

IS TWO ENOUGH?

ECONOMIC POLICY NOTE



IS TWO ENOUGH?

Explanatory note

The Dutch Independent Post and Telecommunications Authority (OPTA) regulates the postal and telecommunication markets in The Netherlands. OPTA is an independent executive body that commenced its activities on 1 August 1997. OPTA's mission is to stimulate sustained competition in the telecommunications and post markets. In the event of insufficient choice OPTA protects end-users. OPTA regulates compliance with the legislation and regulations on these markets.

In terms of market conditions, market structure and regulatory framework, telecommunications and postal markets present a continuously changing landscape. In this environment, OPTA has committed itself to improving the economic reasoning on which strategic choices are made in such a way that market parties can contribute to and have a clear understanding of the development of OPTA-policies, now and in the future. In 2003 the OPTA bureau was complemented with the Economic Analysis Team (EAT). EAT is responsible for developing economic reasoning and stimulating discussion on key issues within the telecommunications and postal markets. To achieve this, EAT produces two kinds of policy notes - short discussion papers. Economic Policy Notes focus on economic issues and principles. Regulatory Policy Notes focus on strategic economic issues in specific regulatory fields. To stimulate discussion EAT organises roundtables. With its products and activities the Economic Analysis Team expects to add value to the economic debate in Dutch telecoms and post.

Often, lessons can be drawn from past cases. Policy Notes will try to benefit from analysing such cases. These Notes, however, are aimed at contributing to the development of future OPTA policies and are focused on providing sound economic reasoning to that effect. For the purpose of these Notes it is not necessary to take into account other considerations, either of a factual or of a policy nature that may have played a role in these past cases. These Notes, e.g., do not set out to identify or evaluate short term benefits service providers may offer to end consumers but primarily aim to look into long term benefits of competition between service providers. As a consequence, discussion of these cases should not be considered or construed as an attempt to revise or evaluate these cases. Furthermore, Policy Notes are not aimed at reviewing past policies or expressing future policies. They are solely intended to stimulate discussion and critical comment within as well as outside of OPTA, thus laying a basis for the development of future policies.

The analyses and conclusions expressed in Economic and Regulatory Policy Notes of the Economic Analysis Team (EAT) do not necessarily reflect the opinions of the Commission of OPTA. As such, the opinions of EAT, in whatever shape or form, do not have a legal status. Quotes from and references to these Notes can be made freely, provided that such quotes and references sufficiently express the preliminary character and purpose of the Notes.

Contents

1	Introduction	5
1.1	Background.....	5
1.2	Outline	5
2	Competition in oligopolies	7
2.1	Non collusive oligopoly in theory	7
2.2	Non-collusive oligopolies in the NRF	8
2.3	Non competitive oligopoly.....	9
2.3.1	Price competition or quantity competition.....	9
2.3.2	The number of firms in the oligopoly	10
2.3.3	The level of product differentiation	11
2.3.4	Switching costs	12
2.3.5	Barriers to entry and contestability of the market	12
2.3.6	Countervailing buyer power.....	12
2.3.7	Bidding markets	13
3	Collusion in oligopoly.....	14
3.1	Introduction	14
3.2	Game theoretic models	14
3.3	Market circumstances that enable tacit collusion	15
3.3.1	Essential market characteristics	17
3.3.2	Important market characteristics	17
3.4	Tacit collusion under the NRF	19
3.5	A step wise approach	20
4	Initial competitive assessment of a duopoly with vertically integrated operators	22
4.1	Current market situation in relevant markets.....	22
4.1.1	Bundling and a multi-play market	24
4.1.2	Infrastructure investments	24
4.2	Relevant scenario	25
4.3	The likelihood of non competitive oligopoly.....	26
4.3.1	Price competition or quantity competition.....	26
4.3.2	The level of product differentiation	26
4.3.3	Switching costs	27
4.3.4	Barriers to entry and contestability of the market.....	27
4.3.5	Countervailing buyer power.....	28
4.3.6	Bidding markets	28
4.3.7	Conclusion	28
4.4	The likelihood of collusive oligopoly	29
4.4.1	Few firms	29
4.4.2	Barriers to entry	29
4.4.3	Frequency of interaction	29
4.4.4	Stable market conditions, low innovation and low uncertainty	29
4.4.5	Symmetry of firms, high market transparency and homogeneous product.....	30

Economic Policy Note, no. 6, September 2006

4.4.6	Specific characteristics of the electronic communication markets	30
4.4.7	Conclusion	31
5	Conclusions and policy recommendations.....	32
6	Literature and references	34

1 Introduction

1.1 Background

At present end-users in the Netherlands can obtain access to fixed communication services through two existing infrastructures: KPN's copper network and cable operators' coax networks.

KPN and cable companies have the obligation to provide certain forms of access. Among other obligations, KPN is obliged to offer unbundled access to the local loop via the main distribution frame (MDF) in the local exchanges. KPN and other operators use unbundled access to the local loop to offer retail services, like broadband internet access, data communication services, and fixed telephony. The cable companies use their infrastructure for the provision of television, broadband internet and telephony services. They are obliged to offer access to providers of media services.

Technological convergence has made it possible to provide broadband internet access and television services over the traditional copper telephony net of KPN and to provide broadband internet access and telephony services over the coax networks for the transmission of television of the cable companies. As a result KPN and the cable companies are increasingly competing with each other in the provision of multi-play bundles to end-users.

Cable companies have invested or are investing heavily in the digitalisation of their networks. Also KPN and other DSL companies have invested or are investing in facilities to upgrade the copper infrastructure. As a consequence the potential for infrastructure competition in the Netherlands has increased. Moreover, KPN has recently announced that it will invest further in the modernization of its network. According to these plans the copper local loop infrastructure of KPN will be replaced by glass fibre up till the street cabinet and the local exchanges in which MDF access is currently provided to competing DSL providers.

In the absence of regulatory intervention the current developments might lead to a situation in which there will be only two vertically integrated operators competing on a possible future relevant market for multi-play bundles to end-users.

In the light of these developments and the fact that OPTA has to evaluate its market analysis decisions within three years, this EPN asks the question whether competition between two infrastructures (KPN and cable) can be effectively competitive in the absence of regulation.

1.2 Outline

When market supply is represented by a small number of firms, interaction between the competitors turns to play a central role in determining the market outcome. This market structure is called oligopoly, of which duopoly – a market served by two firms only – is a specific case that is considered in this EPN. Economic theory on duopoly provides several models of competition to describe the decision making of two firms.

In this paper we assume that neither firm has a single dominant position. Under this assumption, there are two ways in which competition may be threatened in another way besides single dominance.

Economic Policy Note, no. 6, September 2006

The first way is if firms realise supra-normal profits by explicit or tacit collusion. Tacit collusion can be defined as behaviour that is aimed at reaching an implicit cooperative agreement between competitors. In this paper we will not look at explicit collusion. We assume that explicit collusion will be effectively banned by competition policy. This cooperative market outcome is known in competition policy as collective dominance. The definition of significant market power in the NRF (“New Regulatory Framework”) captures the situation of joint dominance.

The second arises when market concentration is high enough for non-competitive outcomes. These non-competitive outcomes are not the result of implicit cooperation but are the result of standard profit maximizing responses of firms on market conditions. Under merger control legislation this phenomenon is captured as “unilateral effects”. This term however currently only relates to the effects of mergers. In this paper we will call this situation non-competitive oligopoly.¹

These two theoretically extreme situations differ in the way in which firms take into account the behaviour of competitors.²

In the non-cooperative situation firms take their competitors behaviour as in some sense given, and not open to influence by its own actions. This does not imply that they are unresponsive to market conditions. On the contrary, each firm will be taking its decisions regarding prices, output or other choice variables in a way that responds to market conditions (which themselves are the results of the decisions of other firms). If in such a market a firm is able to raise prices above the competitive level this is the result of a certain level of market power.

In the cooperative situation, however, firms do not take the behaviour of the competitors as given. A necessary condition of tacit collusion is that firms are acting with the intention of influencing the future actions of the competitors. If firms are acting in a way that takes their competitors actions entirely as given, and not open to influence by the firm’s own actions, then the situation is not one of tacit collusion. In other words, tacit collusion requires that a firm makes a choice which would *not be* in its interest if it assumed that other firms would be uninfluenced by its choice. For instance, under tacit collusion a firm can choose to set an output which, when added to the output produced by other firms, yields the monopoly output in the market as a whole.

Chapter 2 describes the economic theory related to non-cooperative market outcomes. Chapter 3 describes the economic theory related to cooperative market outcomes. Next, chapter 4 applies the theory to the specific telecommunications context and assesses to what extent competition between two vertically integrated infrastructures is likely to be effective. The conclusions and policy recommendations are presented in chapter 5.

¹ The NRF, however, does not recognise non-cooperative, non-competitive market outcomes as a threshold for intervention. The term non-competitive outcomes is used here to indicate situations in which competition is not effective in achieving desirable outcomes such as low prices, high quality of service, large variety of services, and so on.

² Ivaldi, M. / Jullien, B. / Rey, P. / Seabright, P. / Tirole, J. : The Economics of Unilateral Effects, IDEI, Toulouse, November 2003, Interim Report for DG Competition, European Commission, http://europa.eu.int/comm/competition/mergers/review/the_economics_of_unilateral_effects_en.pdf

2 Competition in oligopolies

This chapter will give an overview of the economic theory on competition in oligopolies and describe the way oligopolies are currently dealt with under competition law and in the New Regulatory Framework (NRF). Based on this, a theoretical framework for the assessment of competition in oligopolies is developed.

2.1 Non collusive oligopoly in theory

Duopoly theory comprises various competition models, of which Cournot's and Bertrand's static models constitute the elementary benchmarks of competition in output and price competition, respectively. Even if these models are rather stylised and therefore not realistic as such, they serve as a guideline for evaluating the impact of different forms of competition on market outcomes.

