¹¹⁴

7.4. Barriers to entry

Whether the possibility of entry constitutes a competitive restraint depends mainly on the presence or absence of barriers to entry. Academic discussion existed and still exists as to what needs to be understood by the notion “barrier to entry”. According to Bishop and Walker the key question is “what factors enable an incumbent or incumbents to earn profits in excess of normal profit levels while other equally or more efficient firms are excluded”.¹¹⁵

Many categorisations of barriers to entry have been laid down.¹¹⁶ Kühn, Seabright and Smith make divide barriers to entry into three main categories: artificial, natural and strategic barriers.¹¹⁷

The first type of barriers to entry, i.e. the artificial ones, are barriers posed by formal restrictions, such as legislation or trade association rules. Such barriers are easily recognisable. The second type of barriers, the natural barriers to entry are constituted by technology of production, e.g. high economies of scale and/or high fixed costs¹¹⁸ requiring high investments, including high sunk costs, i.e. costs which the firm will be unable to recoup.¹¹⁹

One can distinguish between exogeneous and endogeneous sunk costs. The former are incurred by any firm entering a market, e.g. acquisition of a plant and

¹¹³ 1992 US Merger Guidelines, *supra* note 6, section 0.2

¹¹⁴ *Ibid.* Section 3.0

¹¹⁵ Bishop, Walker, *supra* note 6, pp. 301-302

¹¹⁶ See e.g. UK Office of Fair Trading, Research paper No. 2, Barriers to Entry and Exit in UK Competition Policy, 1994, dividing barriers to entry into two categories: absolute barriers and strategic incumbent barriers. Absolute barriers to entry are observable barriers, such as legislative hurdles, e.g. patent rights or obstacles like economies of scale. Strategic incumbents barriers refer to barriers to entry as defined by Stigler, i.e. asymmetries between the incumbent and the entrant simply due to the fact that the incumbent entered first.

¹¹⁷ Kühn, Seabright, Smith, Competition Policy Research: Where do we stand?, pp. 4-5

¹¹⁸ See Schmalensee, Ease of Entry, Has the Concept Been Applied Too Readily?, 1989, p. 43

¹¹⁹ Scherer, Ross, *supra* note 20, p. 245.

economies of scale. Endogeneous sunk costs, on the other hand, are determined by the entering firm itself, e.g. advertising expenditure. Incumbents can manipulate the latter type of entry-costs, e.g. by heavily investing in advertisement, creating consumer loyalty. The entering firm will face higher sunk costs, as it will now also need to advertise heavily in order to be able to penetrate the market.

This leads us to the third type of barriers to entry, the strategic ones. These barriers are being set up by firms in order to deter entrants, e.g. acquiring low cost excess capacity, enabling low pricing, perhaps even predatorily low pricing.¹²⁰ In order to make the investment worthwhile, the prospect for the entering firm has to be that supra-competitive profits can be earned: a firm might not be willing to enter a market where fierce competition exists.

7.5. Countervailing buyers' power

Another factor influencing the possibility of exerting market power is constituted by the countervailing power buyers can exert in a certain market.¹²¹ High buyer concentration and buyers' sophistication increases the dependence of sellers on the buyers, which puts the latter in a better bargaining position.¹²² The use of long-term contracts likewise creates dependency of the supplier on the buyer. A further consequence of long-term supply contracts is that market transparency is lowered, because of the confidential contractual relations, reducing the likelihood of collusion.¹²³ Furthermore, the ability and/or possibility for buyers to switch to alternative resources of supply or to develop production upstream and provide for their own in-house supply in response to a price raise will influence the potential of charging anti-competitive prices.

7.6. Homogeneity of products

Another factor enhancing collusion is that the market consists of homogeneous commodity products, appealing agreeing upon a price or a level of output¹²⁴ comparing them and detecting any undercutting. The homogeneity of products increases substitutability between competitors,¹²⁵ increasing the demand elasticity each firm faces. Collusion is then enhanced so as to increase profits for every competitor within the oligopoly without losing a part of their market

¹²⁰ See e.g. Salop, *Strategic Entry Deterrence*, 1979, pp. 335-338

¹²¹ See Motta, *Economic Analysis and EC Merger Policy*, 1999; Galbraith, *American Capitalism: The Concept of Countervailing Power*, 1952

