

Unclassified

DAF/COMP(2012)13/REV1

Organisation de Coopération et de Développement Économiques
Organisation for Economic Co-operation and Development

21-Sep-2012

English - Or. English

**DIRECTORATE FOR FINANCIAL AND ENTERPRISE AFFAIRS
COMPETITION COMMITTEE**

DAF/COMP(2012)13/REV1
Unclassified

MARKET DEFINITION

-- Background note by the Secretariat --

This Background note was submitted to the Competition Committee FOR DISCUSSION under Item XI at its meeting held on 13-14 June 2012.

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JT03326638

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*Background Note by the Secretariat **

1. Introduction

1. Market definition is one of the most important analytical tools for competition authorities to examine and evaluate competition problems. By defining a relevant market, then calculating and assigning market shares, competition authorities seek to assess the market power of firms, which is of central importance to understand competition effects.¹ In addition, the definition of the relevant market helps to identify the market participants, to delineate the boundaries of the market and to determine the area of effective competition.

2. The importance of market definition goes, however, beyond such a narrow instrumental function as the concept has permeated competition law and is, based on its underlying conceptual foundations, now deeply embedded into the law.² Market definition has shaped the way practitioners think about competition issues beyond its narrow role in defining markets³ in any particular case as it is closely linked to the emergence of competition law as a public policy concern.

3. In the last few years, the relevance of market definition as an instrument in merger analysis and in cases of monopolisation and dominance is under discussion in the antitrust community. The 2010 US Horizontal Merger Guidelines, reflecting this debate, state for instance that market definition is not necessarily the first step in a merger analysis. This is a considerable change in light of previous practice and has spurred an intense discussion in the antitrust community about the role, the function and the importance of market definition as an instrument in analysing potential competition effects in any particular case. While a similar discussion already took place previously with the advent and use of merger simulation models in merger analysis, the current debate, possibly also fuelled by the earlier one seems to have taken on a more fundamental dimension. While, as before, merger control seems to be the arena in which new developments are mainly discussed, the role and the importance of market definition as a first step in the analysis is also questioned in monopolisation and abuse of dominance cases.⁴

* The background paper was written by Ulrich Schwalbe (Department of Economics, University of Hohenheim, Germany) and Frank Maier-Rigaud (OECD). Anna Pisarkiewicz (OECD) provided substantial research support and was in particular involved in the drafting and writing of the legal parts.

¹ It is important to bear in mind that market definition is not of intrinsic value. It is a powerful instrument to get at market power and thereby at competition effects but it is neither the only means through which competition effects can be analysed nor the one that will lead to the best results in every case.

² Of course this is true to various extents for different competition laws and seems to mainly depend on the time of adoption of a competition law regime and the legal system within which the competition regime is established.

³ This is for instance apparent in Article 102 TFEU under European competition law, where irrespective of any subsequent analysis of economic effects, dominance, typically operationalised through market share requirements of at least 40%, is a requirement for the application of the article itself.

⁴ See for example EAGCP (2005) and DoJ (2009).

4. The foundations of competition law but in some sense also of market definition were laid with the Sherman Act in 1890 and the general notion that large companies, as eventually measured by market shares in defined markets, wield substantial economic and often also political power that requires some checks for consumer protection, efficiency but also democratic reasons. While early monopolization cases in the US did not rely on market definition, this gradually changed over time and the concept was first introduced formally in the 1982 US merger guidelines and has evolved further since then.⁵

5. Traditionally, the first steps in every competition analysis are the definition of the relevant market, the identification of relevant competitors, the computation and assignment of market shares. This was reinforced by the structure-conduct-performance (SCP) paradigm that had a substantial influence on US and EU competition law until the mid-1970s and that emphasised the importance of market structure suggesting a link between concentration and market power.⁶ Indeed, the dominance requirement in a substantial number of competition laws worldwide, including *inter alia* German and European competition law, can in part be explained by a deep concern with market power presumed to be correlated with market share. The introduction of market definition allowed for the computation of statistical measures of concentration as for example concentration ratios and later on the Herfindahl-Hirschman Index (HHI) guiding enforcement. At the time when market definition and measures of concentration were first introduced into competition analysis, collusion in concentrated industries was the main concern with respect to the competitive process.⁷ Therefore, market definition was more or less aimed at industries with homogeneous products. When the role of concentration ratios was reduced and the HHI was introduced as a measure of concentration in the 1982 US Merger Guidelines, the main concern were markets of industrial products where collusion was considered to be the main problem.

6. In the following years, industries producing differentiated products, such as branded consumer goods and services, gained importance in industrialised countries and it was recognised that mergers in these markets could give rise to a type of competition problem different from collusive or co-ordinated behaviour. It was recognised that in those industries the intensity of competition between firms was more important than the size of the market share or the overall concentration of the industry. Competitors producing close substitutes imposed strong competitive constraints upon each other. However, when a merger between these firms, even in cases of low post-merger market shares, removed these competitive constraints, the merged firm would have an incentive to increase the price of at least one of its products, in the absence of countervailing efficiencies. As these effects do not depend on co-ordination between the firms but result from an independent pricing decision, they are known as unilateral effects.

7. Along with these changes in the economy, economic theory also evolved. Industrial Organisation theory made considerable progress in analysing the behaviour of firms in markets with imperfect competition by employing tools and concepts from game theory. It also analysed the competitive behaviour of firms in more detail, taking into consideration *inter alia* strategic effects and the reactions of rivals. The Harvard School, based on the SCP paradigm, had started from the assumption that many business practices by firms with market power are anticompetitive. The Chicago school explained the behaviour of firms mostly by efficiency reasons. In contrast to both approaches, the new Industrial Organisation theory recognises that most business practices have always both pro- and anticompetitive effects. In many instances, there are efficiency rationales that may explain the observed behaviour at least in part. A competition authority has to decide whether, in a given case, the pro- or the anticompetitive effects are of greater importance. Thus, more weight is given to the actual competitive effects of the behaviour in question.

⁵ See Werden (1992).

⁶ Indeed the SCP approach spawned a substantial amount of empirical IO papers trying to tweeze out a correlation between concentration, prices and profitability.

⁷ Shapiro (2010).

8. Along with these developments and the advances in economics with respect to the effects of mergers and business behaviour, new technologies were developed that had a tremendous impact on the availability of economic data, the processing of these data and the empirical tools to analyse it. Huge amounts of data about consumer buying behaviour, price responsiveness and substitution behaviour are now provided by checkout scanners. Advances in computer technology made it possible to process these data. This in turn led to more refined econometric methods that are employed to analyse markets, and estimate demand functions as well as whole demand systems.

9. These developments laid the foundations for a more effects-based approach in competition law enforcement, in particular with respect to merger control. In the 1982 US Guidelines the hypothetical monopolist test (HMT) was introduced as a method to generate meaningful market shares. The 1992 US Guidelines allowed for unilateral effects as it became clear that a simple consideration of market shares and market concentration, even if derived based on the HMT, could overlook serious anticompetitive effects of mergers, in particular in markets with differentiated products. For unilateral effects, market shares are not always a sound proxy for the effects on competition. In the 2010 Horizontal Merger Guidelines the role of market definition as a necessary first step in every merger analysis has been abandoned.

10. The recent developments, seemingly reducing the importance of market definition, have led to a range of reactions. The first one could be considered as the adaptation of market definition to the special conditions in certain types of markets, for example markets with network effects, auction- and bidding markets and two-sided markets. The second reaction is the development of alternative tools that, under certain conditions, are related to market definition, but allow for a more direct assessment of the expected effects of a merger or other business conduct. Such tools include, among other concepts, pricing pressure indices (PPI's), compensating marginal cost reductions, merger simulations and a direct effects approach. Generally, these concepts cannot be considered as a replacement of market definition, but should be viewed as optional substitutes or methods that complement market definition by providing additional information.

11. These reactions and the recently proposed new approaches have led to the question how competition policy and competition law should react. Should new guidelines stick to the principle of prescribing that any competition analysis has to start with (or at least include) the definition of the relevant market or should alternative tools be allowed instead of, or in addition to, market definition?⁸ As these alternative tools and methods do not rely on market definition, this could create some uncertainty with respect to the predictability of competition law enforcement to practitioners, the business community and competition authorities. However, excluding these alternative tools could imply that methods that do not yield the best predictions about likely anticompetitive effects are employed at least in some cases. There is thus a trade-off between a more flexible approach that allows using the economically most suitable tool for the problem at hand and the repercussions of such "methodological pluralism" on legal certainty and on the status of market definition in competition law more generally.⁹

12. This background paper gives an overview of the discussion on the proper role of market definition in competition analysis. While it focuses mainly on the instrumental function of market definition in analysing effects, it also discusses the wider role of market definition and how the concepts permeated and shaped competition law. The paper is organised as follows: In section 2, the basic economic

⁸ See US Horizontal Merger Guidelines: "The Agencies' analysis need not start with market definition" (Sect. 4).

⁹ It is for instance clear that traffic rules prescribing that cars have to come to a full halt at intersections with stop signs will not be efficient in every individual case, for example at a deserted and easily overseen crossing at 3 in the morning. This lack of efficiency in specific cases is, however, seldom used as an argument for allowing a more refined rule that would for instance allow for stop signs to be applicable only during certain hours.

principles of market definition are presented. The section discusses why markets are defined at all and what role market shares and concentration measures have. Section 3 briefly describes the most common method of defining markets employed by almost all competition authorities, the hypothetical monopolist test (HMT). Also the FERM test as a refinement of the HMT is considered and the concept of markets based on consumers' needs (*Bedarfsmarktkonzept*) is presented as the latter still plays an important role for some competition authorities. The section also discusses the implementation of the HMT and the concept of critical loss and the fact that the concept allows for a simple screening to discriminate between situations that give rise to competitive concerns and warrant a further inquiry and those that do not. Section 4 discusses the problems associated with market definition in several types of competitive situations where market shares generally are a less useful indicator. This is *inter alia* the case in markets with differentiated products, cluster markets, auction- and bidding markets, markets with network effects and two-sided markets. The specific problems encountered with respect to market definition in these cases are considered. Section 5 describes the most important alternative or complementary tools to market definition. This includes a discussion of different pricing pressure indices and their relationship with the HMT and the concept of critical loss as well as compensating marginal cost reductions. The section also covers merger simulation models and the direct effects approach in monopolisation / abuse of dominance cases. The discussion includes a critique of these new approaches. Section 6 discusses the legal and institutional aspects in connection with allowing additional tools to complement or partially replace market definition under "methodological pluralism". Section 7 concludes.

2. Economic principles of market definition

13. Markets in which there is no effective competition will in general lead to inefficiencies *inter alia* in the form of higher prices and/or lower quality of products, reduced R&D investments and/or retarded innovations as compared to markets where the competitive process works effectively. These inefficiencies will arise if the behaviour of firms is not constrained by (potential) other products or services. In these cases, firms are considered to have market power. This concept thus refers to the competitive constraints a firm faces, for example by products and services supplied (or potentially supplied) by rivals and competitors (or potential rivals and competitors). A reduction in competitive constraints usually leads to an increase in market power which in turn could induce welfare decreasing effects.

14. The role of competition law is to assure that effective competition prevails by preventing the creation or the strengthening of market power or to prohibit the abuse of a position of substantial market power (monopolisation). Competition authorities have to assess the competitive effects of decisions concerning mergers or potential anticompetitive conduct. In economics, market power is usually defined as the ability of a firm to keep the price of its product (or products) profitably above the competitive price for an extended period of time.