The assumptions underlying the basic version of each model are that the firms supply homogeneous goods and make their pricing (Bertrand) or output (Cournot) decisions simultaneously, and without cooperation. It is also assumed that firms are symmetric and that entry barriers exist. When firms compete in terms of prices, as in the Bertrand model, competitors know that the firm setting the lower price will attract all demand. Firms will thus lower their prices until prices are equal to the marginal costs. In the duopoly version of the Bertrand model, both firms share the market equally. They jointly supply as many consumers as a competitive market would, and they do not realise an economic profit - this outcome of no economic profits is also referred to as the "Bertrand paradox". The market equilibrium of Bertrand competition coincides with the equilibrium of perfect competition, yielding the optimal outcome from social welfare point of view. When firms compete in terms of output, as regarded by the Cournot model, they take the output of the competing firm as given. While considering the trade off between prices and their own output rather than between prices and the aggregate output, the duopolists set the production level higher than a monopolist but lower than perfectly competitive firms. The prices and profits are higher than in price competition but lower than in a market served by a monopolist.

Whether it is the Bertrand or the Cournot model that better describes a real goods market depends on the market under consideration. If firms, for example, face capacity constraints, or if marginal costs rise rapidly when output is increased, Cournot competition is probably a more appropriate description of the nature of competition on the market (because a single firm would not be able to serve the total market if he charges the lowest price). If firms can easily adjust their capacity and the marginal costs increase relatively little, they are most likely engaged in price competition, as in the Bertrand model.

Perhaps a more realistic competition model would be such that brings together certain aspects of both models. When Bertrand competition is placed in a more dynamic, two stage game, in which firms choose a certain capacity in the first stage and compete subsequently on prices in the second stage, the Bertrand model yields outcomes which are equal to Cournot outcomes.³ So, when firms are faced with output constraints, even if principally competing in prices, they no longer equate their prices to the marginal costs. Unlike in a market of pure price competition, firms produce less than in a perfectly competitive market, charge prices higher than marginal costs and make some economic profit.

³ Kreps, David M. & Scheinkman, Jose A., Quality pre-commitment and Bertrand competition yield Cournot outcomes, *The Bell Journal of Economics*, Vol. 14. No. 2., (Autumn, 1983), pp. 326-337.

Besides capacity constraints, there are other ways for firms to get out of the “Bertrand paradox”. When firms in Bertrand competition differentiate their products, they gain market power and thereby soften price competition. Price competition in a market of differentiated products therefore no longer maximizes consumer welfare by high market output and prices equal to marginal costs. In a similar way product differentiation can be expected to provide more market power under Cournot competition.

Nevertheless, given that neither Bertrand nor Cournot competition – nor a competition mode combining the two – enables the duopoly to earn profits as high as a monopoly, the firms have an incentive to collude and jointly act as a monopolist. If the duopoly is successful in cooperation, it earns joint profits up to the level of the monopoly profit. The condition for such a successful cooperation are discussed in chapter 3.

2.2 Non-collusive oligopolies in the NRF

The definition of effective competition in the regulatory framework for electronic communications is based on the premise that competition is effective when significant market power is absent. In economic terms effective competition is often defined as a situation in which no firm on a market has market power. The economic concept of market power is defined as the ability of a firm to raise the price above the (minimum possible) marginal costs of production.⁴

According to economic theory, there are basically three cases in which firms may possess market power: 1) monopoly, 2) collusion and 3) non-collusive oligopoly. Until recently European competition policy was only concerned with two of these three cases. The relevant threshold for intervention - the concept of a dominant position – is interpreted as covering only the monopoly type situations (as single dominance) and the collusion type situations (as collective dominance). Non collusive oligopolies were not recognized as a possible source of competitive concerns.

However, since the relevant threshold for intervening in merger cases has been changed from “the creation or strengthening of a dominant position” into a “significant impediment to competition”, mergers can be prohibited if the concentration would “*significantly impede effective competition, in particular as a result of the creation or strengthening of a dominant position, in the common market or a substantial part of it.*” This concept is explained as follows in recital 25 to EC Merger Regulation:

“[...] under certain circumstances, concentrations involving the elimination of important competitive constraints that the merging parties exerted upon each other, as well as a reduction of competitive pressure on the remaining competitors, may, even in the absence of a likelihood of coordination between the members of the oligopoly, result in a significant impediment to effective competition.”

Furthermore, the concept of “significant impediment of effective competition” should be interpreted

“[...] as extending, beyond the concept of dominance, only to the anti-competitive effects of a concentration resulting from the non-coordinated behaviour of undertakings which would not have a dominant position on the market concerned.”

The anticompetitive effects of merger resulting from non coordinated behaviour are called non-

⁴ See for instance: Church, J. / Ware, R. Industrial Organization A Strategic Approach (2003), McGraw-Hill, Boston.

coordinated effects⁵. In the context of merger control, non-coordinated effects have been interpreted as the effects of a merger on prices and quantities in a static oligopoly model.⁶

Since the NRF threshold for intervention is aligned with the concept of a dominant position, it seems that non-collusive oligopolies are not captured under the current SMP definition. This may be a serious loophole in the framework if analysis shows that competition is not effective in certain types of non collusive oligopolies. In the next section we will analyse, on the basis of the models explained in section 2.1 which factors define the effectiveness of competition in static oligopoly.

2.3 Non competitive oligopoly

This section analyses the criteria that can be used to assess the likelihood of effective competition in oligopoly.

2.3.1 Price competition or quantity competition

As described in section 2.1, in the Bertrand oligopoly where competitors compete on prices, even in a situation where only two competitors compete on prices with homogeneous goods, the market outcome will be equivalent to perfect competition since both competitors will charge prices equal to marginal cost. Therefore in a situation of pure Bertrand competition can be effective even with two market players. This outcome however is heavily influenced by the basic assumption of the model that the firms are unconstrained in their capacity (i.e. are both able to produce the total market demand) and that goods are not differentiated.

The market outcome is different when one places Bertrand competition in a more dynamic, two stage game, in which firms choose a certain capacity in the first stage and compete subsequently on prices in the second stage. In these situations the Bertrand model yields outcomes which are equal to Cournot outcomes.⁷ Therefore, when production capacity is neither fixed nor idle, it is not likely that Bertrand competition will drive prices down to marginal cost. It should be kept in mind here that production capacity does not only cover the more technical means to produce goods or services, but also stands for, for example, distribution capacity or the ability to process invoices and handle customer complaints.

Product differentiation is another relevant factor here, since it affects the effectiveness of Bertrand competition. In the case of homogeneous products, Bertrand competition yield outcomes that are equivalent to perfect competition outcomes. With product differentiation, this result is no longer present; under Bertrand competition, firms with differentiated products earn positive margins (prices higher than marginal costs). Product differentiation is present when customers perceive that products are differentiated (even if they are technically identical), for example, as a result of different brands.

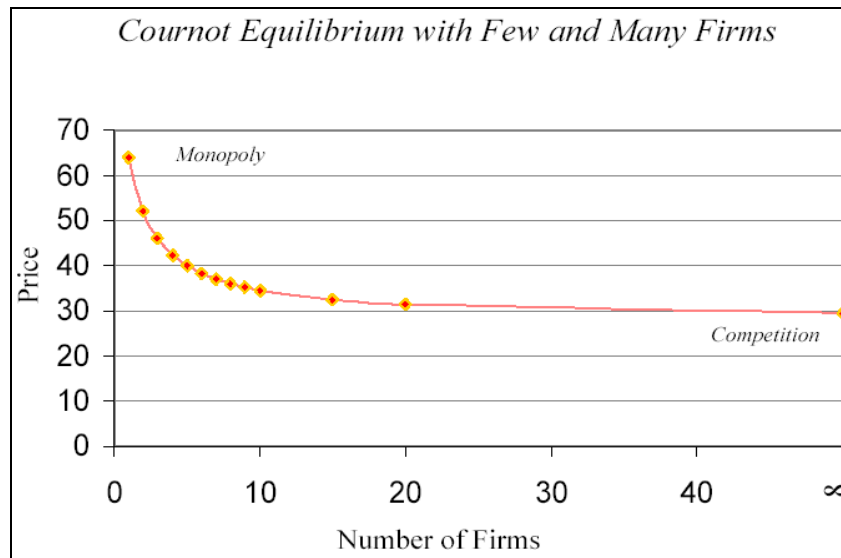
⁵ See for instance: Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings (2004/C 31/03), OJ C 31/5, 5.2.2004.

⁶ See for example: Ivaldi, M. / Jullien, B. / Rey, P. / Seabright, P. / Tirole, J. (2003a): The Economics of Unilateral Effects, Interim Report for DG Competition, European Commission, Available at: europa.eu.int/comm/competition/mergers/review/the_economics_of_unilateral_effects_en.pdf

⁷ Kreps, David M. & Scheinkman, Jose A., Quality pre-commitment and Bertrand competition yield Cournot outcomes, The Bell Journal of Economics, Vol. 14. No. 2., (Autumn, 1983), pp. 326-337.

2.3.2 The number of firms in the oligopoly

In general, the potential for market power increases when the number of undertakings in the oligopoly decreases. This holds in particular for situations where undertakings compete on quantities as in Cournot oligopoly. According to the basic Cournot model the price level in a market decreases when the number of firms increases. Logically price decreases are very significant when one moves from monopoly to oligopolies of 3 to 5 market players but become less significant when the number of firms increases further.



Source: US Department of Justice

Under Bertrand competition with homogenous goods, the number of firms is less relevant, as even with few firms (in fact, two firms) a competitive price level can be reached. In the case of Bertrand competition with differentiated goods, however, this result does not hold and prices remain above marginal costs also with more firms (like under Cournot). When firms compete on prices and products are differentiated, what particularly matters for competition is that there is *some* close competitor supplying a reasonably close substitute.⁸

There is no “magic number” for the minimum number of competitors necessary for effective competition. One way to approach this is to look at the rules of thumb used by competition authorities. The European Horizontal Merger Guidelines⁹ declare markets with an HHI below 2000 as normally as non problematic. Although very roughly, this suggest that between 5 and 6 market players with similar market shares might provide effective competition. The practice of the European Commission shows that 3-to-2 mergers are normally viewed as problematic¹⁰, whereas 5-to-4 mergers are

⁸ Ivaldi, M. / Jullien, B. / Rey, P. / Seabright, P. / Tirole, J. (2003a): The Economics of Unilateral Effects, IDEI, Toulouse, November 2003, Interim Report for DG Competition, European Commission, http://europa.eu.int/comm/competition/mergers/review/the_economics_of_unilateral_effects_en.pdf

⁹ Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings (2004/C 31/03), OJ C 31/5, 5.2.2004.