¹²² European Commission Report, *supra* note 100, p. 55

¹²³ Ridyard, *supra* note 100, p. 261

¹²⁴ Scherer, Ross, *supra* note 20, p. 279

¹²⁵ To be measured by calculating the cross-price elasticities of products, i.e. the extent to which the quantity of the product demand changes in response to a change in the price of some other product, see Bishop, Walker, *supra* note 6, p. 33

share. Furthermore, monitoring is facilitated in a market with homogeneous products, as changes in market shares are more likely to provide an indication of price-cutting when products are homogeneous than when they are heterogeneous.¹²⁶

A further role is played by the importance of technology in a product market. If the relevant product is not a commodity product, but relatively high technology is needed to manufacture a product, the complexity of products and production processes increases, reducing the likelihood of collusion. High technology will also increase the proportion of fixed costs.¹²⁷ Furthermore, in a product market where research and development play a major role, product innovation leads to product differentiation, and collusion will become, as shown above, more improbable. A mature technology product market instead appeases collusion.¹²⁸

Firms can try to artificially standardise their products.¹²⁹ Conversely, firms can try to purposefully differentiate their products, for example, by investing in advertising, in order to lower the demand elasticity they face, which can enhance a different kind of collusion, namely, market area division.¹³⁰

7.7. Transparency

Another important factor is the level of transparency in the market. High transparency as to prices or market strategies clearly enhances collusion, as it facilitates the acquisition of information on the behaviour of competitors, reducing uncertainty concerning their strategies.¹³¹ A further consequence of such high transparency is that it makes it easier to detect a competitor “cheating” on the collusion, enabling the other competitors to take immediate retaliatory action, so that the cheater will thus not be able to draw much profit from his actions. The threat of such instant actions works as a stabilising factor of collusion.¹³² Links, either structural or other, created between undertakings, can constitute a channel through which information can be exchanged. An indicative factor of the existence of collusion can be found when competitors have developed facilitating practices in order to increase the transparency, and thereby reduce uncertainty, in the market.

¹²⁶ According to European Commission Report, *supra* note 100, p. 34, product heterogeneity is not a collusion inhibiting factor per se. If collusion occurs it is more likely that it will be in the form of an overt agreement, due to the complexity of co-ordination.

¹²⁷ *Ibid.* p. 50

¹²⁸ *Ibid.* p. 63

¹²⁹ See *infra* paragraph 8.3.

¹³⁰ European Commission Report, *supra* note 100, p. 49

¹³¹ Green and Porter, however, explain by way of a model that some collusion is possible even when there is non-observability of rival's action: Green, Porter, *supra* note 69, pp. 87-100

¹³² Cf. Scherer, Ross, *supra* note 20, p. 308 ed seq.

7.8. Multi-market contacts

It is necessary, when assessing likelihood of collusion, to consider interdependencies which reach beyond the boundaries of the market being examined.¹³³ As the product and geographic areas where oligopolists encounter each other widen, their interdependence becomes greater, so each has more to lose from any move, which in turn might make any price initiative increasingly unlikely.¹³⁴ Through these multi-market contacts the competitors are in a better position to develop an impression of interest and characteristics of their competitors, thus reducing uncertainty as to the future market behaviour of competitors, as the contacts may reduce information gaps. Multi-market contacts between oligopolists will thus facilitate, as well as stabilise collusion,¹³⁵ as they make it easier to detect cheating and increase the possibilities of retaliation, by creating a “network of vulnerability”.¹³⁶

7.9. Variations of demand over time

Growth of demand in the market is another factor to be taken into account. There is evidence that collusion occurs more frequently in a market where demand is stagnant or slowly growing with below-average profits.¹³⁷ In a stagnant or slowly growing market growth can only be achieved at the expense of market shares of competitors. A mature, saturated market can be seen as indicative of an aggravated threat of collusion, while a considerably growing market instead decreases the tendency towards collusion, as competitors will try to capture a share of the new demand.¹³⁸ A growing demand in a market furthermore renders the detection of deviations more difficult. When an industry is subject to cyclical fluctuations in demand, it becomes more difficult for firms to determine whether changes in demand for their products reflect cheating or whether they are simply caused by an overall change of industry demand.¹³⁹

¹³³ *Ibid.* p. 55. See for economic studies of firms meeting in several markets: Phillips, Mason, Market Regulation and Multi-market Rivalry, 1996, pp. 596-617; Spagnolo, On Interdependent Supergames: Multimarket Contact, Concavity, and Collusion, 1999, pp. 127-139; Thomas, Multimarket Contact and Imperfect Information, p. 224; Thomas, Willig, The Risk of Contagion from Multimarket Contact, 2001