2.1 Market power and the competitive price

15. Economists tend to equate the competitive price with marginal cost and employ the Lerner Index that relates the percentage mark-up on marginal cost to the elasticity of the residual demand function, as a measure of market power.¹⁰ Note, however, that this technical notion of market power defined as pricing above marginal cost may be distinct from the notion of market power as a competition law concept.¹¹ Perfect competition is a theoretical concept that relies on several restrictive assumptions to be satisfied. Therefore, competition economists have suggested the concept of effective competition which is compatible with prices exceeding marginal cost.¹² While in the economic discipline equilibrium prices

¹⁰ This paper only discusses market power of sellers.

¹¹ See OECD (2012a:9ff.) for a discussion of the problems of the concept of "competitive" price outside a narrow economic modelling context.

¹² For a discussion of the concept of effective competition see Bishop and Walker (2010:15-50).

under perfect competition are equated with marginal costs and may therefore also be considered competitive prices, the notion of competitive prices in competition law is often less precise and prices in the absence of competition law infringements may be called competitive prices even if they exceed marginal cost and the market cannot be characterized as perfectly competitive.

Box 1. The Lerner-index and the price elasticity of demand

The Lerner-index results directly from the first-order conditions of profit maximisation and relates the per-unit margin (in percentage terms) to the price elasticity of demand.

$$\frac{p_i - c_i}{p_i} = \frac{1}{\varepsilon_i'}$$

where p_i denotes the market price for product i , c_i the marginal cost and ε_i denotes the own-price elasticity of demand. The own-price elasticity of demand for product 1 is defined as

$$\varepsilon_1 = \frac{\partial Q_1(p_1, p_2, \dots, p_n)}{\partial p_1} \frac{p_1}{Q_1}$$

It denotes how much, in percentage terms, the demand of product 1 decreases with a price increase of 1% by product 1. The own-price elasticity takes a negative value although it is sometimes also stated in absolute terms. The larger the elasticity (in absolute terms), the lower the value of the Lerner-index, and the less market power the firm will have.

16. Consider for example an oligopolistic market where firms incur some fixed cost, compete in quantities and produce a homogeneous good. It can be shown that in such a Cournot model the price under effective competition exceeds marginal cost. From a long-run perspective, where by definition there are no fixed cost, and with free market entry, the competitive price could be considered as equal to the long-run marginal or long-run average incremental cost (LRAIC).

16. The demand a single firm is confronted with depends generally not only on the behaviour of the consumers but also on the prices of substitutes or complements to the products of the firm in question and thus on the supply behaviour of other firms. Therefore, the firm-specific or residual demand function has to be considered if demand and supply side substitution, the most important competitive constraints a firm faces, are to be assessed.¹³ The price elasticity of the residual demand function captures the most important competitive constraints a firm faces, i.e. demand and supply substitution. A price increase by the firm will on the one hand lead to a change in buyer behaviour – consumers will substitute away from the product by either buying less of the product, choosing a substitute, buying in a different area or buying something completely different or nothing at all. On the other hand, the behaviour of suppliers might change as, if production capacities are available, other firms could increase their supply of the product (or of substitute products), reposition their products, expand their capacities or *de novo* entry could take place.

17. The equilibrium price in an industry therefore depends on many factors as *e.g.* the degree of product differentiation, the availability of substitutes, existing capacity constraints, the nature of competition in the market or countervailing buyer power. From a more long-term perspective, barriers to entry, barriers to expansion, a possible repositioning of products and the impact of potential competition have to be taken into consideration to assess the competitive price.

¹³ Baker and Bresnahan (1988).

2.2 *Market Definition as an indirect way to assess market power*

18. This high degree of complexity of any competitive process makes it often very difficult to estimate the competitive price and to assess the market power in a direct way. The data required to estimate the residual demand function and its price elasticity by econometric methods may not be available or not available in the required quality or take too long to collect. The relevant costs often cannot be measured and approximations of marginal cost by accounting measures of average variable cost, for example, may be misleading. Also, a profitability analysis is in many cases fraught with difficulties.¹⁴

19. But even if the data requirements were satisfied, the time constraint under which competition authorities have to operate is often extremely tight. A decision about whether a merger does not raise competition concerns or whether the transaction should be analysed in more detail has to be made within a period that is often too short for a detailed econometric analysis.¹⁵

2.3 *The functions of market definition*

20. In many cases an indirect approach to assessing competitive effects is employed to identify the competitive constraints a firm faces and to assess whether a firm possesses market power or whether market power is created or strengthened by a merger. This indirect approach is generally carried out by competition authorities in two steps: the first one is the definition of the relevant market and the second analyses the competitive conditions within this market.

21. When a relevant market has been defined, the competitors can be identified and market shares can be assigned to the market participants.¹⁶ These market shares can be used to derive statistical measures of the concentration in the market for example by calculating concentration ratios or the Herfindahl-Hirschman Index (HHI), the sum of the squared market shares of all firms in the market.¹⁷ These market shares and the associated measures of concentration are employed to make inferences about the market power of a firm, or, stated otherwise, the strength of the competitive constraints a firm faces. The underlying assumption is that the size of the market share is directly and positively correlated with market power and that the degree of concentration in a market is indicative of competition problems, for example in the form of higher prices than in less concentrated industries.

22. A theoretical justification for employing market shares and the HHI is provided by the Cournot model of quantity competition with firms producing a homogeneous product with constant marginal cost. In this model, there is a direct positive correlation between market power as measured by the Lerner index, market shares and concentration measured by the HHI.

¹⁴ For an in-depth discussion of profitability analysis, see OECD (2012a).

¹⁵ Although so-called pre-notification periods often play a role, the time allotted to competition authorities for an initial assessment of the case is often limited to a single month.

¹⁶ As opposed to the US, the EU directly considers supply substitution when defining the market implying that market shares are assigned also to potential competitors.

¹⁷ The Herfindahl-Hirschman Index is given by $HHI = \sum_{i=1}^N s_i^2$ where s_i is the market share of firm i in the market, and N is the number of firms. Thus, in a market with two firms that each have 50 per cent market share, the Herfindahl-Hirschmann Index equals $0.50^2 + 0.50^2 = 0.5$. The HHI ranges from $\frac{1}{N}$ to 1, where N is the number of firms in the market. Equivalently, if percentage integers are used as in 75 instead of 0.75, the HHI can range up to 100^2 , or 10000. The concentration ratio CR4, where 4 stands for the four largest firms in the market was an important concept in competition analysis until it was replaced by the HHI in the 1982 US merger guidelines.

Box 2. Market shares and the HHI in a Cournot model

Consider a market with n firms $i = 1, \dots, n$ producing a homogeneous good with constant marginal cost c_i and compete in quantities. The inverse demand function is given by $p(Q)$, with $Q = \sum_{i=1}^n q_i$. Here, Q denotes the total quantity produced by all firms and q_i the quantity produced by firm i . The profit maximisation problem for firm i is given by

$$\max_{q_i} p(Q)q_i - c_i q_i, i = 1, \dots, n.$$

The first order conditions are

$$\frac{dp(Q)}{dQ} q_i + p(Q) - c_i = 0, i = 1, \dots, n.$$

Rearranging yields

$$\frac{p(Q) - c_i}{p(Q)} = - \frac{dp(Q)}{dQ} \frac{q_i}{p(Q)} = \frac{dp(Q)}{dQ} \frac{Q q_i}{p Q}.$$

Note that the last term on the right, $q_i/Q = s_i$ is the market share of firm i and the first two terms on the right are the inverse of the price elasticity of demand ε , *i.e.*

$$\frac{dp(Q)}{dQ} \frac{Q}{p} = \frac{1}{\varepsilon}.$$

Simplifying notation, the relation between the margin and the price elasticity of demand for a firm i with marginal cost c_i in a Cournot model is given by

$$\frac{p - c_i}{p} = \frac{s_i}{\varepsilon}.$$

This indicates that for a given price elasticity of demand the market share of a firm is positively related to its margin or to its market power as measured by the Lerner index.¹⁸ Multiplying each term with s_i and summing over all firms in the market yields

$$\frac{s_1^2}{\varepsilon} + \frac{s_2^2}{\varepsilon} + \dots + \frac{s_n^2}{\varepsilon} = \sum_{i=1}^n \frac{s_i^2}{\varepsilon} = \frac{HHI}{\varepsilon}.$$

23. In a Cournot model, the average margin weighted with the market shares is equal to the HHI divided by the price elasticity of demand. As the HHI gives more weight to larger shares, a market with a firm with a very high market share and several small firms yields a high value of the HHI. In this case, the existence of market power could be suspected. Also, when there are only a few firms with equal market shares, market power could be exercised.

24. In addition, if the market contains only a few firms with symmetric market shares, co-ordinated behaviour might arise. This is particularly intuitive in a homogeneous products market as considered here. In addition, equal market shares are an indicator of similar technologies and cost functions so that structural conditions could be conducive to co-ordinated behaviour. A further link between the HHI and the stability of co-ordinated behaviour has been pointed out by Stigler (1964). He showed (under some restrictive assumptions) that the stability of co-ordinated behaviour is inversely related to the HHI. When the concentration in the market is high, a cheating firm can easily be detected and thus deviations from the co-ordinated outcome are deterred.

¹⁸ Note that a large market share does not necessarily imply market power – if the demand is very price elastic, the margin could be very low.

25. But more importantly, the change in the level of an index, *e.g.* caused by a merger, is used to draw conclusions on the competition effects of this transaction. For example a change in the HHI, the so called delta, caused by a merger is used to make an inference about the competitive effect, in particular the increase in price. Stated otherwise, changes in the index are assumed to be correlated with price increases.

26. In a simple Cournot model with constant marginal cost and linear demand, welfare decreases with increased concentration provided there are no efficiency gains and no potential competition.¹⁹ As shown by Farrell and Shapiro (1990), this result can be extended to more general Cournot models. If there are no synergies, a merger in a market with Cournot competition causes prices to increase.²⁰

27. The definition of the relevant market and the calculation of market shares and measures of concentration derived from these shares have been used to specify thresholds. For example, in the Horizontal Merger Guidelines of the European Commission, numerical levels of the HHI and the change in the HHI induced by the merger are used to indicate a range within which no further analysis of the merger will take place. These thresholds allow a primary screening of mergers and can therefore be considered as safe harbours.²¹

28. One role of market definition in competition analysis is to provide a crude first screen to classify competitive situations, particularly mergers or abuse of dominance/monopolisation cases into those that give rise to competition concerns or even serious competition concerns and therefore justify closer scrutiny and those that do not. This screening function of market definition allows the competition authorities to concentrate resources on cases in which it is plausible that the merger or the practices in question could lead to substantial anticompetitive effects and to eliminate all those cases where the prospect of anticompetitive effects is insignificant. If such a threshold enquiry shows that a merger would not create or increase market power or if, in an abuse of dominance case, it is found that a firm does not possess market power, further analysis of such cases is unnecessary.²² Such screens reduce the investigative burden of competition authorities and may also mitigate the risk of false positives.

29. No simple screen is, however, able to perfectly discriminate between situations that give rise to competition concerns and those that do not. Therefore, when thresholds are exceeded, an assessment of the competition concerns is required and a more detailed competitive analysis needs to be carried out in order to determine whether the competition concerns are confirmed.