¹⁰ See for instance the European Commission decisions in Case IV/M.619 Gencor – Lonrho, Decision of 24 April 1995 and Case IV/M.308, Kali & Salz, Decision of 14 December 1993.

typically only regarded problematic in particular circumstances.

As far as we know there is no economic literature on the optimal number of firms in a non-cooperative and static context. A famous article by Nobel prize winner Selten (1973)¹¹, "... where four are few and six are many", investigates the risk of collusion in a purely theoretical model. In the specific context of his model, two firms would not be sufficient to obtain effective competition. In a later article, Huck et al (2004)¹² suggest on the basis of various experiments that "two are few and four are many", again referring to the risk of collusion. Also according to this article, two competitors would not be sufficient to obtain effective competition. These articles, however, were not intended to provide guidance in practical policy discussions and are as such less useful for our purpose.

The economic literature on the optimal number of firms to generate innovations (new products and processes) is more relevant here. There is a vast amount of studies on the so-called "Schumpeterian hypotheses", on the relationship between firm size and market structure on the one hand, and technological progress on the other. In short, this literature has boiled down to the conclusion that there is an "inverted U" relationship between competition and innovation: too much competition is not conducive for innovation because then there are little rents to be captured from innovation. However, too little competition is neither conducive, as then firms do not obtain much additional profit from innovation.¹³ The exact number of firms that is optimal from this dynamic efficiency perspective cannot generally be exactly determined.

2.3.3 The level of product differentiation

Intuitively, the more substitutes there are for a given good, and the closer these substitutes are, the more carefully a firm has to take into account the actions of its competitors. If goods are differentiated, however, firms possess some degree of market power. This is to say that unilateral effects can arise in markets where the available substitutes are limited, or where supply consists of differentiated products. This market characteristic can be regarded using the so-called Lerner index:

$$\frac{p - mc}{p} = -\frac{1}{\varepsilon}$$

where p , mc , and ε stand for price, marginal cost, and own-price demand elasticity, respectively Lerner index.

While the left-hand side of the Lerner index measures the relative price mark-ups, the right-hand side indicates that unilateral effects are inversely dependent on the negative own-price demand elasticity. Indeed, while demand elasticity shows how responsive the product demand is to a change in price, it can be expected that when there are close substitutes for the good under consideration, and the closer the substitutes are, the more elastic is the product demand. In other words, if firms can make the product demand more inelastic by differentiating their products, the more easily they can raise

¹¹ Selten, R. (1973), "A simple model of imperfect competition, where four are few and six are many", *International Journal of Game Theory* 2, 141-201.

¹² Huck, S., H.T. Normann and J. Oechssler (2004), "Two are few and four are many: number effects in experimental oligopolies", *Journal of Economic Behavior and Organization*, 53: pp. 435-446.

¹³ See, for example, Aghion, P., N. Bloom, R. Blundell, R. Griffith and P. Howitt (2005), "Competition and innovation: an inverted U relationship" *Quarterly Journal of Economics* May 2005, Vol. 120, No. 2, pp. 701-728

prices above the marginal costs and cause non-coordinated effects.

Therefore, a higher level of product differentiation in a market creates a higher potential for non-coordinated effects and thereby market power. As seen in section 2.1 these conclusions hold for both price and quantity competition.

2.3.4 Switching costs

Switching costs are the (potential) costs that consumers incur when they switch between suppliers and or brands. Switching costs can be caused by amongst others: the need for compatibility with existing equipment, transaction costs, learning costs, uncertainty about the quality of untested brands and loyalty systems. Switching costs can be strategic or “natural”. They are strategic when they are created by firms with the purpose to limit switching behaviour – think, for example, of contracts with long duration or with fines upon termination. Switching costs give firms a degree of some market power over repeat purchases of their existing customer base. The presence of switching costs also softens competition between oligopolists. In order to attract a customer from a competitor a firm should not only lower its price below that of the competitor but even lower to overcome the switching costs. Switching costs have a greater impact in mature markets than in new markets. In mature markets the trade off between competing for new customers or “exploiting” the existing customer bases mostly results in the latter.¹⁴ Only if firms are unable to discriminate between existing and new customers, will existing customers be able to profit from more intense competition for new subscribers.

2.3.5 Barriers to entry and contestability of the market

The potential for market power is greater when a market has high entry barriers. Conversely, when barriers to entry are low, the potential for market power is lower. In a perfectly contestable market there is no potential for market power. In such a market entry and exit are costless and can be instantaneous. In such markets, even when there are only two players present, these players are not able to raise prices because if they did, entrants would step in and cause prices to fall. Once prices are down these entrants would exit the market. This behaviour is called “hit and run”-behaviour. Even when entry and exit are not costless and instantaneous, markets might still be contestable.¹⁵ Relevant here is that the level of entry and exit barriers is such that possible entrants can enter and exit the market rapid enough to be able to earn back their initial investments before any retaliatory response of the incumbent firms.

2.3.6 Countervailing buyer power

Large customers may be strong enough to provide countervailing buyer power and to thus bring prices down to their competitive level even in a market structure with only a limited number of suppliers. The existence of customers with a strong negotiating position, which is exercised to produce a significant impact on competition, will tend to restrict the ability of providers to set prices above the competitive level. The extent of countervailing buyer power largely depends on whether customers can credibly

¹⁴ Klemperer, P. (1995): Competition when Consumers have Switching Costs: An Overview with Applications to Industrial Organization, Macroeconomics, and International Trade. *Review of Economic Studies*, 62, pp. 515-539.

¹⁵ Baumol, William J, Panzar, John C. & Willig, Robert, Contestable markets: an uprising in the theory of industry structure: Reply, *The American Economic Review*, Vol. 73. No. 3 (Jun., 1983), pp. 491-496

threaten to switch to other suppliers, to self-provide the service, to significantly reduce consumption or to cease to use the service at all in case of a price increase. Many factors play a role in determining the scale of countervailing power on the part of the buyers. The higher the amount of purchase of services by customers or the higher the proportion of the producer's total output that is bought by a certain customer, the stronger the countervailing power might be. The higher the portion of the costs for a service in relation to their total expenditure and the better informed, the more sensitive consumers are to the price and quality of the service and the more readily they might switch suppliers or reduce demand. Further to this, the higher a seller's locked-in investment in specific customers (asset specificity), the more willing he will be to negotiate.

2.3.7 Bidding markets

A specific type of market in which competition can be effective with only a few (or even two) firms is a bidding market. Bidding markets differ from other markets in that sales are made through a tender process and that tenders are taking place relatively infrequent and each represent large lumps of demand. Each firm bids a price to win the tender and then is either chosen as the winning bidder or not. When the firm is chosen as winner it will supply the whole tender (the so called "winner takes all principle"). An "ideal" bidding market has the following characteristics: 1) competition follows a winner takes all principle, 2) demand is lumpy (which means that tenders are infrequent and large in relation to the relevant turnover of the bidder), 3) competition begins afresh for every new contract (which means that there are no lock-in effects), 4) market entry is relatively easy and finally 5) a bidding system or process is involved.¹⁶ It is often argued that competition in bidding markets can be effective, even if there is only a small number of players. The reasons for this is that in bidding markets the consequences of failing to win a bid may be enough to ensure that bidding is very competitive. An ideal bidding market will not exist in reality but when markets feature several of the characteristics mentioned above effective competition can exist in a duopoly situation. Empirical research on the bidding process for TV franchises in the UK for instance showed that only two bidders were sufficient to ensure competitive bidding. The situations in which there were more than two bidders did not yield better market outcomes than the situation of only two bidders.¹⁷ On the other hand, there are authors, such as Klemperer, that argue that genuine bidding markets are rare and, moreover, that the nature of competition on bidding markets is not that different from other markets. Similar instruments to assess competition (such as market shares) can often be used also in a bidding market context.

¹⁶ Based on: Paul Klemperer, Bidding markets, report for the UK Competition Commission.

¹⁷ Lexecon Competition Memo, When two is enough, competition in bidding markets, June 1995, http://www.crai.com/ecp/assets/two_is_enough.pdf

3 Collusion in oligopoly

3.1 Introduction

The static oligopoly models discussed in section 2.1 serve as a conceptual framework for examining market attributes under different forms of competition, however, the models fall short in allowing for dynamic interaction. In other words, by depicting duopolistic competition as a one-shot game, conventional duopoly models exclude the contingency of cooperation, or collusion, between the competing firms. When a dynamic timeframe is implemented, and the firms' interaction is examined over a period of time, game theory on repeated games turns to provide insights to the possibility of cooperative behaviour in duopolistic markets. As the Folk Theorem states, when a game is repeated sufficiently numerous times, the players get the possibility to punish and reward each other, which makes cooperation feasible.

3.2 Game theoretic models

Interactive decision making of competing firms can be considered as a prisoners' dilemma (PD hereafter), where the firms have to choose whether to cooperate or compete. If both firms cooperate, they earn higher profits (2,2) than if both behave competitively (1,1), as shown in the table below. Nevertheless, no matter whether the rival firm cooperates or competes, each firm always maximizes its profit by competing. Hence, in the one-shot PD game, in Nash equilibrium none of the firms cooperate, and both firms earn a profit (in the example below 1 each) lower than feasible through cooperation (2 each).

Payoffs in Prisoners' Dilemma		Firm B	
		Cooperate	Compete
Firm A	Cooperate	2,2	0,4
	Compete	4,0	1,1

While firms in the conventional one-shot PD game do not collude, setting the players in a dynamic timeframe is likely to yield different outcomes. As a fundamental difference to the static game, the repeated PD game enables the firms to reward desirable behaviour and punish undesirable behaviour. On the supply side of a market, cooperating i.e. following the collusion agreement is "desirable", whereas competitive conduct is "undesirable". Hence, "rewarding", means continuation of collusion, and "punishing" refers to return to competitive behaviour or some other punishment mechanism. This ability to reward and punish may enable cooperation of the firms, as suggested by the Folk Theorem. The theorem states that an average payoff of a repeated game that is at least as high as the payoff of a rationally played one-shot game is feasible and sustainable. In order for the Folk Theorem to hold, certain assumptions have to be fulfilled, however. Firstly, the game has to be repeated sufficiently many times. Secondly, the players have to be patient and value future profits positively. Thirdly, sufficient information about past behaviour must be available.