¹³⁴ Areeda, Kaplow, Antitrust Analysis: Problems, Text, and Cases, 1997, pp. 873-874

¹³⁵ It is however also suggested in economic literature that multi-market contacts do not change the scope for collusion in symmetric situations. As soon as some asymmetry is introduced, however, multi market contacts might help collusion: Bernheim, Whinston, Multimarket Contact and Collusive Behaviour, 1990, pp. 1-26

¹³⁶ European Commission Report, *supra* note 100, p. 53; See also Edwards, Conglomerate Bigness as a Source of Power, in: Business Concentration and Price Policy, 1955

¹³⁷ Scherer, Ross, *supra* note 20, p. 248; P. Ash, Seneca, *supra* note 81, pp. 227-236; *Idem.*, Is Collusion Profitable?, 1976, pp. 1-12

¹³⁸ One can however argue that in such growing market deviation from collusion would be less likely, as the effects of retaliation will be quantitatively high.

¹³⁹ Bishop, Walker, *supra* note 6, p. 85

Moreover, volatility in demand adds noise to the data firms monitor in order to try to detect cheating.

7.10. Characteristics of transactions

A prerequisite for the awareness of interdependence is that competitors meet each other frequently on the market, or, in game-theoretical language, play the game repeatedly. The possibility of detecting deviations is dependent on the frequency and size of transactions. The incentive to cheat increases, and the possibility of detection decreases the more lumpy and infrequent transactions are in a market. Furthermore, large orders increase the attractiveness of cheating, by granting buyers secret discounts, earning high short-term profits. Stigler has pointed out that secret price cuts would not be made to "...buyers whose purchase fall below a certain size relative to his aggregate sales."¹⁴⁰ Such large orders furthermore increase countervailing buyers' power, as they can play the firms that will compete for the order off against each other.

According to game theorists, competition authorities need not be concerned when a market is characterised by a limited number of large contracts, as rational operating companies will not collude in such markets.¹⁴¹ In "bidding markets", i.e. a market where sales are made through a tender process, however, the risk exists that competitors adhere to a bidding-cartel, so-called bid rigging, dividing amongst themselves the bids to protect themselves from the possibly detrimental effects of competition.¹⁴²

8. Facilitating practices

*"[U]ncertainty is an oligopoly's greatest enemy"*¹⁴³

Firms have developed facilitating practices that enable them to reach desirable terms for collusion and/or support collusive outcomes, limiting the influence of factors that destabilise co-operative outcomes.¹⁴⁴ The different facilitating practices have in common that they increase transparency, reducing uncertainty on the behaviour of competitors.

Facilitating practices can affect the values of the pay-off matrix and alter a firm's incentives to arrive at and stick to collusion. Salop refers to the adoption

¹⁴⁰ Stigler, *supra* note 49, p. 44. He furthermore stated that "... collusion will often be effective against smaller buyers even where it is ineffective against large buyers".

¹⁴¹ See Peepkorn, *supra* note 56, p. 3

¹⁴² Scherer, Ross, *supra* note 20, p. 307, Bishop, Walker, *supra* note 6, Chapter 13

¹⁴³ Justice Kennedy in the U.S. case *Brooke Group Ltd. v. Brown & Williamson Tobacco Corp.* 509 U.S. 209 (1993)

¹⁴⁴ See Kühn, Vives, *Information exchanges among Firms and their Impact on Competition*, 1994

of facilitating practices that directly affect the pay-off matrix as “incentive management”.¹⁴⁵ As facilitating practices can serve both anti-competitive and pro-competitive ends they have become a frustration for competition authorities.

As we have seen above, the theory of repeated games adopts the perspective that, in achieving a collusive equilibrium, many outcomes are typically possible, and the choice of the outcome turns on one of the outcomes standing out as self-evident. Such an outcome in game-theory terminology is called “focal”.¹⁴⁶ Thomas Schelling, the originator of the idea of “focal points” and its application to oligopoly co-ordination, held that oligopoly behaviour can probably be explained by “tacit communication and its dependence on qualitatively identifiable and fairly unambiguous signals that can be read in the situation itself”.¹⁴⁷ Focal points might be enough to signal to the other competitors the preferred outcome, and for all the competitors to select it as being the self-evident way to behave.¹⁴⁸ Firms can also identify “focal rules”, such as basing point pricing,¹⁴⁹ preserving existing price differences or existing market shares.¹⁵⁰ Once a focal rule of this sort is identified, identifying then a focal point merely turns on choosing a single parameter, such as the common percentage price increase or common percentage output reductions.¹⁵¹