30. Market definition plays an important role also in this second stage of the enquiry, because a properly defined relevant market delineates the area of competition, *i.e.* separates the active competitive forces from those more passively operating in the background.²³ The competitive action taking place within a properly defined relevant market is separate from the rest of the economy at least to the extent that it can lead to distinct prices.²⁴ Therefore, the definition of a relevant market is important to identify possible barriers to entry. If the competitive analysis shows that there are no substantial entry barriers, even

¹⁹ In fact the argument by Willig (1991) that welfare decreases with concentration is more general as he also considers behaviour different from Cournot behaviour.

²⁰ Farrell and Shapiro (1990:112).

²¹ A safe harbour is a binding legal concept. Thresholds may also be used in a purely indicative and ultimately non-binding manner. While the setting of such thresholds is largely arbitrary from a theoretical point of view, the idea is that competition problems are very unlikely under very low market shares.

²² In contrast to monopolisation in the US, abuse of dominance in EU law requires the finding of a dominant position prior to the effects analysis.

²³ See Werden (2012).

²⁴ Werden (2012:16).

a high market share is presumably no indication of durable market power. In addition, market definition helps to identify the market participants and to examine the structural conditions in the market. This is particularly important in the case of possible co-ordinated effects. Market definition allows specifying the scope of co-ordination, identifying a maverick firm that could disrupt any co-ordinated behaviour and to evaluate whether the market is susceptible to co-ordinated behaviour.²⁵ Thus, even if market shares are not used, the definition of the relevant market provides a structured frame within which the competitive analysis takes place. Thus, the definition of the relevant market serves more functions than to give a first simple indication of market power.

31. This, however, does neither imply that – from an economic point of view - market definition has either to be the necessary first step in any competition analysis nor that it has to be employed in all cases. There might be instances where sufficient data are available for a direct assessment of market power that would render the definition of the relevant market redundant. In other instances there may be other conclusive evidence of abuse. Furthermore, as will be discussed in section 4, in certain types of markets, market shares and measures of concentration may be less conclusive with respect to market power and anticompetitive effects and alternative tools may be superior.

32. Market definition, including the calculation of market shares and measures of concentration is thus not an end in itself but a tool to identify the strength of the competitive constraints a firm faces and to assess the existence, the creation or the strengthening of market power and the likelihood of possible anticompetitive effects. The competitive constraints are exerted by the products and services of other firms or in other regions. The relevant market thus has to be defined with respect to the product and with respect to the geographical dimension.

33. For the market shares and the measures of concentration to be a reliable indicator of market power, it is evident that the market has to be defined in such a way that the market shares and the measures of concentration are as meaningful as possible. If the market is defined too narrowly, important competitive constraints are not taken into account and market power is overstated. If markets are defined too broadly, products are considered competitive constraints that in fact do not substantially constrain the behaviour of firms and could thus understate existing market power.

34. It has to be taken into account, that market definition is not a purely economic exercise but is a concept that is also embedded in competition law. To examine whether market definition can be substituted or complemented by other tools and methods of competition analysis, the legal dimension of market definition has to be considered. This involves in particular a study of the embeddedness of market definition in competition law ranging from statutory requirements and the use of the concept in the context of safe harbours or the calculation of fines to questions of legal certainty and the value of precedents addressed in section 6.

3. The Hypothetical Monopolist Test

35. The Hypothetical Monopolist Test (HMT) was introduced as a tool for competition analysis in the US Horizontal Merger Guidelines in 1982, but the conceptual idea can be traced back to 1956.²⁶ This

²⁵ For the role of maverick firms in the analysis of co-ordinated effects see Baker (2002) and (2008). The term maverick does not, as is often assumed, go back to the TV series or the 1994 movie *Maverick*. It also does not refer to the character played by Tom Cruise in the movie *Top Gun*. It likely refers to unbranded cattle and goes back to Samuel Maverick a Texas lawyer and cattle ranger who was considered to be “independently minded” by fellow ranchers for not branding his cattle, thereby deviating from standard practice.

²⁶ The basic idea of the HMT seems to have been expressed by the Supreme Court in its *Cellophane* decision in 1956 and by Adelman in a 1959 law review article. The idea was taken up in the late 1970s in the

method for defining the relevant market is now employed by most jurisdictions and after thirty years of application to many cases, this concept has achieved a broad consensus as the most convincing approach to market definition. The HMT is usually defined in a horizontal merger context, but it is considered to be the correct method to define relevant markets for all types of potential competition law abuses. The basic idea of the HMT is quite simple. Shares in a designated market provide a reliable indication of market power only if at least a firm with a market share of 100% in that designated market, (a monopolist), is able to exercise market power. In other words, if even a monopolist could not profitably increase the price above the competitive level, firms with market shares below 100% would certainly not be able to do so either. If that is the case, firms will not have any market power and the market shares determined in the designated market will be meaningless. In the past thirty years, some minor modifications to the HMT were made, but the main concept remains the same as when it was introduced in 1982.

3.1 *Recent version of the HMT*

36. A recent version of the hypothetical monopolist test as it is normally employed to define the relevant product market is stated in the 2010 US Horizontal Merger Guidelines:

“The hypothetical monopolist test requires that a product market contain enough substitute products so that it could be subject to post-merger exercise of market power significantly exceeding that existing absent the merger. Specifically, the test requires that a hypothetical profit-maximizing firm, not subject to price regulation, that was the only present and future seller of those products (“hypothetical monopolist”) likely would impose at least a small but significant and non-transitory increase in price (“SSNIP”) on at least one product in the market, including at least one product sold by one of the merging firms. For the purpose of analyzing this issue, the terms of sale of products outside the candidate market are held constant. The SSNIP is employed solely as a methodological tool for performing the hypothetical monopolist test; it is not a tolerance level for price increases resulting from a merger.”²⁷

37. Usually, a small but significant increase in price is considered to be an increase of 5%-10%.²⁸ A price increase is regarded as non-transitory if it lasts at least for one year. It is also assumed that firms outside the candidate market will not react and change the prices of their products.²⁹ The HMT does not require a uniform increase in the prices of all products in the market. This could be an issue if the margins of the products in the candidate markets differ considerably. In a symmetric situation with similar margins and demand structures, however, a uniform price increase is a reasonable assumption.³⁰

Handbook on Antitrust Law by Sullivan (1977), and in the Areeda and Turner (1978) treatise. The first explicit use of the term “hypothetical monopolist” can be found in a DOJ Report on competition in the coal industry in 1978. For the history of the HMT see Werden (2003).

²⁷ US Merger Guidelines, 2010, 4.1.1, footnote omitted.

²⁸ Higher or lower price increases could also be used as the choice is rather arbitrary.

²⁹ This implicitly assumes that the elasticity of supply of firms outside the candidate market is infinite. The relevant demand function to be considered is thus the structural demand and not the residual demand function. This makes an empirical analysis easier as only the own- and cross-price elasticities of demand have to be considered. See Camesasca and van den Bergh (2006:114).

³⁰ There is some debate about the type of price increase to be considered. Different options are conceivable: the increase of only one price, a uniform price increase for all products under the control of the hypothetical monopolist or a profit-maximising increase that could imply different price increases for different products. Depending on the type of price increase, the relevant market could be broader or narrower. For a discussion see Daljord and Sørgard (2011) and Daljord *et al.* (2008). If firms are involved that produce several differentiated goods, the SSNIP test has to be modified to take into account the pricing

38. A slightly different version of the HMT, as used for example in the EU, considers whether a hypothetical monopolist could profitably increase the price by a SSNIP of 5%. This version of the HMT could lead to a different market definition as a price increase of 5% may still be profitable for the hypothetical monopolist but a profit-maximising firm would in fact increase the price only by 3%.³¹

39. Whether a profit maximising hypothetical monopolist will effect a SSNIP depends on the competitive constraints imposed on him by other products or services. If the hypothetical monopolist were not to impose a SSNIP, important competitive constraints must exist that limit the market power, *i.e.* the ability to impose a profit maximising SSNIP.³²

40. The relevant market has also to be defined with respect to the geographic dimension as for example high transport cost could limit the options or the willingness of consumers to buy products in more distant locations. Stated otherwise, competitive constraints are imposed not only by substitute products available at any particular location but also by products supplied at other locations the consumers could turn to in order to buy the product. Therefore, the location of suppliers has to be considered when defining the relevant geographic market.³³ To define the spatial dimension of a market, the same conceptual approach can be employed. For geographic market definition, the HMT

*“requires that a hypothetical profit-maximising firm that was the only present or future producer of the relevant product(s) located in the region would impose at least a SSNIP from at least one location, including at least one location of one of the merging firms. In this exercise the terms of sale for all products produced elsewhere are held constant.”*³⁴

41. If the profit maximising hypothetical monopolist can impose a SSNIP, all the products and regions that pose the most immediate competitive constraints on the behaviour of the monopolist are contained in the market.

42. The competitive constraints to an increase in price come from three sources: Demand substitution, supply substitution and market entry. According to the European Commission Notice on the Definition of the Relevant Market, “demand substitution constitutes the most immediate and effective disciplinary force on the suppliers of a given product, in particular in relation to their pricing decisions.”³⁵ It comprises all the various ways buyers can react to a price increase which depends *inter alia* on the availability and closeness of substitutes, possible geographic substitution, and transport cost. All kinds of demand substitution are summarised by the elasticity of the market demand function which is explicitly

incentives of the hypothetical monopolist (see *e.g.* Davis and Garcés (2010:214)). The pricing incentives of the hypothetical monopolist also differ depending on whether he sells substitutes or complements outside the candidate market.

³¹ This difference has to be recognised when the HMT is implemented for instance using critical loss analysis. See section 3.2.3 below. Obviously the question whether a certain increase in price is profitable is different from the question whether such an increase is profit maximizing.

³² By construction, the HMT refers to a price increase. In some markets, however, competition might take place with respect to other competitive parameters than price – *e.g.* by quality or service. The HMT should therefore be adapted to different forms of non-price competition. While this is in principle possible, considering a decrease in quality, holding the price constant could prove to be more difficult than considering a price increase.

³³ The case where suppliers are not willing to serve certain customers is treated in the context of market definition with price discrimination.

³⁴ 2010 US Horizontal Merger Guidelines, sect. 4.2.1.

³⁵ Commission Notice on the Definition of the Relevant Market, OJ C 372 [1997], para.13.

taken into account by the HMT. If the price elasticity is high, consumers will react by a substantial reduction in demand because many close substitutes are available to which consumers could switch or the product or service is, for example, available in nearby locations. In this case, the hypothetical monopolist would not impose a SSNIP and the candidate market would not qualify as a relevant market.³⁶

43. Next to demand substitution, supply substitution is the second important competitive constraint a hypothetical monopolist faces. It refers to the ability of other firms to quickly redirect existing productive assets, not under the control of the hypothetical monopolist, for the production of substitutable products. In this case, supply substitution can constrain the hypothetical monopolist's market power in a similar way to the constraint imposed by demand substitution. Supply substitution that has a competitive impact requires that the firms producing substitutes must possess the necessary production facilities and the technological know-how.³⁷ They must also have access to the necessary distribution channels, marketing concepts and must be able to restructure production quickly, normally in less than one year and at insignificant cost. This implies, for example, that production and supply capacity must not be tied up under long-term contracts. If any of these conditions is not satisfied, supply substitution is unlikely.