Economic Policy Note, no. 6, September 2006

When cooperating, firms split the monopoly profit, whereas in competition the firms' profits depend on the form of competition they are engaged but then profits never reach the monopoly level. Even though future profits are valued positively, they are considered to be of lower importance the further the point of time when they are gathered. Hence, any of the two firms will choose to cheat only if the value of the monopoly profits it can collect when cheating the agreement (which consists of a short-term monopoly profit and subsequent profits under punishment) is higher than the value of profits when respecting the cooperative agreement. The players' incentives to cooperate or deviate in a repeated game are dependent on the time horizon and the amount of information on the behaviour of players available (transparency).

When the repeated prisoners dilemma game is played infinitely and firms have perfect information about each other's behaviour, all acts of cheating are punished. Similarly, cooperation is always rewarded by continuation of the collusion. Consequently, repeated games with infinite time horizons and perfect information can be expected to allow for collusion, as long as the firms have positive valuation for future profits.

If firms do not possess perfect information of their competitor and their behaviour, deviation from cooperation may not be observed immediately or not with certainty. Under imperfect information a cheating duopolist may thus be able to collect monopoly profits for a longer time period, which increases the incentive to deviate from the agreement. Being aware of the imperfection of the information available, the firms are more cautious about and less likely to engage in collusion.

If the game is repeated a finite number of times, the strategies chosen by the firms can be determined by first considering the final round of the game, and the game can be solved using backward induction. In the last round, being aware that there is no subsequent round where a firm can be rewarded or punished, both firms deviate from the cooperation agreement. The last round of the game is thus identical to the one-shot PD game. Furthermore, given that the firms will not cooperate in the final round, they will not choose to cooperate in the second last round, either. This line of reasoning carries through the course of the game. Thus if the firms know when their interaction will terminate, say, because of entry of new competitors, they do not collude at any stage of the game.

3.3 Market circumstances that enable tacit collusion

From the theoretical models we saw that in order to tacitly collude, firms have to co-ordinate on a collusive equilibrium. This is feasible if there is dynamic interaction as in repeated games. It was also shown that coordination is easier if there is an infinite time horizon, perfect information and positive valuation of future profits. This section explores in which market circumstances tacit collusion is likely to occur.

When engaging in tacit collusion a firm has to make a trade off between short run gains and possible long term losses. Even if the short run gains from undercutting are high a firm will only deviate if the expected long term profits of sticking to collusion are lower than the expected long-run profits under the market conditions that will prevail by undercutting.

Tacit collusion is easier to sustain when the short-term gains from undercutting are low.

The gains of undercutting are determined by the price cost margins, the own elasticity of demand, the homogeneity of the product and the mode of competition in the market (prices of quantities). Another important factor is the length of the detection lag. If rivals are not able to detect undercutting rapidly, undercutting can be sustained longer and is more profitable.

Tacit collusion is easier to sustain if the long-run losses from retaliation are high.

In order to deter cheating and sustain the collusive outcome, a firm must have the willingness and means to punish a deviation. This punishment is often referred to as 'retaliation'. There are many forms of retaliation: returning to normal competition, temporary price wars or refusing cooperation on other joint policies.

The risk of retaliation depends on the ability of rival firms to monitor deviation from the collusive conduct. This means that the relevant market variables have to be observable. This is more likely if rival firms are able to deduce from their own sales and profits whether or not the other firm is deviating from the collusive conduct. This is easier in markets with stable demand conditions, homogeneous products, a high degree of transparency and low buyer power.

The means of retaliation depend on the delay before competitors (can) react, which depends on the extent of monitoring and on structural factors such as adjustment costs and long term contractual arrangements.

The impact of retaliation is amongst others determined by the degree of symmetry in the market, whether demand conditions are stable, firms meet in a multitude of markets and the degree of excess capacity.

The answers to the questions by which the sustainability of tacit collusion can be determined in turn depend on market specific characteristics. These market characteristics have to be assessed when analysing the existence of joint dominance. Most literature makes a difference between 'essential' or 'necessary' market characteristics and 'important' market characteristics. Essential characteristics are those that have a decisive impact on the firm's ability to sustain tacit collusion. Important characteristics are those that make it easier for firms to sustain tacit collusion for a substantial period of time.^{18 19}

¹⁸ The selection of essential and important factors is based on the following reports:

- Europe Economics, Study on Assessment Criteria for Distinguishing between Competitive and Dominant Oligopolies in Merger Control, May 2001, http://europa.eu.int/comm/enterprise/library/lib-competition/doc/oligopolies_study.pdf

- CPB, Tight Oligopolies In Search of Proportionate Remedies, Marcel Canoy and Sander Onderstal, February 2003, CPB Document No 29, <http://www.cpb.nl/nl/pub/cpbreksen/document/29/doc29.pdf>

- Patrick Rey, Collective Dominance and the telecommunications industry, University of Toulouse, September 7, 2002, http://europa.eu.int/comm/competition/antitrust/others/telecom/collective_dominance.pdf

¹⁹ Section 4.3 below explains the so-called Airtours criteria, that is the necessary conditions for coordinated behaviour that the CFI set out in its judgment about the Airtours/First Choice merger: (1) the presence of a natural and transparent collusive price scheme ("focal point"); (2) credible retaliation possibilities; (3) no external constraints (in the form of new entry or strong customers). See also RBB Brief 2, June 2002, "Airtours/First Choice: CFI holds Commission to Account".

3.3.1 Essential market characteristics

Few firms

There are two main reasons why with fewer firms it is easier to reach a mutually acceptable equilibrium. With many firms coordination is more difficult particularly when coordination is only based on a tacit common understanding of collusive market conducts. With few firms an agreement is more attractive, because each firm can get a larger share of the pie. This has two important implications. Firstly, when there are few firms, the gains of undercutting are lower, because the extra share of the pie a firm with a high market share can capture is smaller. Secondly, the long-term benefit of cheating is reduced, precisely because the smaller the number of firms the larger will be the share of the collusive profit²⁰. Additional reasons are that achieving an “understanding” and monitoring it is easier with fewer firms.

High entry barriers

If there are no entry barriers, co-ordination does not work, because high prices will attract new entrants to the market, which erodes the profitability of collusion. Potential entry reduces the potential cost of deviation, because retaliation is less costly for deviating firms if they expect entry to occur and dissipate profits anyway.

Frequent interaction

Collusion is only possible if firms interact frequently, because firms should be able to retaliate the deviation of the collusive outcome by a rival firm. The frequency of interaction is an essential market characteristic because a collusive outcome can only be sustained if deviation can be punished almost instantly. If parties interact frequently then the incentive to deviate from the cooperative market outcome is reduced. A party deviating from the cooperative outcome would enjoy the possibility for higher profits for only a relatively short period. If there is a longer time lap between the moments of interaction deviation can become more profitable because retaliation will take place a later moment in time in the future. The fact that orders are large and lumpy compared to the market size has been mentioned as a factor which reduced the likelihood of collusion.

3.3.2 Important market characteristics

Market stability and transparency.

In an innovation driven and non transparent market it is difficult for firms to collude. Innovations allow firms to gain significant competitive advantage over their rival(s). This reduces the value of future collusion and the possibilities for punishment after deviation due to the prospect of an upcoming innovation which will drastically decrease demand for the current product. A collusive agreement is only stable if firms can monitor the market conduct of rivals. Not only the availability of information contributes to transparency, but also market stability, that is, stable demand (predictable demand fluctuations) and supply (slowly advancing technology) conditions.

²⁰ This holds for sure with pure Bertrand competition. With Cournot competition the price level in a market decreases when the number of firms increases. Depending on the price elasticity of demand it is possible that the collusive profit per firm will also be larger when the numbers of firms increases.

Symmetry and no quality differences

The more symmetric firms are, the easier it is for them to agree about the conditions of coordination, and the easier it is to enforce it. Symmetry can have many dimensions such as available capacity, number of products and cost similarities. The assessment of symmetry focuses mostly on symmetric market shares and symmetric production costs. Further factors that have been used to assess symmetry are: the degree to which parties are vertically integrated compared to fringe competitors. When one firm has a higher quality product than others (also called 'vertical differentiation.') it is more difficult to collude.

Homogeneous products

This factor has a more ambiguous impact on collusion. On the one hand product homogeneity makes markets more transparent by reducing the parameters that need to be monitored. This makes detection of deviation easier and collusion more likely. Furthermore product homogeneity increases the effect of retaliation, thus reducing the incentive to cheat. On the other hand product homogeneity allows a firm to capture a larger share of the market by undercutting its rival, which increases the incentive to cheat.

As seen in section 2.3.3, product differentiation can reduce the competition between firms. The more firms differentiate their products, the more freedom they have to behave independently from their rivals. This is however not an effect of collusion, but of non-coordinated effects.

Countervailing buyer power

The presence of strong buyers may negatively affect the ability to reach a coordinated effect. If buyer power is substantial, buyers can offer firms incentives to deviate from a tacit agreement. If a buyer represents a significant portion of market demand and offers to buy at a price below the collusive market price but still above the marginal cost of supply, firms will have a considerable incentive to accept the buyer's offer.²¹ Another way in which buyers may counteract the coordinated outcome is when buyers sponsor the entry of a new entrant. However, many small buyers can help to detect price cuts, making sustaining collusion easier. A concentrated buyers side is not sufficient to conclude that there is countervailing buyer power. A relevant factor is whether buyers are final users or not. In the latter case the buyers may be able to pass the costs on to their own customers.

Excess capacity

This factor has an ambiguous effect on collusion. The traditional view is that increasing marginal costs and capacity constraints facilitate collusion. The argument is that firms have a lower incentive and capability to cheat if they can not easily expand their output. Consequently in industries with high sunk costs and excess capacity, like the telecommunications sector, it is hard to sustain collusion. However, looking at the enforcement potential it can be argued that excess capacity facilitates collusion, because firms are capable of swiftly and hard retaliation against deviations from the collusive outcome.

Structural or co-operational links

Structural or co-operational links between firms in the market can serve as mechanisms to facilitate collusion. Examples of such structural links that can be considered (in order of significance for the ability to coordinate) are: membership of trade associations, membership of institutions self regulating

²¹ Bishop, S. and Walker, M. , The economics of EC competition law, concepts, application and measurement (2002), London, para. 7.47.

a sector, supplier relationships and ownership ties such as cross shareholdings. In the absence of structural links, cooperation agreements like interconnection agreements, may also contribute to collusion (see section 4.4.6).