A list of facilitating practices facilitating collusion has become a staple of both economic texts and antitrust monographs.¹⁵²

¹⁴⁵ Salop, *supra* note 79, p. 271

¹⁴⁶ See e.g. Baker, *supra* note 68, pp. 162-169

¹⁴⁷ Schelling, *The Strategy of Conflict*, 1960, p. 74. Firms can provide signals through focal points in many different ways: firms could announce their choice amongst different possible outcomes, for example on a press conference or in a journal.” Also collusion in the past can facilitate firms’ cognition of signals sent by a rival firm. On focal point pricing see also Scherer, *Focal Point Pricing and Conscious Parallelism*, 1967

¹⁴⁸ Kreps, *supra* note 66, pp. 388-389, 411. See also Farrell, *Cheap Talk, Coordination and Entry*, 1987, p. 34, defining “cheap talk” as costless, nonbinding and nonverifiable information

¹⁴⁹ Fixing prices inclusive of transport costs, regardless of the distance, Scherer, Ross, *supra* note 20, pp. 505-506

¹⁵⁰ The 1992 US Merger Guidelines, *supra* note 6, recognise that “[f]irms co-ordinating their action need not to reach complex terms concerning the allocation of market output across firms or the level of the market place but may, instead, follow simple terms such as common price, fixed price differentials, stable market shares or customer or territorial restrictions”, 1992 US Merger Guidelines, Section 2.11

¹⁵¹ Baker, *supra* note 68, pp. 163-165

¹⁵² See e.g. Scherer, Ross, *supra* note 20, pp. 235-315; Carlton, Perloff, *supra* note 79, pp. 201-238; Salop, S.C., *supra* note 79, pp. 265-290; Posner, R., *supra* note 17, pp. 55-61; Rees mentions information exchange, trade associations, price leadership, collaborative research, cross-licensing of patents, most-favoured-customer clauses and meeting-competition clauses in buyer-seller contracts, resale price maintenance, basing point pricing, common costing books, Rees, *Tacit Collusion*, 1993, pp. 27-40

8.1. Price leadership

Price leadership is an industry practice in which one firm's pricing movements are followed by its rivals.¹⁵³ Price leadership is a phenomenon that is difficult to judge. It can constitute a facilitating practice, as the price leader indicates the preferred 'focal' consensus price or output level, but can, on the other hand, also be merely the natural working of the market. Economic studies have shown that price leadership of some sort occurs in many oligopolistic industries.¹⁵⁴

Structural scholar Joe Bain's, in analysing price leadership systems, found that "in an oligopolistic market any independent price change by a single oligopolist tends to be read as an 'offer' by his rivals, and an acceptable reaction to the price change may be interpreted as an acceptance of the offer of the first firm. Thus, negotiation can perhaps take place through a series of public announcements rather than through a meeting of persons, and the meaning of true consensual action becomes vague".¹⁵⁵

Three different forms of price-leadership can be distinguished.¹⁵⁶ The first form is dominant price-leadership, i.e. one dominant competitor, in other words, the only firm large enough to significantly affect the market, imposes its prices upon the industry, and the other competitors follow, as they will have little to gain from diverging from the dominant firm's prices.¹⁵⁷ The second form is barometric price-leadership, a non-collusive form of price leadership whereby the price leader merely acts as a barometer of market conditions: In Stigler's words: the barometric firm "commands adherence of rivals to this price only because, and to the extent that, its price reflects market conditions with tolerable promptness".¹⁵⁸ Such behaviour cannot, however, be condemned, as it is entirely legitimate to raise prices as costs increase. The third form is collusive price-leadership, either explicit or tacit, where the competitors commit themselves to adapt to price increases initiated by one of them, being the price-leader.