44. Supply substitution is treated differently in different jurisdictions. In the EU, "Supply-side substitutability may also be taken into account when defining markets in those situations in which its effects are equivalent to those of demand substitution in terms of effectiveness and immediacy."³⁸ This has the conceptual advantage that the competitive constraints imposed by demand and supply substitution are treated symmetrically. Such a symmetric treatment of demand and supply substitution could, however, also lead to problems with respect to the product market. If supply substitution is considered at the market definition stage, it could occur that two products A and B that are no substitutes in demand are forced into the same product market because the producer of B could easily and quickly change production from B to A. This may result in an unintuitive product market comprising products that are not demand substitutes.³⁹

45. The US Horizontal Merger Guidelines focus only on demand substitution at the market definition stage of the analysis. Reactions of suppliers are dealt with at later stages of the enquiry when identifying market participants and assigning market shares. This approach considers firms that would easily and quickly divert production at least partly into the relevant market as rapid entrants and they would be considered as market participants. If information about capacities that could profitably be diverted to the relevant market is available, these rapid entrants would be assigned market shares according to these capacities. Thus, the relevant market defined with respect to demand substitution would be expanded to take into account supply-side flexibility.

46. Both methods to deal with supply substitution take this important competitive constraint into account. The main difference is the stage of the analysis when this is done. In general, these two approaches, if carried out correctly, should lead to similar market shares and measures of concentration. The simultaneous consideration of demand and supply substitutability at the stage of market definition does, however, require an analysis of the competitive reactions of rivals and a balancing of pro- and

³⁶ In the case of buyer power (monopsony or oligopsony), relevant markets should be defined analogously with respect to the competitive constraint of seller substitution. See Baker (2007:133).

³⁷ As the term substitution implies this does not necessitate identical technology but simply the possibility to adapt sufficiently quickly and at limited cost.

³⁸ Commission Notice on the Definition of the Relevant Market, OJ C 372 [1997], para.20.

³⁹ In addition, when the price elasticity of demand or cross-price elasticities are measured, *e.g.* to determine the closest substitutes, one has to estimate the residual demand function which also contains the reactions of competitors while focusing on demand substitution alone at this stage allows the estimation of the structural demand function that contains only demand substitution something that is much easier to do.

anticompetitive effects.⁴⁰ Defining the relevant market in this way is substantially more involved and could generate controversy. The focus of demand side substitution in the first stage of a market definition seems to have some practical advantages as one can concentrate on one competitive constraint at a time.

47. Market entry and the related problems of the existence and the extent of barriers to entry and product repositioning are generally not dealt with at the stage of market definition but at a later stage of competition analysis *within* the relevant market. Therefore, these competitive constraints will not be considered further here.

3.2 Implementation of the HMT

3.2.1 Evidence used for market definition

48. One source of evidence for demand substitution stems from changes in market structures, for example the entry of a new supplier or other natural experiments.⁴¹ Second, the same market may have been subject to a recent competition analysis so that data, for example an estimated demand system, are available allowing the estimation of own- and cross-price elasticities of demand at least for past consumer behaviour. Third, evidence of demand substitution could be obtained by consumer surveys.⁴² In surveys, consumers are asked to which products or locations they would turn to in order to substitute for the product under consideration if the price were to be increased by a SSNIP. This could be done empirically by a suitable sampling method or by interviews. Fourth, the firm itself, for example its marketing division, may have collected data on buyer substitution behaviour to identify the closest rivals. Fifth, information about likely substitution behaviour could be provided by industry experts, consultants, former executives, suppliers of complements or distributors. Sixth, the cost of switching to substitutes and the time required for switching to products outside the candidate market as well as the characteristics and location of the product could allow inferences about demand substitution. Evidence of supply substitution could be gained from industry and technology experts and also from past behaviour of market participants with respect to structural changes in the market and their responses to the pricing behaviour of competitors.

3.2.2 The HMT in merger cases

49. To define the relevant product market in a merger case, the HMT generally starts with a narrowly defined candidate market comprising the products of each of the merging firms.⁴³ If a monopolist maximising its profits with respect to these products would effect a SSNIP to at least one of these products, the relevant market is defined, if not, the next best substitute (or substitutes) is included in the candidate market, and the test is applied again for the larger group of products. This procedure is iterated until a set of products is found that satisfies the test.⁴⁴ Thus, starting from some product or group of products, the

⁴⁰ See for example Baker (2007:133) for a discussion of the problems that integrating supply-side substitution at the stage of market definition (as opposed to a later stage) may entail.

⁴¹ A survey of economic evidence for market definition and the measurement of market power is provided by Baker and Bresnahan (2008). For natural experiments in competition analysis see Davis and Garcés (2010:185).

⁴² See e.g. Baker and Bresnahan (2008:12).

⁴³ Baker (2007:144). In practice, finely disaggregated candidate markets will only be considered if information about the substitution behaviour of consumers is available. In markets with finely differentiated products, often groups of differentiated products can be aggregated and such groups can be taken as the starting point. See for example Baker (2007:145).

⁴⁴ Starting from two candidate markets, this process could in principle lead to relevant product markets that do not overlap – in this case the merger would not be considered as horizontal as the firms do not compete in the same market.

relevant market is usually taken to be the smallest market that passes this test. This does not imply that all products that consumers consider to be substitutes are included in the relevant market. The reason for this is that there are several relevant markets as a relevant market that contains more substitutes continues to satisfy the HMT.⁴⁵

50. An equivalent procedure is used to define the relevant geographic market. Starting with the locations of the merging firms, additional locations are added to the candidate markets until the test is satisfied. From an economic point of view product and geographic markets need to be defined simultaneously because otherwise markets may be defined too narrowly. The reason for this is that substitution with respect to the product dimension or the geographic dimension could in itself already be small enough to make a SSNIP profitable, while a simultaneous substitution along both dimensions may remain unprofitable. This case can arise if the consumers that buy substitute products are different from those that buy at other locations.⁴⁶

51. Despite the fact that this algorithmic procedure is sensible from a conceptual point of view, this strictly iterative method and the smallest market principle could cause problems as “the methodology can fail to detect a horizontal merger as horizontal, because the test can be satisfied before the provisional market expanded to include a product of the merging partner even though the products competed.”⁴⁷ Therefore, some flexibility in the price increase threshold is reasonable, if a small increase in the threshold would change a merger from a non-horizontal to a horizontal one, a slightly higher threshold should be employed.⁴⁸ Another practical problem that complicates the application of the iterative procedure is the identification of the next best substitute(s).

52. A related problem with the smallest market principle could for example arise when there are closer substitutes to the starting product than those products already included in the relevant market. In these cases, markets could consist of “miscellaneous unconnected links in the chain of substitutes”⁴⁹. To avoid such unintuitive markets, any ‘holes’ in the relevant market can be filled with closer substitutes.

53. Despite these problems, the smallest market principle should be applied to avoid the definition of markets that are overly broad. This principle is also applied in the US Horizontal Merger Guidelines and in the Merger Assessment Guidelines of the UK Competition Commission and the Office of Fair Trading:

*“The relevant market may not be the narrowest market that meets the hypothetical monopolist test. However, to the extent that they use them, the Authorities will not normally have regard to market share and concentration thresholds calculated on anything other than the narrowest market that satisfies the hypothetical monopolist test.”*⁵⁰

⁴⁵ Baker (2007) pointed out that if relevant markets differ depending on the starting point, for example if they overlap or are nested, a competition analysis should be carried out in all relevant markets where competitive concerns arise.

⁴⁶ From a theoretical point of view, the distinction of product market definition and geographic market definition is an artificial one. As goods in economic theory are defined by their physical characteristics, location and point in time of availability, demand substitution automatically includes all types of substitution.

⁴⁷ Lopatka (2011:80).

⁴⁸ See Rill (1990:49f).

⁴⁹ Farrell (2011:663).

⁵⁰ CC/OFT (2010), Section 5.2.3.

54. Nevertheless, application of the hypothetical monopolist test makes it necessary to identify the products that can be considered as the next best substitutes to be included in a candidate market if this market has turned out not to be a relevant market. The economic concepts employed to identify empirically those products that impose the most substantial competitive constraints are cross-price elasticities and diversion ratios.

Box 3. Cross price elasticities and diversion ratios

The cross-price elasticity is defined as the percentage change in the demand for product 2 when the price of product 1 increases by 1%. Formally, this elasticity is defined as

$$\varepsilon_{21} = \frac{\partial Q_2(p_1, p_2, \dots, p_n)}{\partial p_1} \frac{p_1}{Q_2},$$

where p_1 denotes the price of product 1 and Q_2 the quantity demanded of product 2 (at prices p_1, p_2, \dots, p_n). Note that in the case of substitutes, this elasticity is positive. It measures the degree of substitutability between two products. Cross-price elasticities measure the degree of substitutability between two products. *E.g.* a cross-price elasticity between products 1 and 2, ε_{21} , of 1.5 implies that a 1% increase in the price of product 1 leads to an increase in the demand of product 2 by 1.5%.

The diversion ratio between products 1 and 2 characterises how much of the demand reduction of product 1 caused by a price increase of this product is diverted to product 2. This of course depends on the own-price elasticity of product 1 and on the cross-price elasticity between products 1 and 2. Formally, the diversion ratio between products 2 and 1 is defined as

$$D_{12} = \frac{\partial Q_2 / \partial p_1}{\partial Q_1 / \partial p_1} = - \frac{\varepsilon_{21} Q_2}{\varepsilon_1 Q_1}.$$

Sometimes, it is useful to weigh the diversion ratio with the relative prices of the two products. This gives the diversion ratio in terms of revenue.

$$D_{12}^r = \frac{\partial Q_2 / \partial p_1 p_2}{\partial Q_1 / \partial p_1 p_1} = - \frac{\varepsilon_{21} Q_2 p_2}{\varepsilon_1 Q_1 p_1}.$$

This diversion ratio shows how much revenue is diverted from product 1 to product 2 by an increase in p_1 . The magnitude of the revenue diverted of course depends on the prices of the two products.

55. The diversion ratio between products 1 and 2 characterises how much of the demand reduction of product 1 caused by a price increase of product 1 is diverted to product 2. It measures the closeness of competition between two products. For example, if the own-price elasticity ε_1 is -3, the cross-price elasticity ε_{21} is 1.5, and the quantities of the two products are 2000 for product 1 and 1500 for product 2, then the diversion ratio is 35% for a 5% increase in the price of product 1.

56. If quantitative evidence about the substitution behaviour of buyers, *e.g.* from a consumer survey or from an estimation of the demand system is available, than own- and cross-price elasticities can be estimated by using econometric methods.⁵¹ These measures can be used to rank the possible substitutes according to their cross-price elasticities and/or diversion ratios and add the closest substitute to the candidate market and apply the HMT with respect to the extended market.⁵² The cross-price elasticity used

⁵¹ Quantitative techniques used *inter alia* to estimate demand functions, demand systems and elasticities will not be considered. A survey of these methods is provided in Davis and Garcés (2010), a study originally commissioned by DG Competition.