Multi-market contact

Even if the conditions for collusion are poor on individual markets there is a risk of collusion if the same firms are present on several markets. It increases the frequency of interaction and softens asymmetries that arise in individual markets. For example, one firm can have a competitive advantage in one market and its rival can have its own competitive advantage on an other market.

Club or network effects

Telephony is an example of a service that entails positive network effects. The value of a telephony network rises if the number of people connected to the network increases. Network effects tilt the market in favour of a single firm, thereby creating a 'winner-take-all' type of competition which is not prone to collusion.

3.4 Tacit collusion under the NRF

Under the NRF and competition law tacit collusion is captured under the concept of collective (or joint) dominance.²² The current legal interpretation of the concept of collective (or joint) dominance stems from the Court of First Instance's (CFI) judgement in the Airtours/First Choice merger case. In this case the CFI overturned the Commission's findings about a 4-to-3 merger in the travel industry and outlined certain criteria that must be given to determine undertakings as collectively dominant.

The CFI's judgement defines collective dominance as a situation in which it is economically rational and preferable for firms to adopt, on a lasting basis, a common policy in the market with the aim of selling at above competitive prices. In the judgement the CFI set out three necessary conditions for a collective dominance position:

- i) Each member of the dominant oligopoly must have the ability to know how the other members are behaving in order to monitor whether or not they are adopting the common strategy. It is therefore necessary for sufficient transparency for all firms in the oligopoly to be aware, sufficiently precisely and quickly, of the way in which the other firms' market conduct is evolving.
- ii) Any tacit co-ordination must be sustainable over time. Implicit in this is the view that a retaliatory mechanism of some kind is necessary, so that any firm that deviates from the co-ordinated practice would be met by competitive reactions (not necessarily only addressing the cheating firm) by other firms.
- iii) It is necessary that existing and future competitors, as well as customers, do not undermine the results expected from the common policy. Particularly relevant in this context is whether there are fringe competitors and, if they are able to counteract a collective dominant position.

²² ERG, Revised ERG Working paper on the SMP concept for the new regulatory framework, September 2005, Available at: <http://erg.eu.int>

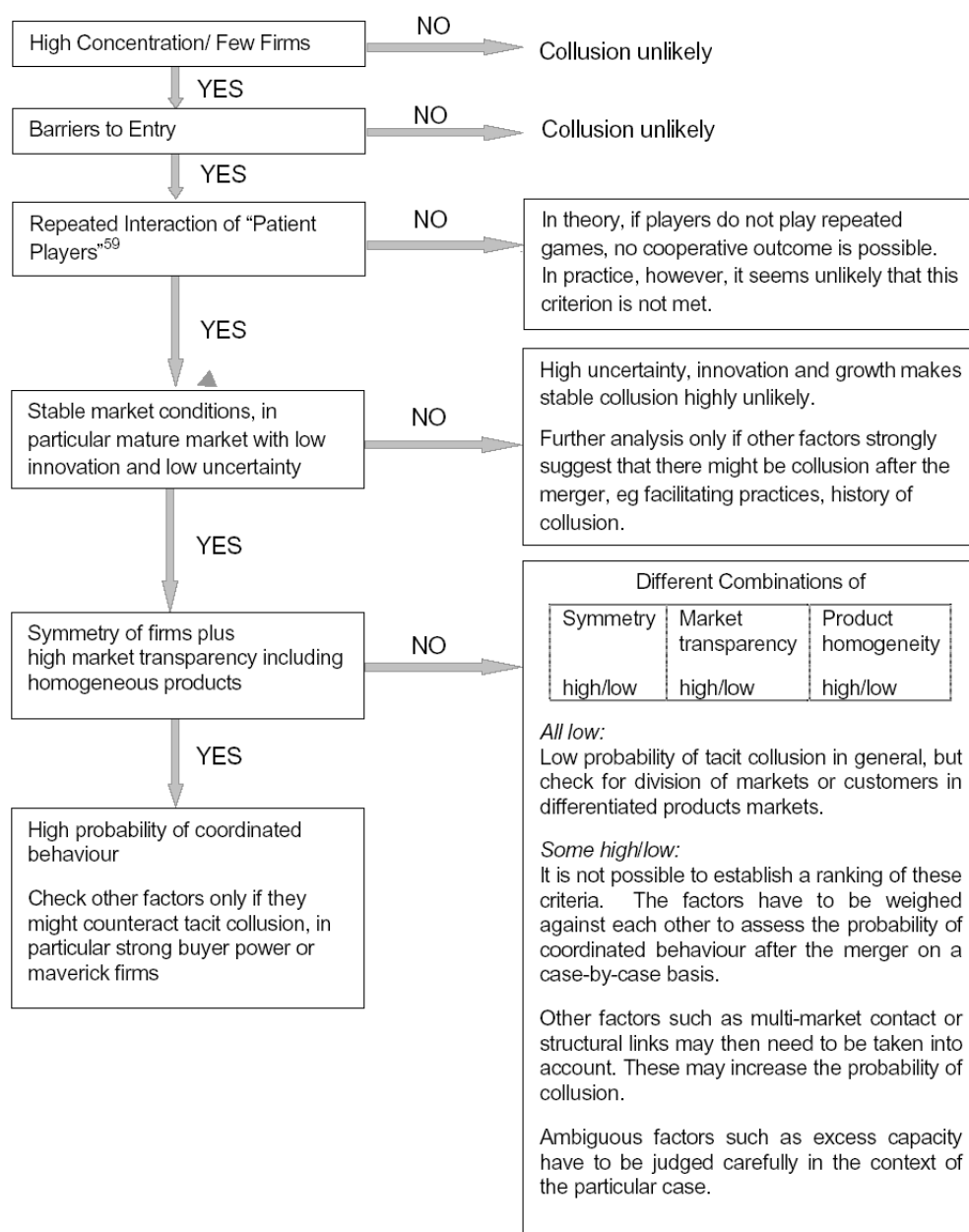
The conditions developed by the CFI in the Airtours case are broadly consistent with the relevant the current state of economic theory and provide a conceptual framework in which the market characteristics described in sections 3.3.1 and 3.3.2 have to be analysed.

3.5 A step wise approach

Given the multitude of factors influencing the likelihood of tacit collusion, it is very difficult to assign relative importance to the market characteristics. Literature has made a first attempt by making a difference between 'essential' or 'necessary' market characteristics and 'important' market characteristics, as has been shown above. Europe Economics has developed a framework in which the relevant factors are ranked in a decision tree.²³ It should be noted that such a decision tree can only be used as a first screening of a particular situation. An assessment in the context of a competition law procedure or a market analysis under the NRF will have to meet the requirements as described in section 3.4.

²³ Europe Economics, Study on Assessment Criteria for Distinguishing between Competitive and Dominant Oligopolies in Merger Control, May 2001, http://europa.eu.int/comm/enterprise/library/lib-competition/doc/oligopolies_study.pdf

Economic Policy Note, no. 6, September 2006



Source: Europe Economics, Study on Assessment Criteria for Distinguishing between Competitive and Dominant Oligopolies in Merger Control, May 2001, http://europa.eu.int/comm/enterprise/library/lib-competition/doc/oligopolies_study.pdf

4 Initial competitive assessment of a duopoly with vertically integrated operators

Chapters 2 and 3 show that the question whether effective competition is possible in a duopoly can be answered by looking at two types of competitive situations. Competition in duopoly is clearly not effective if firms tacitly (or explicitly) collude. In the absence of tacit collusion competition in a duopoly can be effective in specific market circumstances. This chapter applies these theoretical findings to a possible scenario for the electronic communications markets in the Netherlands. In this context we will first give a short overview of the current market situation and the developments in the market. After that we will describe the relevant scenario and conduct a preliminary assessment of the likelihood of tacit collusion and the likelihood that competition will be effective in the absence of tacit collusion. In the first assessment we will apply the stepwise approach described in section 3.5 on the relevant scenario. In the second assessment we will apply the criteria developed in section 2.3 on the relevant scenario.

It should be noted that competitive assessments in an NRF context normally require examining existing market situations. In these cases the likelihood of certain market outcomes has to be assessed on the basis of mainly structural characteristics of an existing market. The analysis in this paper, however, deals with a possible future (or even hypothetical) market situation and is necessarily made in the absence of an existing market. The analysis therefore contains a certain amount of speculation. Nevertheless it should provide insights in the way an NRA can draw conclusions on future market developments and the likelihood of effective competition.

4.1 Current market situation in relevant markets

With the introduction of competition KPN and the cable companies lost their historical monopoly position on fixed telephony and broadcasting. However, the market shares of KPN on fixed telephony and of the cable companies on broadcasting are still high. OPTA concludes in its market analysis decisions²⁴ that KPN has a dominant position on several fixed telephony markets and that the cable companies have a dominant position on the markets for transmission and supply of broadcasting services.

Table 1, market shares fixed telephony subscription, 2004, 2005

Network operator	2005	2004
KPN	85-90%	95-100%
Cable	5-10%	0-5%
Other DSL	0-5%	<1%

Source: EIM²⁵

²⁴ Market analysis decisions for fixed telephony of 21 December 2005 and for the transmission of and supply of broadcasting transmission services via the cable of 17 March 2006.