8.2. Exchange of information

We have seen that, in a competitively structured market, full information is a requirement for competitive outcomes. However, in an oligopolistic market, the increased transparency makes it easier to detect a deviating firm, shortens

¹⁵³ See Asch, *supra* note 28, pp. 66-69

¹⁵⁴ See e.g. Kaplan, Dirlam, Lanzillotti, Pricing in Large Business, A Case Approach, 1958

¹⁵⁵ Bain, Price Leaders, Barometers and Kinks, 1960, p. 283

¹⁵⁶ First proposed by Stigler in: The Kinky Oligopoly Demand Curve and Rigid Prices, 1947, pp. 444 - 446, expanded upon by Markham, J.W., The Nature and Significance of Price Leadership, American Economic review, 1951, pp. 891 - 905. Scherer, F.M., Ross, D., *supra* note 20, pp. 248-250

¹⁵⁷ It has been argued that this is *ex hypothesi* impossible in an oligopoly, as no single firm is in such a dominant position within an oligopoly: Whish, R., Competition Law, 1993, p. 470

¹⁵⁸ Stigler, *supra* note 156, p. 444

detection lags, and increases the possibility of punishing such a firm adequately.¹⁵⁹ By decreasing the transitional losses from price rises and the transitional gains from price discounts, incentives are altered in such a way as to make the joint profit outcome easier to achieve and to attain.¹⁶⁰ Game theoretical studies into the subject of information exchanges have led to useful insights for competition policies.

Information can be exchanged directly between competitors or indirectly, via an intermediary, e.g. a trade association. Such trade associations engage in much activity that is both legal and useful; routine activities include publications containing beneficial general information about the relevant industry. Some information collection and dissemination by trade associations is competitively helpful or neutral, but can, however, contemporarily have anti-competitive effects, as it can enhance cartellisation or interdependent pricing. Information dissemination brings particular risks with it if it is done in oligopolistically structured markets.

Information exchange can furthermore take place in public, through, for example, public advanced price announcements,¹⁶¹ or run via customers.¹⁶² However, such practices often escape competition law control, as it is very difficult to distinguish between rational business behaviour and behaviour that consciously enhances collusion.

The harm of information exchanges to competition depends on, besides the market structure, the content of the information being exchanged, the way it is exchanged, and the frequency by which it is exchanged.

The exchange of aggregate data concerning the whole market or industry is less likely to enhance collusion than information concerning individual companies, enabling the monitoring of compliance with collusion, so that the incentives to defect are diminished, as the threat of punishment is increased. Green and Porter have pointed out, however, that the exchange of aggregate data cannot always be considered harmless: In order to activate a punishment mechanism, firms can agree on a critical market price level, the so-called trigger-price, below which

¹⁵⁹ An example of Shapiro's topsy-turvy principle, *supra* note 35. On the importance of information in a market facilitating collusion: Kühn, Vives, *supra* note 144; Kühn, Fighting Collusion by Regulating Communication Between Firms, mimeo

¹⁶⁰ Salop, S., *supra* note 79, pp. 271-272

¹⁶¹ See e.g. Holt, Scheffman, Facilitating Practices: The Effect of Advanced Notice and Best-Price Policies, 1987, p. 187

¹⁶² E.g. through the use of most favoured customer clauses or meeting competition clauses, see *infra* paragraph 8.5

the oligopolists will automatically assume that someone has cheated and trigger of a price war.¹⁶³

It is furthermore the information concerning current information that, from a game theoretical perspective, may alter incentives for firms and increase the likelihood of collusion. The exchange of such information reveals who is defecting, and consequently allows for immediate punishment. The frequency of information exchanges determines, furthermore, the lapse of time that can evolve between cheating and punishment thereof, and therewith the profitability of cheating. According to game theorists, competition policy should focus on frequent exchange of detailed, current information.¹⁶⁴

The exchange of historic information, as a general rule, is not expected to increase the likelihood of collusion to any serious extent, nor does the exchange of information regarding future behaviour, i.e. communication between competitors on how they are going to act, constitute a real threat to competition. From a game theoretical perspective, communication, carrying the promise to adhere to an agreement, while this is not a firm's best choice, is just "cheap talk",¹⁶⁵ and will not directly affect the pay-offs. Only when the pay-off matrix is such that, with the help of a credible punishment strategy, parallel behaviour is the logical outcome anyhow, i.e. is an equilibrium amongst the possible equilibria, then communication just helps to determine and choose between collusive outcomes.¹⁶⁶

However, when communication concerning future behaviour carries a commitment, e.g. by publicly informing the consumers, the pay-off matrix is affected, and the likelihood of collusion might increase.¹⁶⁷ Firms can commit themselves to contractual obligations, such as the "most-favoured-customer" clause¹⁶⁸ and the "meeting competition" clause,¹⁶⁹ increasing the probability of

¹⁶³ Green, Porter, *supra* note 69, pp. 87-100

¹⁶⁴ See Peeperkorn, *supra* note 56

¹⁶⁵ On the idea of "cheap talk" see Rees, *supra* note 152, pp. 27-40; Farrell, Cheap Talk, Coordination and Entry, 1987; Farrel, Rabin, "Cheap talk", 1996

¹⁶⁶ See Peeperkorn, *supra* note 56, p. 4

¹⁶⁷ According to some game theorists, however, exchange of information in public can also be pro-competitive and decrease the likelihood of collusion as it decreases informational advantage of incumbent firms over possible entrants and customers, which can now function as a constraint on collusion.