⁵² On ranking substitutes, see Werden (1998).

to rank the closest substitutes for a given product measures the percentage change in the quantity demanded of the possible substitutes when the price of one or several goods in the candidate market increases. For example, if product 1 is in the candidate market and the question is whether product 2 should be included in this market, the relevant cross-price elasticity is ε_{21} . Note also that cross-price elasticities and diversion ratios need not lead to the same ranking of products as the diversion ratio also depends on the quantities sold of the two products. If these quantities differ considerably, different rankings by cross-price elasticities and diversion ratios could result in different relevant markets depending upon which ranking is applied.⁵³

57. If no direct evidence about the substitution behaviour of consumers is available so that elasticities and diversion ratios cannot be estimated, the next best substitute to be included in the candidate market has to be chosen based on the best qualitative evidence available. Here, aspects such as interchangeability, physical characteristics or the price level could be considered as indicators of the degree of substitutability.

3.2.3 *Implementing the HMT by critical loss analysis*

58. The question asked by the HMT, whether a profit-maximising hypothetical monopolist would impose a SSNIP does not only depend on the demand substitution but also on the profit margin of the hypothetical monopolist.⁵⁴ A price increase by the monopolist has 2 effects: the margin of the quantity he continues to sell after the price increase has become larger but the quantity he sells has decreased. A price increase therefore is profitable only if the additional revenue due to sales at a higher margin is larger than the reduced revenue due to the drop in the quantity sold. This relation between the profit margin and volume of demand substitution caused by a price increase of S per cent has led to the concept of the critical loss and its counterpart, the critical elasticity.⁵⁵ It is not an alternative to the HMT but a way to implement this test.⁵⁶

59. The break-even critical loss is defined as the volume of demand that has to be lost in response to an increase in price by 5% in order for this price increase to be unprofitable. Stated otherwise, the critical elasticity indicates the maximum value of the price elasticity of demand (approaching the indifference point from below) that induces a hypothetical profit-maximising monopolist to increase the price by S . The critical loss has to be compared with the expected actual loss (AL) a firm would incur by a price increase. This actual loss is approximately given by the price increase S multiplied by the price elasticity of demand ε .⁵⁷ If the critical loss is smaller than the actual loss, a 5% price increase would be unprofitable and the

⁵³ In practice, empirical methods as price correlation analysis or stationarity tests are often used to determine whether products belong to the same relevant market. For a survey of these methods see for example Davis and Garcés (2010:169f.). The use of these methods is, however, criticised because the results could be misleading as these approaches do not consider the central question of market definition, i.e. the amount of buyer substitution. (Baker (2007:152)). A similar argument holds for tests of shipment flows (Elzinga-Hogarty-test) that look at the insulation of an economic region according to inflows (“little in from outside” (LIFO)) and outflows (“little out from inside” (LOFI)). If both are low, it is argued that the area constitutes a relevant geographic market. However, as this test is based on current prices, it does not answer the question of buyer substitution in the case of a price rise and may thus over- or understate the geographic boundaries of the market. See for example Werden (1981) or Baker (2007:153).

⁵⁴ In what follows, we will not consider supply substitution at the stage of market definition.

⁵⁵ This concept was introduced by Harris and Simons (1989).

⁵⁶ Corresponding to the two different versions of the HMT, one with a profit-maximising SSNIP and one with a profitable SSNIP, two versions of the critical loss exist, the “profit-maximising critical loss” and the “break-even critical loss”.

⁵⁷ This holds for a linear demand function or approximately for small increases in price. If demand is non-linear, actual loss depends on the curvature of demand. See Ezrielev and Simons (2011).

next best substitutes have to be added to the market and the critical loss analysis has to be repeated with the enlarged candidate market.

60. The standard break-even critical loss in the homogeneous products case can be derived as follows.⁵⁸ Consider the price in the starting situation p^0 and the price after an increase p^1 . The quantities demanded at those prices are denoted by $Q(p^0)$ and $Q(p^1)$ where the demand at the higher price is assumed to be smaller than at the lower price. The profit of the firm that produces with constant marginal cost c depends on the price chosen and is denoted by $\pi(p^0)$ and $\pi(p^1)$. The difference in prices $p^1 - p^0$ is denoted by Δp , the difference in profits by $\Delta\pi$ and the difference in quantities demanded $Q(p^0) - Q(p^1)$ by ΔQ . The price increase is just not profitable if the change in profits, denoted by $\Delta\pi$ is 0:

$$\Delta\pi = (p^1 - p^0)Q(p^1) - (p^0 - c)(Q(p^0) - Q(p^1)) = 0.$$

61. The term $(p^1 - p^0)Q(p^1)$ describes the additional profit generated by selling the quantity $Q(p^1)$ at a higher price and the term $(p^0 - c)(Q(p^0) - Q(p^1))$ denotes the lost profit due to the reduced quantity sold. If the two effects are equal, the price increase is profit-neutral.

62. This can be written as

$$(p^1 - p^0)(Q(p^1) - Q(p^0) + Q(p^0)) - (p^0 - c)(Q(p^0) - Q(p^1)) = 0$$

or

$$(p^1 - p^0 + (p^0 - c))(Q(p^1) - Q(p^0)) = (p^1 - p^0) Q(p^0).$$

63. Dividing by $Q(p^0)$ and p^0 and rearranging terms yields

$$\frac{Q(p^0) - Q(p^1)}{Q(p^0)} = \frac{p^1 - p^0}{p^0} / \left(\frac{p^1 - p^0}{p^0} + \frac{p^0 - c}{p^0} \right).$$

The term on the left side denotes the reduction of the quantity demanded due to the price increase in percentage terms, *i.e.* the critical loss (CL), $(p^1 - p^0)/p^0 = S$ is the percentage increase in price and $(p^0 - c)/p^0 = m$ is the margin.

64. Thus, the break even critical loss can be written as

$$CL = \frac{S}{S + m}.$$

65. For example, if the price increase is 5% and the margin is 45%, then the critical loss would be 10%, *i.e.* the firm would have to lose 10% of its demand if the price were to go up by 5% to make the price increase unprofitable. Note that the break-even critical loss is independent of the specific shapes of the underlying demand or cost functions and can be measured by considering only the margin and the price elasticity of demand.

66. This analysis asks whether a 5% price increase would be profitable. The hypothetical monopolist may, however, only impose a price increase of for example 3% as this maximises profits, even if a 5% price increase implies a higher profit compared to no change in price at all. As a result, a “profit-maximising” critical loss can be defined and it can be shown, that the latter is always smaller than the

⁵⁸ The presentation follows Davis and Garcés (2010:211).

“break-even” critical loss. Implementing the HMT with the break-even critical loss could thus lead to narrower markets as the monopolist can lose more sales before this drop in volume becomes critical.

67. If the critical loss for a profit-maximising hypothetical monopolist is considered, the shape of the demand function has a substantial impact on the critical loss.⁵⁹ In the case of a linear demand function, the profit-maximising critical loss CL_l^* is given by

$$CL_l^* = \frac{S}{2S + m},$$

where the subscript l stands for linear. For a demand function with constant elasticity, an isoelastic demand function, the profit-maximising critical loss CL_i^* is

$$CL_i^* = 1 - (1 + S)^{\frac{-(1+S)}{S+m}}.$$

with the subscript i denoting isoelastic. If the actual loss is smaller than the critical loss, the candidate market should be enlarged by the closest substitutes. A price increase is unprofitable (or at least not profit maximising) if the actual loss exceeds the critical loss. If that is the case, the relevant market is found.

68. Note that a higher margin is associated with a lower critical loss as small increases in price on sales that continue to be made are less important, by definition of high margins, than the loss of profits on the sales foregone. Thus, it is often argued by parties that for a firm with a high margin, the actual loss by a 5% price increase will surely be larger than the small critical loss. Therefore, such a price increase would not be profitable and the market would have to be enlarged. However, one has to take into account that a high margin at the starting price implies that the price elasticity of demand at this price is low, *i.e.* consumers are not particularly price sensitive. Therefore, a small increase in price should be associated with a small loss in demand. The large margin at the starting price and the large losses caused by a price increase could be an indication that the price has already been raised above the competitive level. If this were the case, the firm already possesses market power and the market should not be enlarged.⁶⁰

69. There is considerable debate on the proper application of the critical loss analysis in merger cases.⁶¹ It has been pointed out that the hypothetical monopolist controls several products that are not necessarily perfect substitutes but could be differentiated products. In such instances the substitution between the products as characterised by cross-price elasticities and diversion ratios has to be taken into account when calculating the critical loss.⁶²

70. For example, if a hypothetical monopolist over the products 1 and 2 would increase the price of product 1, then a fraction D of the reduced demand would be diverted to product 2 and the actual loss would be only the lost sales not recaptured by product 2. In the case of a uniform price increase for both products (or for all products in the candidate market if there are more than two) the aggregate diversion ratio D indicates the fraction of lost sales that are recaptured by all other products under the control of the hypothetical monopolist. Thus, the actual loss is given by $(1 - D)S\varepsilon$. Using the Lerner index, this can be

⁵⁹ For the derivation of the formulas see Werden (1998).

⁶⁰ For a discussion of this argument see Farrell and Shapiro (2003) or O’Brien and Wickelgren (2003).

⁶¹ See for example Coate and Simons (2009), (2010a) and (2010b), Coate and Williams (2005) and (2008), Daljord *et al.* (2007), Farrell and Shapiro (2008) and (2010), Katz and Shapiro (2003) and (2004), and O’Brien and Wickelgren (2003) and (2004), as well as Scheffman and Simons (2003).

⁶² See Farrell and Shapiro (2003) or O’Brien and Wickelgren (2003).

written as $(1 - D)S/m$.⁶³ This actual loss is smaller than the break-even critical loss, *i.e.* a relevant market is defined if the following condition holds:⁶⁴

$$D \geq \frac{S}{S + m}.$$

71. This condition is easier to satisfy if the margin is high and/or if the aggregate diversion ratio is large, *i.e.* if the hypothetical monopolist is able to recapture a larger share of the demand lost by an increase in the price of one of its products.

72. The condition differs if instead of the break-even critical loss the critical loss for a profit-maximising hypothetical monopolist is considered. For a linear demand function, this condition becomes

$$D \geq \frac{2S}{2S + m}.$$

73. To implement the HMT by critical loss analysis, it has to be checked whether all the assumptions that underlie the derivation of the formula that is to be applied are satisfied.⁶⁵ For example, the derivation of the formula implicitly assumes that the marginal cost of the hypothetical monopolist remains constant. Also, the total cost function and the demand function is assumed to be continuous. However, if for example substantial amounts of fixed cost could be saved by a reduction in output (for instance by closing a plant) or if the demand function exhibits a kink at the prevailing price (because the elasticities for different uses of the product differ substantially), application of the formulas would lead to overly broad markets. In such cases, the HMT should not be implemented by a critical loss analysis and the test has to be adapted to the specific facts of the case.⁶⁶

74. Provided that all the underlying conditions for the application of the critical loss analysis are satisfied, the HMT can be implemented by employing this analysis. Application of critical loss analysis, however, requires a detailed study of the substitution behaviour of consumers, *i.e.* an estimate of diversion ratios and of the firms' margins. There is some controversy concerning the use of critical loss analysis to implement the HMT for market definition.⁶⁷ If the necessary information to carry out a thorough critical loss analysis is available, that is diversion ratios and margins are known, this information in itself would almost be sufficient to estimate market power directly without defining a relevant market in the first place.