²⁵ EIM, Consumentenonderzoek afname gebundelde communicatieproducten in Nederland, 2^e meting, 27 February 2006, Available at: www.opta.nl

Economic Policy Note, no. 6, September 2006

Table 2, market share television subscription, 2004, 2005

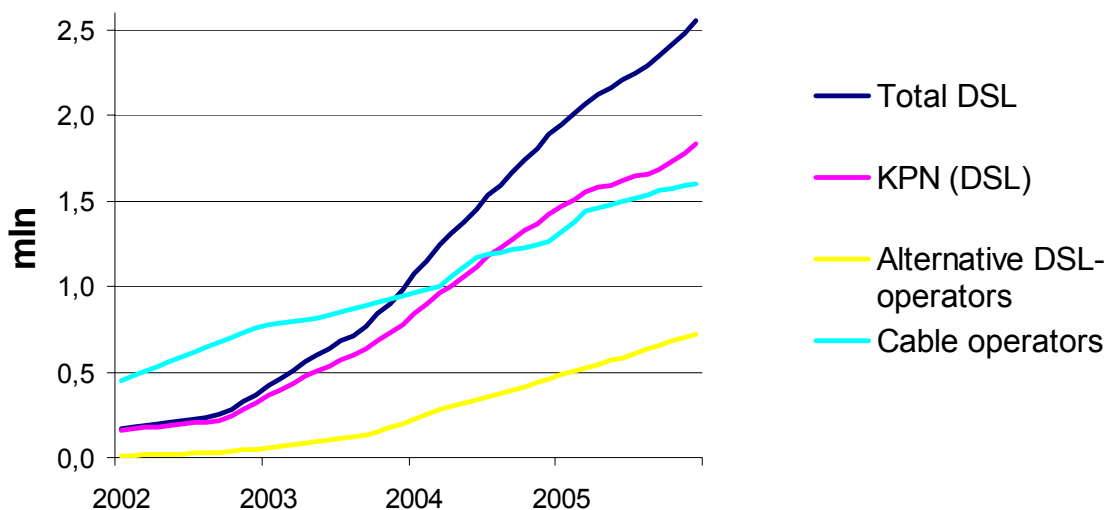
Network operator	2005	2004
Cable	85-95%	90-95%
Satellite	0-10%	5-10%
Digitenne	0-5%	<2%
IPTV	<2%	<1%

Source: EIM

With the introduction IP-based services the traditional boundaries between markets fade away. The cable companies and DSL operators other than KPN challenge KPN with the introduction of VoIP while KPN and other DSL operators enter the television market by introducing IPTV.

On the retail market for broadband internet access, competition between cable and DSL-operators is strong. The cable operators were the first movers in 2001. KPN and other DSL operators followed after the European Commission forced the national telephony incumbents to open up their local loops for entrants. After that ADSL started catching up. As a result at the end of 2004 the number of broadband cable subscribers was equal to the number of DSL broadband subscribers. The ratio DSL-cable is quite stable now around 60/40. KPN a market share of 44 percent, other DSL-operators of 16 percent and the cable operators of 40 percent.

Figure 1: Number of broadband access lines 2002-2005

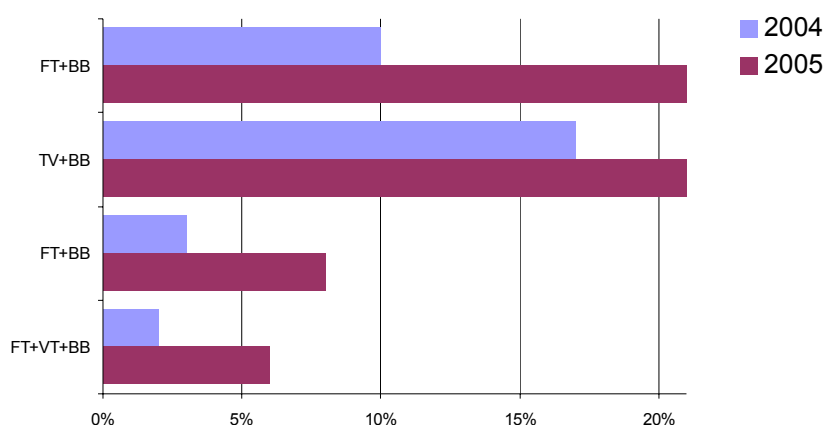


Local loop unbundling in combination with infrastructure competition has been very effective in the Dutch broadband access market. Prices are relatively low and with a broadband internet access penetration rate of more than 60 percent of the households the Netherlands is a front runner in the world.

4.1.1 Bundling and a multi-play market

KPN, cable operators and some other DSL-operators have introduced triple play bundles of fixed telephony, broadband internet access and television. Consumer research²⁶ shows that the usage of bundles increased significantly between the end of 2004 and the end of 2005.

Figure 2: Number of households that use two or more products from one market party, as a % of all households²⁷



Source: EIM.

In the short term bundling will not have a direct effect on the market definitions for telephony, broadband and TV because the take-up is still insufficiently strong and competition in bundles is not the dominant mode of competition. In the longer term it is possible that these markets converge into one bundled (multi-play) market. In terms of definition of a relevant market this requires that substitution between the bundled multi-play product and the individual products that form the bundle is not strong enough to constrain the behavior of a hypothetical monopolist supplying multi-play bundles.²⁸

4.1.2 Infrastructure investments

At this moment we see two infrastructures, namely the KPN network and the cable network, that can offer the multi play bundles of future communication services. Although investments in other infrastructures like mobile networks, fiber networks and fixed wireless networks are also promising - and it can not be ruled out that (potential entry of) these infrastructures will enlarge the competitiveness of the last mile in the coming years - the impact of these infrastructure is still unsure. (see also 4.3.4)

In 2005 KPN announced that it wants to migrate its network to a 'Next Generation Network' during the next few years. With this migration, KPN aims to acquire a cost-effective broadband IP-network through which it can provide future electronic communication services. KPN will remove the circuit-switched telephony exchanges and the MDF-locations and part of the local loop between the MDF

²⁶ EIM Consumentenonderzoek naar de afname van gebundelde communicatieproducten in Nederland, 2e meting (2006), available at www.opta.nl

²⁷ FT is Fixed telephony, TV is television and BB is broadband access

²⁸ The question when a bundle becomes a relevant market will be analysed in another Policy Note of the Economic Analysis Team to be published in 2006.

locations and the cable distribution boxes will be switched from copper to fiber. During the last few years the cable companies have upgraded their network (to make two-way access possible) and invested in software equipment to offer high speed broadband internet access, Voice-over-IP and digital television. Cable companies are also replacing their coax with fibre up to a couple of hundred meters of the houses.

4.2 Relevant scenario

In the scenario of the bundled (multi-play) market it is plausible that at least two firms with own infrastructures compete on the market.²⁹ One of these firms is KPN, the other firm would be a cable operator with a substantial coverage of the territory of the Netherlands. This scenario is plausible for two reasons. Firstly both infrastructures are capable of providing multi-play services of similar quality and characteristics. Secondly, the trend towards consolidation may lead to the emergence of a national cable operator covering almost 90% of the territory.³⁰ The presence of other players on the markets is less certain. This depends on two factors: first the deployment of alternative technologies providing alternatives for (parts of) the bundle, and secondly the presence of competitors that make use (of parts) of the infrastructure KPN and cable companies. In the absence of voluntary access agreements the presence of these players is likely to be dependent on regulated access to infrastructure, which is in turn dependent on the assessment of the competitive conditions in the relevant markets.

The analysis OPTA will have to perform is a “Greenfield” analysis. This means the assessment of a hypothetical market situation in which no access regulation exists. In such an assessment the presence of competitors that make use of regulated access to (parts of) the infrastructure of KPN and cable company based is assumed not to exist. It may be that KPN or the cable company provide access voluntarily. The competition on this basis will not be independent from KPN or the cable company and may not be sustainable for this reason. The deployment of alternative technologies providing alternatives for (parts of) the bundle is relevant (for example, wireless technologies) in the assessment of the scenario.

A scenario where there are only a few players on the market can have different outcomes. One of these outcomes may be a situation in which either KPN is individually dominant on the bundled market or the cable companies are individually dominant in their service area. This market outcome is not considered here, since it will be captured by standard SMP analysis. What is considered here is a situation without single dominance but with competitive risks taking the form of collusion or non-effective competition.

²⁹ In this chapter the theory of chapter 2 and 3 will be applied a scenario of a bundled multi-play market. This theory is however applicable to any (individual) market especially if no single dominant position has been found, but a risk of collusion or a tight oligopoly is expected.

³⁰ In the current market situation there tend to be two cable operators covering more than 90% of the territory. Since the activities of these two cable operators do not geographically overlap the general outcome of the analysis will not be very different to our scenario. However if the difference between one or two cable operators is relevant for a specific market characteristic we will make a separate remark about.

4.3 The likelihood of non competitive oligopoly

The remainder of this chapter assesses the likelihood of effective competition in the scenario described in section 4.2, thereby assuming that the members of the duopoly are not tacitly (nor explicitly) colluding. The assessment is carried out on the basis of the criteria developed in section 2.3. Because the scenario assumes a duopoly, the number of firms is not discussed.

4.3.1 Price competition or quantity competition

As described in section 2.3.1 competition in a duopoly can be effective if it is pure Bertrand competition. Therefore the relevant question in this section is whether the competition in the relevant scenario can be characterized as pure Bertrand competition.

The issue to look at is the parameter on which players compete. Electronic communications markets are characterized by high fixed costs a large part of which is sunk. In the relevant scenario both providers have invested heavily in upgrading their infrastructure to be able to provide multi play services. Once the infrastructure is upgraded in a certain region a provider is in principle able to provide services to all customers within that region. Therefore competition can probably best be described as a two stage game in which the firms chose capacities in the first stage firms chose capacities, and in the second stage they compete on prices. As discussed earlier in section 2.3.1 such a situation produces outcome equal to Cournot outcomes.

Furthermore, in reality investments in capacity are not one off but look more like a continuous process. Firms have to take investment decisions on a regular basis (for instance because of maintenance, upgrading or replacements). Firms will only take these decisions if they expect to be able to realize a return on their investments through a price which not only covers the marginal costs. Therefore, in a pure Bertrand scenario firms are not likely to undertake such investments plans as parties currently do. On the other hand, if investments are really sunk, sunk costs can also have a positive effect on short-run price competition. In the short run, a firm will not leave the market if it can at least recover its marginal costs. Consequently it is not very likely that in the short run one firm will be able to drive the other firm out of the market.

The second issue to look at is whether firms are unconstrained in their capacities. Both players should in principle be able to supply the whole market demand. Technically this may be realistic since both infrastructures have an almost national coverage. In an economic sense, however, it seems unrealistic. So far practice shows that almost all players in the electronic communications markets have faced problems in serving unexpected large demand for their services These problems were mainly caused by malfunctioning administrative processes, billing, technical migration problems and the like.

Therefore it seems that this condition for pure Bertrand competition is not fulfilled and outcomes of the competitive process look more like the outcomes of Cournot competition. The next section sets out that another condition of pure Bertrand competition, namely homogeneity of products, is neither met.