¹⁶⁸ The inclusion of a "most-favoured-customer" clause, or "most favoured nation" clause in a sales contract provides the buyer the insurance that the seller cannot offer a lower price to another customer. Salop distinguishes between "retroactive" and "contemporaneous" Most Favoured Nation clauses: Salop, *supra* note 79, p. 273

¹⁶⁹ The inclusion of a "meeting competition" clause in a (long term) contract provides the buyer with the insurance that the buyer can not offer commits the seller to match any lower

detection of deviations. Cheap talk then turns into “less cheap talk”, with a higher potential of distorting competition.¹⁷⁰

Furthermore, is the content of the information exchanged of importance. From a game theoretical perspective, data can be divided into three different categories. The first category is constituted by data concerning prices, other sales conditions, sales and output. The exchange of such data helps colluding firms to identify deviation. The exchange of the second category of information, i.e. data on current costs, demand and capacity, helps to identify possible collusive equilibria, and to determine availability of effective punishment strategies. Exchange of the third category of information, namely data on investment, R&D, future costs and demand, helps to reduce the long-term uncertainty that may threaten a collusive equilibrium. According to game theorists the first two categories of information being exchanged should receive the most attention from competition authorities, as they are most directly related to the success of collusive behaviour.¹⁷¹

8.3. Product standardisation

There can be very significant benefits from product standardisation, e.g. when the standards deal with quality, used experience or safety. Standardisation can, however, also yield competitive harm. Standardisation may facilitate collusion by increasing transparency thus making it easier to agree on price and to detect deviations. Standardisation might, furthermore, slow down innovation.¹⁷²

8.4. Geographical Pricing Systems

Another facilitating practice, frequently used by competitors in order to standardise, or at least facilitate calculation of prices are geographical pricing systems, such as delivered pricing systems, which can consist of basing point pricing or zone pricing.¹⁷³

price offered by one of its competitors in the market. Several variants exist: e.g. “meet or release” clause, or the “no-release meeting competition” clause, see Salop, *supra* note 79, pp. 279-181

¹⁷⁰ Game theorists claim, however, that it is only in as far as exchange of information may lead to a worse competitive outcome, in the sense of higher prices or lower output than would otherwise have been reached, or when it increases the stability of collusion, that such communication itself acts as a competition restriction.

¹⁷¹ See Peeperkorn, *supra* note 56

¹⁷² See Sullivan, Grimes, *The Law of Antitrust: An Integrated Handbook*, 2000, p. 253

¹⁷³ Wright, *Collusion and Parallel Action in Delivered Price Systems*, 1949, p. 202. Other categorisations are possible, see Kaysen, *Basing Point Pricing and Public Policy*, 1949, pp. 292-293: single basing point systems and universal freight equalization systems; Landon, *Geographic Price Structures*, 1925, pp. 126-129: basing point systems, zone pricing systems and freight equalization systems.

The belief that delivered pricing systems can facilitate collusive pricing has an intellectual tradition in antitrust economics.¹⁷⁴ According to Dennis Carlton's cogent summary of the relevant theory¹⁷⁵, delivered pricing systems may facilitate collusion in two ways. First, he points out that they will remove price discretion on shipping charges. Secondly, using the theory developed by Stigler,¹⁷⁶ he retains that adherence to delivered pricing schedules might facilitate collusion in settings where shocks to demand in different geographic areas are imperfectly correlated. A delivered pricing system allows firms in the low demand area to penetrate the high demand area without costly and potentially destabilising revisions to the price schedule.