3.2.4. *The HMT in monopolisation or abuse of dominance cases*

75. In merger cases, the usual benchmark price the analysis starts from is the prevailing price. This is because in merger analysis the question is whether a merger will create or increase market power. The analysis focuses on possible future effects of the merger as compared to the current situation and increases

⁶³ The Lerner index implies that $\varepsilon = 1/m$.

⁶⁴ If the price of only one product is increased, the condition is given by $D \geq x/m$. (see Daljord *et al* (2007)). This relates to the question of how the hypothetical monopolist would increase the prices of the products in the candidate market. For extensions of the critical loss concept see for example Katz and Shapiro (2008) or ten Kate and Niels (2010).

⁶⁵ This includes the shape of the demand function if the profit maximising critical loss is to be calculated.

⁶⁶ See Werden (2008).

⁶⁷ See for example Baker (2007), Carlton (2007), and Coate and Fischer (2008), as well as Coate and Williams (2007).

of prices above the currently prevailing level are considered.⁶⁸ The analysis in merger cases therefore is in general prospective.⁶⁹ In monopolisation cases or in cases of an abuse of a dominant position, the potential anticompetitive effects may already have occurred. As a result, the analysis may be retrospective and the prevailing price may already be higher as compared to the but-for price.⁷⁰ A mechanical application of the HMT in retrospective harm cases, taking the prevailing price as the benchmark price could lead to overly broad markets and an underestimation of a firm's market power. This is known as the *cellophane fallacy*.

Box 4. The Cellophane Fallacy

The Cellophane Fallacy is a well-known and generally accepted critique of the SSNIP test. Its name is directly linked to the US Supreme Court case in *United States v. E.I. du Pont de Nemours and Co.*,⁷¹ in which the Court accepted an overly broad definition of the relevant market thereby failing to detect du Pont's market power.

At the time du Pont was the sole manufacturer of cellophane. Accused of violating Section 2 of the Sherman Act, and more specifically of monopolising the interstate commerce for cellophane, the company argued that the relevant market consisted of flexible wrapping materials (such as aluminium foil, wax paper, saran paper and polyethylene) rather than just cellophane, as claimed by the Department of Justice. The choice of the relevant market was of great importance given that it led to substantially different market shares, less than 20% for the broad market and over 75% for the narrow market respectively.

First the District Court, and later on also the Supreme Court leaned towards the arguments submitted by du Pont and ruled that within the broadly defined market of flexible wrapping materials, the company did not possess substantial market power. Analysing interchangeability between products, the Supreme Court introduced the use of cross elasticity of demand. Having found that it was very high, the Court concluded that the inclusion of other products in the relevant market was justified.

The Court's decision has been subject to extensive criticism because of its failure to recognise that the prices on which the market definition was based were already tainted by the infringement. In other words, the market definition proceeded prospectively, as if in a merger case, not taking the (at least partial) retrospective effects of the alleged infringement into account. As prevailing prices above the competitive level were used, a high degree of substitutability between cellophane and other wrapping materials was found and a larger market definition was erroneously embraced.⁷²

⁶⁸ A notable legal exception is the US where prevailing prices pre-merger can be adjusted downwards if the authority suspects co-ordinated behaviour. Presumably the idea is that co-ordinated behaviour will eventually break down and current prices should therefore not be used. As a general principle it should, however, be clear that a competition law infringement will not allow the authority to go beyond remedying the identified infringement or prohibiting the merger. This implies that analytically the market should be defined based on prices that are not (yet) affected by the effects of the merger or conduct.

⁶⁹ Other obvious exceptions are merger regimes without (pre-) notification procedure where a merger may already be consummated for some time before it is investigated. A merger could also prevent a price from falling – this is in principle also a prospective analysis as the prevailing price is compared to the expected future price.

⁷⁰ This is of course identical to the co-ordinated behaviour problem in merger analysis or the consummated merger issue mentioned above.

⁷¹ *United States v. E.I. du Pont de Nemours & Co* 351 US 377 [1956].

⁷² The problem of the cellophane fallacy is explicitly acknowledged for example by the EU and the UK in their respective guidance documents. The recognition of the problem also stopped the Commission from applying the SSNIP test in the Article 101 MasterCard case. See COMP/C.34.579, MasterCard, 19 December 2007.

76. If the currently prevailing price has already been increased substantially above the competitive level, consumers might consider products as substitutes that would not be substitutes at the competitive price level.⁷³ If a monopolist already charges his profit-maximising price, a further increase by 5% is certainly not profitable because otherwise the monopolist would have increased the price. In this case starting the HMT from the prevailing price will find that a profit-maximising monopolist will not impose a 5% price increase and thus that the candidate market is too small and further products have to be added. This would lead to smaller market shares and thus an underestimation of the firms' market power.

77. In principle, the solution to this problem is to use the competitive (but-for) price as a benchmark price in a retrospective competition analysis, not the currently prevailing price. In this case, the relevant market includes those products and regions that are substitutes at the price level prevailing in a competitive (but-for) market. If, however, the competitive but-for price is known, than market power can be inferred directly by comparing the actual and the competitive but-for price, *i.e.* measuring the margin. The appropriate counterfactual or but-for price is, however, in general not easy to determine.⁷⁴

78. In some competition laws such as for example under EU or German law, market definition in abuse of dominance cases has a dual function: First the market is defined to assess whether a firm has a dominant position where dominance is determined by certain market share thresholds and second, the effects of the alleged anticompetitive behaviour are examined. In this context, market definition and market shares are used to support the evaluation of possible anticompetitive effects.⁷⁵

79. The estimation of the competitive but-for price has an impact on the size of the relevant market. Starting the HMT from an estimated competitive counterfactual price that is more than 5% below the prevailing price, a price increase of 5% would be profitable, concluding the definition of the relevant market. If the difference between the estimated competitive price is smaller than 5%, a price increase of 5% has to be considered unprofitable and further products would have to be added to the candidate market, resulting in smaller market shares. This market definition exercise is aimed at identifying anticompetitive effects and is distinct from the market definition that is required to determine whether the firm in question is dominant.⁷⁶

80. It could also happen that the prevailing price is below the competitive price. This could be the case if the firm receives subsidies. If these payments cause the prices of products and services to remain at a level below the competitive price, a "reverse cellophane fallacy" could occur. Due to the artificially low prices, consumers are not willing to consider alternative products, which they would have accepted as

⁷³ This is clear in case of a linear demand function where the price elasticity is an increasing function of price.

⁷⁴ For methods to evaluate market power using competitive benchmark prices see for example Hausman and Sidak (2007) or OECD (2012a).

⁷⁵ Until quite recently, a rather strict form-based approach was employed to assess anticompetitive behaviour, *i.e.* certain forms of behaviour were prohibited *per se* for dominant firms and the economic effects of this behaviour were not analyzed further. In the last years, a more effects based approach is employed, analyzing the economic effects of the allegedly anticompetitive behaviour on a case-by-case basis.

⁷⁶ The definition of the relevant market to assess whether a firm has a dominant position leads to a significant conceptual problem as market definition typically depends on the theory of harm. For analysing potential anticompetitive effects either the prevailing price, in case of a prospective theory of harm or an appropriate counterfactual (but-for) price should be chosen if the analysis is retrospective. For an 'objective' determination of whether a firm has a dominant position in a market, the price without market power, *i.e.* a price equal to the long-run marginal cost or average incremental cost should be used. While this distinction may be of limited practical relevance, it implies that at least in theory two distinct market definition exercises with two distinct defined markets in any single abuse of dominance case under EU law need to be conducted.

attractive substitutes at a higher, competitive price. In this case, there is a risk to define the relevant product market too narrowly, as important substitutes are not included in the market. This could lead to an overestimation of market power.

81. The abuse of a dominant position or the attempt to monopolise does not necessarily imply a change in the price level. If a dominant firm attempts to exclude a smaller rival from the market by input foreclosure, this behaviour has no immediate effect on the market price. Only after the rival has been excluded, the dominant firm will presumably be able to charge a price substantially above the competitive level. In this case, the analysis is prospective similar to merger cases and the currently prevailing price should be the starting point for a SSNIP to define the relevant market.⁷⁷

82. As a general rule, the benchmark should be the price that would prevail absent the abusive behaviour. Estimating the counterfactual price allows determining the effects of an abusive conduct. This is quite distinct from the market definition that some laws require in order to determine whether the law actually applies to the firm at hand.⁷⁸ The determination of a benchmark price is often also controversial in private damages cases as it could have an impact on the size of the relevant market and thus on the calculation of damages. One way to assess the competitive price in practice is the use of comparable markets.⁷⁹ If a competitive market for the same product exists, for example in a different region or in another country, the price in this region could be taken as a proxy for the competitive price. A market that corresponds to the one in question in every respect (supply, demand, technology, preferences, income etc.) will, however, often be difficult to find. Further, the analysis must identify all the differences between the two markets and allow for these by additions or deductions.

83. Having defined a relevant market in a retrospective competition analysis a ‘consistency check’ should be undertaken. First, the market definition should be consistent with demand- and supply-side substitution, second, all the products in the market so defined should be substitutes at the prevailing price and third, the market definition should be plausible with respect to the characteristics and uses of the products in the market.⁸⁰

84. From a conceptual point of view and despite the practical difficulties, the HMT provides the right framework to define the relevant market in dominance and monopolisation cases as this test takes into consideration the most important competitive constraints.

3.3 *Alternative ways to define the relevant market*

85. Besides the hypothetical monopoly test, two other concepts of market definition have to be mentioned. The first one, the Full Equilibrium Relevant Market (FERM) test, can be considered as an extension of the HMT. The second defines markets according to consumers’ needs, is based mainly on the functional interchangeability of products and is a traditional form of market definition used in German legal practice.

⁷⁷ See Bishop and Walker (2010:128) and Werden (2000).

⁷⁸ In mergers there is obviously no such conflict as market definition is exclusively used to gauge the effects of the merger on competition. Market definition in Article 102 TFEU cases under EU competition law in contrast legally require a market to be defined in order to determine the applicability of the law distinct from the analysis of anticompetitive effects as already discussed above.

⁷⁹ See OECD (2012a) for an extensive discussion of different benchmarking concepts.

⁸⁰ Bishop and Walker (2010:129f). If there are several possible relevant markets, this check should be applied to all possible market definitions.

3.3.1 *The Full Equilibrium Relevant Market Test*

86. The HMT as defined in the US Merger Guidelines assumes that firms outside the candidate market do not react to the price increase of the hypothetical monopolist. This assumption is made to simplify the analysis and concentrate on demand substitution first and to analyse supply substitution at a later stage of the analysis. Firms outside the candidate market will in general, however, react to a price increase by the hypothetical monopolist. Therefore, the HMT is not an equilibrium test as these reactions are not taken into account – the HMT compares an equilibrium situation with a disequilibrium. The Full Equilibrium Relevant Market (FERM) test allows for pricing reactions of firms outside the candidate market.⁸¹ The prices set by the hypothetical monopolist and by the firms outside the candidate market are mutual best replies, *i.e.* the FERM test is an equilibrium test that considers the combined effects of demand and supply behaviour. In addition, the FERM supposes that the hypothetical monopolist maximises the joint profit of all the firms products in the candidate market, *i.e.* different price increases for different products in the candidate market are possible. The test has been applied to the computer server industry. The resulting relevant markets turned out to be smaller than those identified by the HMT as the firms outside the candidate market react to the increase in prices by the hypothetical monopolist by raising their prices as well which increases the profitability of the first price increase.