4.3.2 The level of product differentiation

The traditional Bertrand model assumes homogeneous goods. By differentiating de products firms can escape the fierce price competition in the Bertrand model and create a certain level of market

power over their customers. This is not per se bad since consumer preferences may be differentiated and better served by differentiated supply. In the relevant scenario it is likely that multi product bundles are differentiated in some way other than price. The scope of differentiation does not really lie in the connection itself, this is just a broadband connection with certain capacity and availability parameters, but more in the service package delivered over the connection. This is especially relevant with respect to the more value-added services like attractive applications and television content. Furthermore differentiation is caused by the branding of the different packages. Therefore it is likely that products will be differentiated and will not be perfect substitutes. It is, however, not likely that products will be differentiated to such an extent that both firms will be operating in different markets.

4.3.3 Switching costs

The traditional Bertrand model assumes that switching costs are zero. In the communications sector two types of switching costs can be distinguished from the perspective of the consumer: financial costs and costs as a result of lengthy administrative procedures³¹. Although consumers perceive high financial switching costs actual financial switching costs after the contract period can be relatively low. All market parties stunt with free modems, no installation costs and discount periods. The migration process, however, from one supplier to another is not always smoothly. This has often to do with number portability problems and technical migration problems, (telco-telco migration) which can result in 'being cut off' for a while. In our scenario of only two vertically integrated operators these technical problems will probably be of less concern, because the two infrastructures operate to a large extent technically independent from each other.

As a result of switching costs operators extract some market power over repeat purchases of their existing customer base. Prices can contain a mark up above marginal cost because to attract a customer from a competitor a firm should not only lower its price below that of the competitor but even lower to overcome the switching costs. The height of this mark-up also depends on the ability to discriminate between existing and new customers. Only if firms are unable to discriminate between existing and new customers existing customers will be able to profit from more intense pricing competition for new subscribers. An example of price discrimination in the communications sector is that existing customers can not downgrade their subscription after the contract period and get the same conditions that hold for new customers. Regulatory intervention has already reduced some of these 'locked in effects'. One can think of rules for number portability within the contract period and limitations on the automatic prolongation of a contract for a fixed period of time.

As stated in section 2.3.4. switching costs have a greater impact on mature markets than on emerging markets. Considering the relatively low penetration rates of triple play bundles the market is emerging. On the other hand customers migrate from the relatively mature markets of telephony, broadband internet access and television in which the same operators (KPN and cable) have a large customer base. This means that prices of triple play bundles have to be rather low to overcome the switching costs of the individual communications products.

4.3.4 Barriers to entry and contestability of the market

In the electronic communications markets barriers to entry are high, especially with regard to the last mile. Therefore it is very unlikely that the markets in the relevant scenario are contestable. Consequently, the duopoly is not facing competitive constraint from outside the market through "hit

³¹ Heliview, Overstapdrempels en notaspecificaties, 21 November 2005, commissioned by the Ministry of Economic Affairs.

and run” competition.

In the relevant scenario it is not likely that firms from outside the duopoly pose competitive constraints on parts of the multi play bundle. Although parts of the bundle can be supplied through alternative infrastructures such as mobile networks and fixed wireless networks, assuming multi play bundles constitute the relevant market, it is not likely that firms that only supply a part of the bundle put competitive pressure on the providers of the complete bundle. In case the relevant market is wider than the multi play bundle a market situation with two large players and a significant competitive fringe will exist. In that situation the likelihood of effective competition will depend on the combined competitive pressure of the firms that only supply parts of the bundle.³²

4.3.5 Countervailing buyer power

The customers served in the relevant scenario are mainly consumers and small businesses. Each of these customers represents only a very small fraction of total market demand. Therefore there are no large customers who are strong enough to provide countervailing buyer power and to thus bring prices down.

4.3.6 Bidding markets

Competition in large parts of the electronic communications markets cannot be characterised as a bidding market. First of all there is no bidding system involved. Second of all there is no winner takes all kind of competition, because firms will have to compete on a regular basis for parts of the consumers (see section 3.3.1 on frequency of interaction) Third, demand is not lumpy: there is frequent interaction and the turnover per contract is relatively low, especially on the consumer market. Fourth, Lock-in effects are not absent, because it’s easier and cheaper to keep a customer than to gain a new one. And fifth, entry barriers are relatively high due to sunk costs. Only the market segments in which large business customers are present may show some characteristics of bidding markets.

4.3.7 Conclusion

This chapter has assessed a relevant scenario in which only two vertically integrated operators are present on the market and access regulation is absent. Competition between only two operators can be effective if they compete in accordance with the traditional Bertrand model. On the basis of the assessment it seems the condition for pure Bertrand competition is not fulfilled and outcomes of the competitive process look more like the outcomes of Cournot competition (or differentiated Bertrand competition). Operators can possess some degree of market power because of product differentiation and switching costs. Furthermore potential entry and countervailing buying power are low. Finally the communications market is no bidding market. On balance the conclusion of the assessment is that in the relevant scenario there is a significant risk that competition is not effective. The extent to which prices lie above long-run average costs and thus excessive profits are obtained is difficult to predict. In any case, in the absence of tacit collusion, prices will be lower than the theoretical monopoly price.

³² The question when a bundle becomes a relevant market will be analysed in another Policy Note of the Economic Analysis Team to be published in 2006.

4.4 The likelihood of collusive oligopoly

Chapter 3 described the market characteristics that contribute to risk of coordinated conduct. In this section we assess whether the relevant scenario meets these criteria. For this assessment we make use of the stepwise approach described in section 3.5. In addition we describe some specific features of the electronic communications industry that are relevant for the assessment of the likelihood of tacit collusion.

4.4.1 Few firms

In a duopoly with a vertically integrated DSL network provider and a vertically integrated cable provider concentration is likely to be very high. The exact level of concentration will depend on the presence of other infrastructures which may provide alternatives to the multi-play bundle. It will also depend on the openness of the infrastructures. In the absence of regulation entrants depend upon commercial access negotiations. This means that there are no independent competitors to both networks. Finally the effect of two in stead of one vertically integrated cable operator is that coordination is more difficult which reduces the scope for collusion.

4.4.2 Barriers to entry

As in most electronic communication markets barriers to entry will be high, especially with regard to the last meters to the residence of the customer. The roll out of an alternative network providing connections capable of delivering a multi play bundles will require significant investments which are likely to be sunk to a large extent. So in the absence of access regulation competitive pressure from potential new entrants will therefore be low. Only if the vertically integrated firms have incentives to provide access voluntarily there may be some potential for entry, but this type of entry is dependent on the willingness of the incumbent firms.

4.4.3 Frequency of interaction

It is likely that parties in the duopoly will face repeated interaction. A large part of the markets consist of residential users who only purchase one connection at a time. Purchases are not lumpy. This is not only the case in the situation where users migrate from single sources to multi play offers but will stay in a more mature market. If consumers are able to switch suppliers regularly, there will always be a relevant part of the consumers seeking for an extension of an existing contract or a switch to a new supplier. The suppliers in the oligopoly will have to compete for these customers on a frequent basis. This creates scope for retaliation and thus for collusion. Additionally, both players are likely to provide similar services – for each individual service there is likely to be frequent interaction.

4.4.4 Stable market conditions, low innovation and low uncertainty

The telecommunications industry is a fast growing industry driven by technological developments. Therefore it seems unlikely that this criterion will be met in the relevant scenario. Looking at the current dynamics in the electronic communications markets, which are not only caused by the regulation of the market but are to a large extent not dependent on access regulation (such as technological developments, innovation in equipment) exogenous, it does not seem reasonable to expect that in a Greenfield situation the market will change into one with low innovation and uncertainty.

4.4.5 Symmetry of firms, high market transparency and homogeneous product

In the current situation the main players on the market are not symmetric. In a situation of not one big national cable company (as in our scenario), but with two big regional cable companies KPN operates on a national basis while the cable companies operate on a regional basis. Furthermore the technical possibilities of the existing networks differ to a certain extent. As a result of the move towards all IP based networks and further consolidation in the cable sector the market positions of the relevant firms in our scenario might be more symmetric than in the current situation. The same reasoning may apply to differences in cost structures of the firms.

In the current market situation the products provided by KPN and the cable companies are differentiated products. This differentiation stems partly from the past as KPN was only providing telephony services and the cable companies were only providing television services – each company has therefore built a reputation in its specific area. As a result of the emergence of multi-play bundles the product portfolios of DSL and cable operators become more comparable. This does not necessarily mean that products become homogeneous. There will always be technological differences, for instance in quality of service or capacity, but also branding will play an important role. The extent to which services are differentiated is discussed further in section 4.3.2. When more services are differentiated it will be difficult to reach, monitor and enforce a tacitly collusive agreement.

The choice of services in the communications sector is large and differentiated. Consumers have to make significant search costs to find the best deal. Although the consumers are helped through comparisons made by consumer unions and independent internet sites, it is likely that market transparency is relatively low. This will inhibit tacit collusion because monitoring the behaviour of the competing firms and the finding of a focal point to collude on becomes more difficult.

4.4.6 Specific characteristics of the electronic communication markets

Club or network effects

The communication sector is characterised by positive network externalities. The value of a service to a single customer rises with the number of other customers on the network. For example by subscribing to a telephone service a customer makes subscriptions by other consumers more valuable (so called “positive externalities”). In absence of interconnection between networks, network effects tilt the market in favour of a single firm, thereby creating a ‘winner-take-all’ type of competition which is not prone to collusion. In the presence of interconnection obligations however, this effect is less likely since these obligations tend to neutralize club or network effects.

Need for interconnection

An important characteristic of the electronic communications sector is that operators often need to cooperate to provide services and compete in an effective manner. Agreements on interconnection and standards have to ensure that operators can offer universal connectivity. The need for interconnection agreements and the required cooperation that these agreements involves require frequent interaction between competitors. This creates a scope for retaliation and thus facilitates collusion. The extent to which the need for interconnection creates scope for collusion is also depending on the share of interconnection costs in the total costs of the services delivered to the end user. In a market where firms compete on multi-play bundles this share may be lower than in the

traditional telephony services. This may be a result of the use of interconnection principles from the IP world (such as peering and bill and keep) and the fact that a large part of the services in the bundle are not end-to-end services.