However, non-collusive rationales exist for the use of delivered pricing systems.¹⁷⁷ Business justifications for the use of delivered pricing can counter the finding of anti-competitiveness, but will have to be all the more convincing when the market structure is more prone to collusion. Relevant characteristics to be assessed are the homogeneity of products, transportation costs constituting substantial portion of price, large scale of production, geographically scattered producers, and, most importantly, the concentration within the relevant industry.¹⁷⁸

8.5. Most Favoured Customer Clauses and Meeting Competition Clauses

Long-term sales contracts often include most-favoured-customers (MFC) clauses,¹⁷⁹ which provide the buyer with the insurance protection against the contingency that the seller may offer a lower price to another customer.¹⁸⁰ The MFC requires the seller to pay a monetary penalty if he reduces price. Retroactive MFC clauses prevent price discrimination when the seller offers a

¹⁷⁴ However, some authors hold that delivered pricing systems are not necessarily preferable to Free On Board pricing as means for detecting deviations from cartel pricing. There are a number of circumstances under which Free On Board pricing will be superior to delivered pricing as a means of facilitating collusion: Haddock, *Basing Point Pricing: Competitive v Collusive Theories*, 1982, 289

¹⁷⁵ Carlton, D. W., *A Reexamination of Delivered Pricing Systems*, p. 51

¹⁷⁶ Stigler, G., *A Theory of Delivered Pricing Systems*, 39 *American Economic Review*, 1949, 1143

¹⁷⁷ Carlton, *supra* note 175

¹⁷⁸ Kaysen, *supra* note 173, at 290-291

¹⁷⁹ Also referred to as most favoured nation clauses, from the analogy to the most-favoured-nation status encountered in international trade, which is a promise to give goods from a particular country the most favourable treatment given any other trading partner.

¹⁸⁰ See Salop, *supra* note 79, p. 273; Crockert, *What Do "Facilitating Practices" Facilitate? An Empirical Investigation of Most-Favoured-Nation Clauses in Natural Gas Contracts*, 1994, p. 297

discounted price to another buyer in the future, while contemporaneous MFC clauses are a non-discrimination guarantee between current customers.¹⁸¹

The advantage of the inclusion of such a contract for an individual buyer is that he is guaranteed the lowest price that a seller charges to any of its other customers. MFC clauses in contracts furthermore reduce buyers' search costs by easing the process of securing a favoured price without an extensive search for the best available price.¹⁸² The MFC device can also reduce negotiation costs by guaranteeing to buyers that they will not be disadvantaged in the future vis-a-vis rivals who buy from the same seller.¹⁸³

Theoretical studies have, however, shown that inclusion of MFC clauses in contracts may facilitate collusion in oligopolistic settings and lead to supra-competitive pricing.¹⁸⁴ MFC clauses can be regarded as constituting information exchange by means of customers policing price levels. Furthermore, inclusion of MFC clauses provides a means of dis-incentivating deviations from a supra-competitive consensus price. Incentives for a seller to discount, and thus deviate, are reduced, as MFC clauses state that such deviations must be granted to all of its buyers.¹⁸⁵ The use of MFC clauses thus raises the marginal costs of deviations, and decreases the short-term profitability thereof. The theory is that, when sellers understand that competitors face the same disincentives,

¹⁸¹ The total penalty equals the price decrease times the number of outstanding orders. Salop, *supra* note 79, p. 274, nt. 16

¹⁸² Authors have however criticized the 'efficiency' of reducing search costs for buyers, as it is really a form of free riding by "uninformed" buyers on the investment that "informed" buyers make in seeking and bargaining for low prices. See Baker, Vertical Restraints with Horizontal Consequences: Competitive Effects of "Most-favored-Customer" Clauses, 1995

¹⁸³ For a detailed discussion of procompetitive effects of MFC clauses, see Simons, Fixing Price With Your Victim: Efficiency and Collusion With Competitor-Based Formula pricing Clauses, 1989, pp. 607-611

¹⁸⁴ Salop, *supra* note 79; See also Cooper, Most-Favored-Customer Pricing and Tacit Collusion, 1986, p. 377; Belton, A Model of Duopoly and Meeting or Beating Competition, 1987, p. 399. See however, an experimental study on facilitating practices, in which it was concluded that, while advanced price announcements lead to higher prices under certain market conditions, MFC clauses alone did not lead to an adverse impact on competition: Grether, Plott, The effect of Market Practices in Oligopolistic Markets: An Experimental Examination of the Ethyl Case, 1984, p. 479