87. From an economic point of view, the FERM test is a very attractive concept as it considers the strategic behaviour of all participants. Its application, however, requires assumptions about the nature of competition in the market at the first stage of the competition analysis which could lead to controversy.

3.3.2 *Markets based on consumers needs*

88. This type of market definition, known as the “Bedarfsmarktkonzept” is the traditional approach to market definition employed in German legal practice. Under this concept, products are assigned to the same relevant market if they are functionally interchangeable, exhibit similar physical characteristics and if their price levels are comparable.⁸² All these criteria are, however, not directly relevant for the central question that market definition tries to answer: What are the competitive constraints a firm faces? Two products need not be entirely (or even largely) functionally interchangeable to impose competitive constraints upon each other, nor must they exhibit the same physical characteristics.⁸³ What is important is the impact of those properties on substitution behaviour. Even substantial price differences are no clear indicator that the products belong to different markets. If the goods differ in quality or durability, a durable high-quality product may be a close substitute for a considerably cheaper but low-quality and short-lived one.

89. While this test may provide useful indications as to which group of products may be substitutes in a relevant market defined in an economically meaningful way, it is not apt to answer the central questions of market power and the competitive constraints placed on it by substitutes.

3.4 *Conclusion*

90. From an economic point of view the hypothetical monopolist test is the correct conceptual framework to define a relevant market as a first step in a competition analysis. It allows determining the

⁸¹ See Ivaldi and Lörincz (2005) and (2011).

⁸² "Such functional interchangeability does not carry as its central aim the ultimate task of identifying market power, as the products' attributes only contain relevance inasmuch as that they influence the extent of competition in between commodities and locations. Consequently, a market definition based upon irrelevant product characteristics may lead to distorted conclusions of the firms' market power". Camesasca and van den Bergh, (2002:158).

⁸³ For example technology used in the production of a completely different product may be reconfigured to produce a substitute that exerts competitive constraints.

competitive constraints a firm faces. If sufficient data about the substitution behaviour of consumers and also on profit margins is available, the HMT can be implemented by a critical loss analysis. In cases of monopolisation or abuse of dominance, market definition is more complicated on a conceptual level as in merger cases as it has – at least in some jurisdictions – a dual function, *i.e.* to determine whether a firm has a dominant position and to support the assessment of possible anticompetitive effects. Determining anticompetitive effects is difficult in particular in retrospective cases where the starting price for the HMT should be the counterfactual price as the prevailing price may result in an overly broad market. If comparable markets can be found, the prices on these markets could be used as the counterfactual.

91. Even if the HMT is carried out correctly, the predictive power of the market shares and concentration measures might, however, be different for different types of markets. In the next section markets with distinct features that are often encountered in competition analysis but where market shares and concentration measures might not be particularly informative are discussed. In markets with differentiated products where the direct competition between products is decisive, in bidding markets where the intensity of competition between bidders is important, in two-sided markets with indirect network effects or in highly dynamic and innovative markets where competition might be characterised as competition “for the market” rather than “competition in the market”, market shares may allow drawing no or only very limited inferences about market power and competitive effects. In these cases, thresholds and safe harbours based on market shares as a first screen to discriminate between unproblematic and problematic scenarios, may over- or underestimate the market power of firms and the potential competition effects. In these cases employing alternative concepts as screening devices that have a higher predictive power than market shares should be considered. This, however, does not imply that the definition of the relevant market should be abandoned. As was pointed out before, market definition serves several other important functions in addition to providing a simple proxy for market power.

4. Market definition for specific types of markets

92. In what follows we consider some markets with specific features that require adaptations of the standard version of the HMT. In particular, markets are discussed where it is difficult to assess boundaries or where the nature of competition in the market leads to market shares that are only weak indicators of market power.⁸⁴

4.1 Price discrimination markets

93. Some markets are characterised by substantial differences between consumers for example concerning their willingness to pay, their location with respect to suppliers or their ability to substitute. Such differences may enable the seller to engage in price discrimination, *i.e.* charge different price-cost margins to different groups of buyers. This has to be taken into account when applying the HMT. If a profit-maximising hypothetical monopolist were able to increase the price charged to a specific group of consumers by 5% to 10% and to continue charging that price for a considerable period of time, the relevant market would have to be defined not only by the products and regions but also by the group of consumers in question.⁸⁵ However, such price discrimination is feasible only if several conditions are satisfied. First of all, arbitrage between the various groups of buyers has to be excluded as this would render price discrimination impossible. In addition, the hypothetical monopolist must be able to identify the various groups of consumers, the price difference between groups should be substantial and these groups should be of important size. In these cases, the HMT should be applied not only with respect to the product but also with respect to the group of targeted customers.

⁸⁴ For analytical reasons, these specific features are treated separately – in practice a mix of the different features might occur, such as systems markets with many differentiated products sold to different consumer groups at different prices.

⁸⁵ See for example Geroski and Griffith (2003:9), Werden (1983:529) or Werden (1984:662).

94. Price discrimination could also be an issue with respect to geographic market definition if the hypothetical monopolist could charge customers different prices according to their location. In this case, the geographic market would have to be defined with respect to the location of customers.⁸⁶

95. In practice it is often difficult to establish whether these conditions, in particular the hypothetical monopolist's ability to identify the different groups, are met. Nevertheless, if price discrimination is common practice in relation to the good in question, it is highly likely that a hypothetical monopolist would also engage in price discrimination. In such cases, account should be taken of the various groups of buyers subject to price discrimination when defining the relevant market.⁸⁷

4.2 *Aftermarkets*

96. Market definition could become more complex where products are used only in combination with other goods such as printer cartridges or spare parts for cars. Typically, the consumer buys a primary product, such as a car or a printer, and subsequently purchases another, secondary good without which the first is of little or no use, *i.e.* the primary and secondary products are complements and form a system that works properly only if it comprises both products.⁸⁸ It should be noted that aftermarket issues also arise in franchise relationships, where the primary product is the franchise or the associated label.⁸⁹ Often, a consumer who has bought a certain primary product is extremely restricted in the choice of a secondary product. This may be the case for reasons of compatibility, technical specifications or intellectual property rights. For instance, only certain cartridges will be compatible with a particular type of printer. As a result, the consumers are “locked in”. In such situations the question arises whether the markets for primary and secondary products can be defined in isolation or whether a combined market comprising the two complementary products, *i.e.* a ‘systems market’ should be considered. In many cases, the producer of the primary good is also one of the very few suppliers. It may even be the case that the producer is the only supplier of a secondary good under the proprietary brand of the primary one, if competition from other secondary products is precluded. As a result, if the market for the secondary good, called the “aftermarket”, were separately defined as the relevant market, the market shares identified would be large and thus seemingly imply market power.⁹⁰

97. It is, however, questionable whether even a 100% market share in the aftermarket is a clear indication of market power. If the supplier of the secondary product could exploit the lock-in of consumers in the aftermarket by charging a price substantially in excess of the competitive price, this would constitute evidence of market power. Whether such excess prices can be charged depends on the competitive constraints faced by the supplier of the primary product. A rational consumer⁹¹ will take the cost of the

⁸⁶ In the US Merger Guidelines, the HMT in this case is described as follows: “The hypothetical monopolist test requires that a hypothetical profit-maximising firm that was the only present or future seller of the relevant product(s) to customers in the region would impose at least a SSNIP on some customers in that region. A region forms a relevant geographic market if this price increase would not be defeated by substitution away from the relevant product or by arbitrage, *e.g.* customers in the region travelling outside it to purchase the relevant product. (US Merger Guidelines, sect. 3).

⁸⁷ Maisel (1983:55-57). If there is price discrimination, defining the relevant market may, however, prove difficult in practice. (Hausman *et al.* (1996)).

⁸⁸ Bauer (2006); Hovenkamp (1993).

⁸⁹ Klein (1999).

⁹⁰ See for example Motta, (2004:111-113), Shapiro, (1995), or Shapiro and Teece, (1994).

⁹¹ This rationality assumption is crucial for the arguments that follow and there is a growing literature in behavioural economics including the “shrouding” literature that would question the empirical accurateness of this assumption with corresponding repercussions for the conclusions drawn here. See for example Gabaix and Laibson (2006) or Heidhues *et al.* (2012).

secondary product into account when buying the primary product, especially if the price of the secondary product accounts for a large share of the total price of the system or if the secondary product frequently has to be replaced. As the two products are complements, an increase in the price of the secondary product reduces demand for the corresponding primary product, provided that the consumers have a sufficiently wide choice of substitutes, *i.e.* if there are tight competitive constraints imposed on the producer of the primary product. The seller will not increase the price of the secondary good if the consumers' choice of the primary good also depends on the price of the secondary good and a higher price would encourage them to purchase a different primary good. In this case, the manufacturer of the primary product cannot exercise any market power in the aftermarket and a distinct relevant market for the secondary product does not exist. Therefore, primary and secondary products should be considered as a system and the HMT should be applied to systems and not to primary and secondary products separately.⁹²

98. A different situation arises if for each primary product there are several secondary products available that are incompatible with other primary products. In this case, the HMT should be applied to the primary products and separately for each group of secondary product compatible with each primary product. In this case the manufacturer of the primary product could exercise market power in an aftermarket depending on the competitive constraints in the market for the primary product.

99. A systems market might also not be the appropriate approach if there are several primary and secondary products where the secondary products are compatible with the primary products. In this case consumers could choose any combination of primary and secondary products. The supplier of a primary product has in general no market power in the aftermarket and separate markets for the two products can be assumed.

100. While in case of price discrimination and in aftermarkets the hypothetical monopolist test can be employed in almost the same fashion as in the standard case, this is not the case for markets with differentiated products where substantial problems can arise.

4.3 *Cluster markets*

101. Markets where several goods are jointly demanded and supplied are referred to as cluster markets in the literature. Cluster markets are characterized by transaction complementarities between the various components of a bundle of products or services.⁹³ Transaction complementarities arise when a consumer incurs lower transaction costs if he buys several products from one firm, instead of buying each product from a different firm. Put differently, a customer's willingness to pay for the products will be higher if he buys them as a bundle instead of purchasing each good separately. Thus, transaction complementarities may be interpreted as economies of scope on the demand side that benefit consumers (and not producers). Transaction complementarities imply that consumers demand bundles of goods or services. This effect is being reinforced by possible economies of scope on the supply side, where it is efficient for a firm to produce the goods or services jointly rather than separately.⁹⁴ Therefore, the relevant unit with respect to market definition is the bundle of goods or services that is demanded by consumers and supplied by producers. The components of the bundle may be substitutes as well as complements.⁹⁵

⁹² If consumers are not taking the future costs of the secondary product fully into account or if a large group of customers has high cost to switch to a different system, market power in the secondary market could be exercised and a distinct aftermarket could be considered.

⁹³ Ayres (1985).

⁹⁴ Boadwee (1986).

⁹⁵ Ayres (1985:111).