4.4.7 Conclusion

The relevant scenario does meet the “essential criteria” described in section 3.3.1 and therefore the risk of collusion cannot be dismissed. The market is characterized by few firms, high entry barriers and frequent interaction. Therefore a further look at the “important characteristics” is needed. Given the dynamic nature of the industry worldwide, it is not expected that the market conditions in the relevant scenario will stabilize, in particular with regard to innovation and uncertainty. The assessment with regard to symmetry, transparency and homogeneous products does produce a mixed picture. On the one hand, transparency seems relatively low and products are differentiated, which makes collusion unlikely. On the other hand, however, symmetry between the main players is increasing. Specific characteristics of the electronic communications industry make an assessment of the risk of collusion currently ambiguous. On balance the likelihood that tacit collusion will occur in the scenario seems low but can certainly not be ruled out because of the specific characteristics of the electronic communications markets such as network effects and need for interconnection. Further research on these issues is necessary to provide more definitive answers.

5 Conclusions and policy recommendations

In a situation of oligopoly there are two ways in which effective competition can be threatened in another way than single market power. The first way is if firms realise supra-normal profits by explicit or tacit collusion. The second arises when market concentration is high enough for non-competitive outcomes. These non-competitive outcomes are not the result of implicit or explicit cooperation but are the result of a situation in which firms have a high degree of market power.

In the absence of tacit collusion, an oligopoly can give effectively competitive outcomes if firms compete according to the pure Bertrand model, if the markets displays characteristics of a bidding market or if markets are contestable and disciplined by potential entry. In reality neither of these three situations can be found. The level of competition in a tight oligopoly therefore depends on a number of factors. These factors are: whether firms compete on prices or on quantity, the level of product differentiation, switching costs, barriers to entry and contestability of the market and countervailing buyer power.

In a situation of tacit collusion there will not be effective competition. The incentives for a firm to engage in a tacitly collusive agreement depend on a trade off between current and future profits of sticking to a collusive agreement as opposed to cheating from the agreement. The likelihood of tacit collusion depends on a number of market characteristics – a further distinction can be made between essential and important characteristics. Essential characteristics are: few firms, high entry barriers and frequent interaction. Important characteristics are: market stability and transparency, symmetry and no quality differences, homogeneous products, countervailing buyer power, excess capacity, structural or co-operational links, club or network effects.

The framework for the assessment of non competitive oligopoly and tacit collusion has been applied to a hypothetical scenario of a duopoly of two vertically integrated firms that both supply multi-plays bundles to end users via their own infrastructure.

When assessing the likelihood of tacit collusion it seems that the relevant scenario does meet the essential criteria. Therefore a further look to the important characteristics is needed. Given the very dynamic nature of the industry worldwide, it is not expected that the market conditions in the relevant scenario will stabilize, in particular with regard to innovation and uncertainty. The assessment with regard to symmetry, transparency and homogeneous products does produce a mixed picture. On the one hand transparency seems relatively low and products are differentiated, on the other hand symmetry between the main players is increasing. On balance the likelihood that tacit collusion will occur in the scenario does not seem high but cannot be ruled out because of the specific characteristics of the electronic communications markets such as network effects and need for interconnection. Further research on these issues is necessary to provide more definitive answers.

In the absence of tacit collusion the effectiveness of competition is assessed on the basis of criteria described above. This assessment shows that the conditions for pure Bertrand competition are not fulfilled and outcomes of the competitive process look more like the outcomes of Cournot competition. Operators can possess some degree of market power because of product differentiation and switching costs. Furthermore potential entry and countervailing buying power are low. Finally the communications market is no bidding market. On balance the conclusion of the assessment is that in the relevant

Economic Policy Note, no. 6, September 2006

scenario there is a significant risk that competition is not effective. The extent to which prices lie above marginal costs and profits are supra normal is difficult to predict. In any case, in the absence of tacit collusion, prices will be significantly lower than the theoretical monopoly price.

This economic policy note only deals with the question in which circumstances competition can be effective in an oligopoly. The assessment shows that it is unlikely that competition is effective with only two firms in the multi-play market. This raises the question whether regulatory intervention is needed. In this context it should be noted that only in a situation of tacit collusion the NRF gives the possibility to intervene.

When considering regulatory intervention into a tight oligopoly situations there a number of issues a regulatory body should take into account.

Within industries facing large economies of scale there is in some way a trade-off between the optimal number of firms on the market and the degree of competition within the market. The social optimum would be a market in which there is room for multiple firms (at least more than 2) operating at minimum efficient scale. However, in some markets scale economies are such that there is only room for one (natural monopoly) or two firms operating at a minimum efficient scale. Another network operator entering the market would not be sustainable in the long run. Even though competition is not necessarily effective in this case, this may be the optimal situation from a total welfare point of view.

Another issue is that the assessment shows that the market outcomes in a tight oligopoly situation lie somewhere on a continuum between effective competition and monopoly. Before considering regulatory intervention, a more thorough analysis of at which point on that continuum the market is located, is needed. The considerations should also include an weighing of the costs of regulatory intervention against the potential benefits of more effective competition.

Further research

The primary goal of this EPN is the provision of a theoretical framework through which the competition in a duopoly can be analysed. Although the EPN also presents a preliminary analysis of the expected state of competition within an oligopoly in the electronic communication sector in the Netherlands it should be noted that this analysis is still very preliminary and not based on empirical data.

In order to reach a more definitive answer to the question '*Is 2 is enough?*' the Economic Analysis Team suggests that further empirical research is conducted on the following issues:

- the nature of competition in the communications sector (Bertrand or Cournot outcomes).
- the weighing of the discussed criteria for tacit collusion in the communications sector.
- the expected point on the continuum between effective competition and monopoly, given the costs of regulation.
- whether another infrastructure would be sustainable in the long run.

Last but not least this EPN suggests to start a discussion within Europe about the way in which the NRF can deal with the situation of a tight oligopoly.

_

6 Literature and references

Aghion, P.; Bloom, N.; Blundell, R.; Griffith, R.; Howitt, P.: Competition and innovation: an inverted U relationship (2005). Quarterly Journal of Economics, Vol. 120, No. 2, pp. 701-728.

Baumol, W.; Panzar, J.; Willig, R.; Contestable markets: an uprising in the theory of industry structure: Reply (1983). The American Economic Review, Vol. 73. No. 3, pp. 491-496.

Bishop, S.; Walker, M.: The economics of EC competition law, concepts, application and measurement (2002). Sweet & Maxwell, London, 2nd edition.

Canoy, M.; Onderstal, S.: Tight Oligopolies In Search of Proportionate Remedies (2003). CPB Document No 29. Available at <http://www.cpb.nl/nl/pub/cpbreeksen/document/29/doc29.pdf>

Church, J.; Ware, R.: Industrial Organization. A Strategic Approach (2003). McGraw-Hill, Boston.

EIM, Consumentenonderzoek naar de afname van gebundelde communicatieproducten in Nederland, 2e meting (2006), Available at <http://www.opta.nl>

European Commission: Guidelines on the assessment of horizontal mergers under the Council Regulation on the control of concentrations between undertakings (2004). 2004/C 31/03, OJ C 31/5.

European Regulators Group: Revised ERG Working paper on the SMP concept for the new regulatory framework (2005). Available at <http://erg.eu.int>

Europe Economics: Study on Assessment Criteria for Distinguishing between Competitive and Dominant Oligopolies in Merger Control (2001). Available at http://europa.eu.int/comm/enterprise/library/lib-competition/doc/oligopolies_study.pdf

Heliview; commissioned by the Ministry of Economic Affairs: Overstapdrempels en notaspecificaties, (2005).

Huck, S.; Normann H. -T.; Oechssler, J.: Two are few and four are many: number effects in experimental oligopolies (2004). Journal of Economic Behavior and Organization, Vol. 53, pp. 435-446.

Ivaldi, M.; Jullien, B.; Rey, P.; Seabright, P.; Tirole, J. (2003a): The Economics of Unilateral Effects; Interim Report for DG Competition, European Commission (2003). IDEI, Toulouse. Available at http://europa.eu.int/comm/competition/mergers/review/the_economics_of_unilateral_effects_en.pdf

Klemperer, P.: Competition when Consumers have Switching Costs: An Overview with Applications to Industrial Organization, Macroeconomics, and International Trade (1995). Review of Economic Studies, Vol. 62, pp. 515-539.

Kreps, D.; Scheinkman, J.: Quality pre-commitment and Bertrand competition yield Cournot outcomes (1983). Bell Journal of Economics, Vol. 14, No. 2, pp. 326-337.

Economic Policy Note, no. 6, September 2006

Lexecon: When two is enough, competition in bidding markets (1995). Competition Memo. Available at http://www.crai.com/ecp/assets/two_is_enough.pdf

OPTA: Consumentenonderzoek afname gebundelde communicatieproducten in Nederland, 2^e meting (2006). Available at: <http://www.opta.nl>

Rey, P.: Collective Dominance and the telecommunications industry (2002). University of Toulouse. Available at http://europa.eu.int/comm/competition/antitrust/others/telecom/collective_dominance.pdf

Selten, R.: A simple model of imperfect competition, where four are few and six are many (1973). International Journal of Game Theory, Vol. 2, pp. 141-201.

ECONOMIC ANALYSIS TEAM

The Dutch Independent Post and Telecommunications Authority (OPTA) regulates the postal and telecommunications markets in The Netherlands. OPTA is an independent executive body that commenced its activities on 1 August 1997. OPTA's mission is to stimulate sustained competition in the telecommunications and postal markets. In the event of insufficient choice OPTA protects end-users. OPTA regulates compliance with the legislation and regulations on these markets.

OPTA has committed itself to improving the economic reasoning on which strategic choices are made so that market parties have a clear understanding of what to expect from OPTA now and in the future. In 2003 the OPTA bureau was complemented with the Economic Analysis Team (EAT). EAT is responsible for developing economic reasoning and stimulating discussion on key issues within the telecommunications and postal markets. To achieve this, EAT produces two kinds of policy notes - short discussion papers. Economic Policy Notes focus on economic issues and principles. Regulatory Policy notes focus on strategic economic issues in specific regulatory fields.

With its products and activities the Economic Analysis Team expects to add value to the economic debate in Dutch telecoms and post. For further information visit www.opta.nl from where you can download EAT publications.



Contact: EAT@opta.nl