¹⁸⁵ Whereas the use of retroactive MFC clauses in contracts penalises all price reductions made at some date, contemporaneous MFC's penalise and deter only selective discounts, i.e., price cuts that are limited to a restricted number of buyers. In the latter case general reductions are not penalised or deterred. Adjustments to a lower co-operative outcome are not deterred if they become necessary, Salop, *supra* note 79, p. 276. Salop demonstrates with a simple, 2-firm game-theory model, where firms can only choose between high pricing or low pricing, that if both rivals institute a MFC, if detection is sufficiently rapid, the cooperative outcome of both firms choosing to price high may become a credible equilibrium: Cooper, *supra* note 184, p. 377

confidence is raised that each will respond similarly, and will stick to supra-competitive pricing.¹⁸⁶

Thomas Cooper has also analysed the contribution of MFC clauses to the achievement and maintenance of a tacitly collusive pricing structure. Cooper showed that, for firms to choose to adopt MFC clauses unilaterally, there need not be any explicit agreement among the rival producers to include these provisions in their sales contracts. Additionally, this analysis showed that all firms could profit from higher prices due to the use of MFC clauses even if not all firms introduce them into their contracts.¹⁸⁷

A meeting-competition clause (MC) in a long-term supply contract provides the buyer with insurance protection against a lost opportunity of being offered a lower price by another seller, as the original seller commits himself to match the lower price offered by any other seller.¹⁸⁸ A common variant is the meet-or-release clause, giving a seller the opportunity to meet a lower price, offered to the buyer by a rival seller, or to release the buyer from the contract.

As with MFC clauses the inclusion of a MC clause in a contract serves as an information exchange device, buyers controlling adherence to consensus pricing by oligopolists. Inclusion of the clause also diminishes or eliminates detection lags of chisellers, facilitating the selective matching of otherwise secret discounts. Assuming that the seller wished to match the discount, the rival's strategy is countered. As a result, the co-operative joint profit outcome is made relatively more credible.

In the case of the inclusion of a no-release meeting-competition clauses in sales contracts, the seller binds himself to match any lower price offered by a rival seller. Economists argue that, with inclusion of MC clauses in contracts, like the inclusion of MFC clauses, supra-competitive consensus pricing is stabilised, as no oligopolist will wish to deviate from the joint profit outcome. Salop argues, moreover, that the inclusion in a contract of a MC clause also facilitates the successful achievement of the supra-competitive pricing outcome.¹⁸⁹ When a no-release MC clause is provided jointly with an MFC clause, oligopoly co-ordination is held to be further facilitated.¹⁹⁰

¹⁸⁶ Whish, *supra* note 157, p. 468. Whish points out that another anti-competitive effect of MFC clauses is that they can entrench dominant firms by raising rivals' costs.

¹⁸⁷ Cooper, *supra* note 184, 378 ed seq.

¹⁸⁸ See e.g. Salop, *supra* note 79, p. 279

¹⁸⁹ *Ibid.* p. 280

¹⁹⁰ *Ibid.* p. 281

9. Conclusion on facilitating practices

The effect on competition of the use of facilitating practices is difficult to analyse. While the use of such facilitating practices can have considerable competitive benefits, they can, and do often contemporaneously, have anti-competitive objects and effects, as they can facilitate the achievement of, and the monitoring and detection of deviations from oligopolistic pricing, thus helping to prevent a breakdown in oligopolistic discipline. For this reason, competition authorities encounter great difficulties in assessing the impact of such practices on competition in oligopolistically structured markets.

10. Conclusion

Many studies on oligopolistic behaviour have been completed, but unlike perfect competition of pure monopoly, there exists no single “theory of monopoly”. Game theory in its present state does not seem to offer much guidance to competition policy concerning the number of firms that will enhance collusion. However, the only absolute conclusion that can be drawn from economic studies, both empirical and game theoretic, is that formulating general rules, which can be applied across all industries, appears to be problematic, if not impossible.¹⁹¹ However, useful suggestions can be drawn from the economic analysis for the application of competition laws to oligopolistic markets, especially those which resulted from game theoretic studies. One should, nevertheless, bear in mind that economic theories are necessarily based on simplifying assumptions often obtained in the context of stylised economic models that cannot take into account all the complexities of real life cases.

Furthermore, economics typically look at the result of collusion, without distinguishing between explicit collusion and tacit collusion: both have as an outcome supra-competitive pricing which is detrimental to consumer welfare. Lawyers, on the other hand, distinguish between explicit collusion, for which proof of prior concertation exists, and tacit collusion. For the latter, lawyers feel uncomfortable condemning it, relying merely on economic evidence.

¹⁹¹ Shapiro, *supra* note 35, p. 332

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