102. In practice, the concept of cluster markets has been applied to a range of markets in the US and in Europe, e.g. hospitals, comestibles, banks, and telecommunication services. The fact that bundles of goods or services are demanded and supplied in a market does, however, not affect the basic principle of market definition. In this context, the concept of substitutability or exchangeability applies to the bundle rather than to its separate components where a bundle of products or services serves as a first candidate market.⁹⁶

103. A market definition that is based on an isolated component of the bundle, ignoring transaction complementarities, would be too narrow. If the price of a component is raised while the prices of the other components remain unchanged, consumers will not immediately switch to substitute goods. In other words: The demand for the separate components of the bundle is less price elastic than the demand for the bundle as such. The reason is that consumers take into account the effect of the increase in the price of a component on the total price of the bundle. If the price of the component constitutes only a small fraction of the total price, a price increase will not imply any considerable decrease in demand. Due to the slight reduction in demand, one would expect that there are no alternatives available to consumers, and a separate market would be defined for the component. If further components of the bundle are taken into account, demand will become more price elastic. The reason is that other bundles are becoming more attractive. Without transaction complementarities, the price elasticity of demand would decrease with an increasing number of products. Thus, a market definition exercise that ignores transaction complementarities could lead to overly narrow markets.

104. The concept of cluster markets has been subject to criticism, since such bundles contain goods and services between which there is no supply or demand substitutability. Therefore, cluster markets may merely serve to simplify the analysis. Thus, only a small number of separate markets will have to be defined e.g. for various care or banking services if market shares and entry conditions are similar, or if, in the case of missing data, market definition is based on e.g. the number of hospital beds. Cluster markets may, however, result in a deficient market definition if competition between the producers of part of the products restrict the range of possible prices available to the suppliers of the bundle.⁹⁷

4.4 *Markets with differentiated products*

105. Product differentiation usually occurs in two distinct ways. The first type of differentiation occurs with respect to the attributes of the product, including design, colour, brand or any other specific feature that may appeal to the differing tastes and preferences of consumers. Products differentiated along these lines often appear densely packed over a wide range of attributes and prices without any obvious gaps in the chain of substitution. The second type of differentiation refers to the location of the product or service. This is important in cases such as retail stores, movie theatres, petrol stations or hospitals.⁹⁸ Depending on the location of the consumer, the attribute and the price of the product, consumers can choose from different suppliers incurring different transport cost.⁹⁹

106. Two problems with respect to market definition in the case of differentiated products can arise. The first concerns the continuity of the substitution chain in cases there are no clear gaps or stark distinctions between products or if suppliers are densely and evenly distributed in space. This renders the

⁹⁶ Briglauer (2007), 328, Gual (2003:44).

⁹⁷ Baker (2007).

⁹⁸ On hospitals and the importance of travel cost for the competition analysis of hospitals see OECD (2012b).

⁹⁹ Whether these are indeed costs of travelling to a hospital located further away or shipping costs in case an item is mailed is not relevant.

identification of the boundary of the market by the HMT difficult. In such instances, markets will tend to be defined broadly yielding small market shares that would understate market power.¹⁰⁰

107. The second problem is due to the binary nature of the market definition exercise that classifies products as either “in” the market or “out” of the market. It implies that all competitors in the market are effective competitors offering perfect substitutes while those outside the market do not impose any competitive constraints on the products in the relevant market at all.¹⁰¹ Such an approach will overstate the impact of imperfect substitutes in the relevant market and understate the competitive constraints posed by imperfect substitutes outside the relevant market. The market definition/market share approach gauges the competitive constraints that one product imposes on the others in the candidate market by the size of its market share and not by the intensity of competition. This is an acceptable proxy if market shares convey at least some information about the intensity or closeness of competition.

108. The intensity of competition between two products A and B depends on the diversion ratio between A and B. As the market shares reflect the first choice preferences over the products in a differentiated products market, the market share of product A indicates the fraction of consumers who prefer A over all other products in the relevant market. The diversion ratio with respect to product B specifies how many consumers would switch to B in case of an increase in the price of A. These are the consumers that have B as their second choice. For example a diversion ratio of 33% with respect to product B implies that one third of the sales of product A lost due to the price increase goes to product B. The higher the diversion ratio, the more intense is the competition between the two products. Market shares in a differentiated products market are thus an indicator of the intensity of competition only to the extent that they are proportional to the diversion ratio. This holds, however, only under the special condition that all products in the relevant market are “equally differentiated”, as has been shown by Willig (1991).¹⁰²

109. This is of course an inadequate assumption in many cases. Generally, a relevant market will be comprised of closer and more distant substitutes, *i.e.* products that compete with varying degrees of intensity quite unrelated to the market shares. As a result, the effects of a merger will in general depend on the closeness of the products of the merging firms and not primarily on their respective market shares.

4.4.1 *Unilateral effects in differentiated product markets*

110. In general, unilateral effects can be described by the change in the quantities and prices in an oligopolistic industry caused by the loss of competition between merging firms. These effects can occur in different types of markets, *e.g.* with competition in quantities or capacities, or in auction and bidding markets. They are most pronounced in markets with differentiated products and price competition.

111. Unilateral effects in those markets can be explained as follows. Consider a market with differentiated products with n single product firms producing at constant marginal cost c_i . From the first

¹⁰⁰ Werden (1997:368).

¹⁰¹ Diversion ratios can be considered a continuous variable approach to this problem whereas market definition uses an approximation based on a simple indicator function that takes only the values 1 (in the market) or 0 (out of the market). A more general indicator function would allow the weighing of product shares in the market according to their competitive impact. Using more general indicator functions would allow to capture the idea of Evans (2010) to use “soft market boundaries” for market definition. From a formal point of view, markets would become “fuzzy sets”. For applications of fuzzy set theory to antitrust and market definition, see Mansur (1995:164).

¹⁰² It can be shown that this holds if the preference ordering over two goods does not depend on the availability of a third product, *i.e.* if the so-called independence of irrelevant alternatives assumption (iia) is satisfied. See Hausman (2010).

order condition of profit maximisation, the Lerner condition yields $(p_i - c_i)/p_i = 1/\varepsilon_i$ for all firms in the market where ε_i denotes the price elasticity of the demand function for firm i .

112. A merger between firm 1 and 2, however, changes the profit maximisation problem for these firms. Before the merger, they choose their prices independently, not taking into account the positive externality that a price increase of firm 1 would have on firm 2 as some of the demand that firm 1 would lose because of the price increase is diverted to firm 2. The same argument applies to firm 2. After the merger, the competitive constraint that each firms' product has imposed on the other is eliminated and both firms can internalise this externality. When choosing their profit maximising prices *post* merger, they will take into account that some of the lost demand by one firm is recaptured by the other. *Pre* merger, a price increase of p_1 by Δp_1 would lead to a loss of profit for firm 1 with a value of $(p_1 - c_1)\Delta Q_1$ where ΔQ_1 denotes the reduction in the quantity sold by firm 1. After the merger, the loss is less as some of the consumers of product 1 will be diverted to the product of firm 2, which will increase the profits of firm 2 by $\Delta Q_2(p_2 - c_2)$, the additional demand denoted by ΔQ_2 multiplied with the profit margin of firm 2, $(p_2 - c_2)$. *Pre* merger, the price of firm 1 was chosen optimally given that none of the lost profit was recaptured. As *post* merger, profit recapture is positive, firm 1 has an incentive to increase the price. The same reasoning applies to firm 2. Thus, *post* merger, the merged firm will choose the profit-maximising prices resulting in an increase in the prices of both products. This holds for all mergers of price-setting firms in markets with differentiated products, *i.e.* also a merger of producers of more distant substitutes has the potential to harm competition.¹⁰³ The strength of the incentive to increase prices, however, depends positively on the amount of sales diverted to the other product and on the profit margins of firm 1 and 2. The larger the diversion ratios and the larger the profit margins, the larger is the incentive to increase prices.¹⁰⁴

113. This type of unilateral effects analysis is not an equilibrium analysis as the price reactions by the non-merging firms in the relevant market are not considered.¹⁰⁵ As prices are strategic complements under Bertrand competition with differentiated products, firms have an incentive to raise their prices if the merging firm has increased the prices of its products, albeit to a lesser extent. This again creates an incentive for the merged firm to increase prices a bit further etc. Thus, the unilateral effects analysis tends to underestimate the incentive to increase prices.¹⁰⁶

114. As the description of unilateral effects in a market with price competition has shown, the closeness of the substitute products as measured by the diversion ratios can be more important for the incentives to increase prices and thus for the competitive effects of mergers than the size of the firms market share.

¹⁰³ As prices in a differentiated products Bertrand-game are strategic complements, *i.e.* the best-reply functions of the firms have a positive slope, the best reply to a price increase by a firm is to increase price as well.

¹⁰⁴ A similar argument holds for products that are differentiated in space where diversion of customers occurs from one location to another. These diversion ratios are determined by travelling time and transport cost.

¹⁰⁵ Of course, non-merging as well as merging firms could react not only by changing prices but also by repositioning their products. Or the price increase could trigger market entry. As repositioning and market entry are generally analysed after the relevant market is defined, it will not be considered here. For an intuitive equilibrium derivation of prices before and after a 3 to 2 merger with horizontally (but equally) differentiated products in a Bertrand setting see Maier-Rigaud and Parplies (2009).

¹⁰⁶ To analyse the change in the industry equilibrium taking into account the price reactions of non-merging firms, merger simulation models can be employed that also take such effects into account.

115. If it were known that the diversion ratios between the products of the merging firms are proportional to the market shares, than the shares of the merging firms and the change in the HHI induced by the merger could be used as an indicator of unilateral effects.¹⁰⁷

116. As has been demonstrated by Baker, in highly concentrated markets, share-based diversion ratios will in general not cause large deviations with respect to the predicted price effects of a merger. “Put differently, errors in measuring the diversion ratios that arise from using market shares as a rough proxy for them are unlikely to be large enough to make implausible the inference that prices will rise non-trivially following this merger when market shares are so high, absent additional information showing that switchers from each merging firm would rarely prefer the product sold by the other firm.”¹⁰⁸

117. This indicates that market shares, the level and the change in concentration can be employed as proxies for the competitive effects of a merger in markets with price competition and differentiated goods only if either diversion ratios are proportional to market shares or if the market is concentrated and the shares of the merging firms are substantial.¹⁰⁹ But unilateral effects may occur also in less concentrated markets when the firms that merge are close competitors. In these cases market shares and the change in concentration induced by a merger are often not a reliable indicator of the competitive effects. In those markets, two mergers with identical changes in the HHI could lead to substantially different magnitudes of unilateral effects depending on the intensity of competition between the merging parties. As a result, information about the diversion ratios that provide information on the competition between the firms is of higher importance for the competitive effects than market shares or changes in the level of concentration.¹¹⁰

4.4.2 Unilateral effects in markets with quantity or capacity competition

118. Unilateral effects can also arise in markets where firms produce homogeneous goods and compete in quantities, for example glass, cement or steel. A merger of two firms in such a market will eliminate competition between them. In the pre-merger situation, neither of the firms will have taken account of the positive external effect a quantity reduction would have for the other firm. A quantity reduction by firm 1 leads to an increase in the market price of the good and thus an increase in the profits of firm 2 and *vice versa*. As the merger will internalise these externalities, the merged firm will supply a smaller quantity as compared to the situation *pre* merger, which in turn leads to a higher market price.

119. Non-merging firms will react to the quantity reduction by the merging firms by expanding their quantities, albeit to a lesser extent because quantities are strategic substitutes.¹¹¹ This reinforces the

¹⁰⁷ In this case, the diversion ratio between two products 1 and 2 is proportional to $s_2/(1 - s_1)$, where s_1 and s_2 denote the market shares of the respective products. For small values of s_1 this can be approximated by $s_2(1 + s_1)$. For the diversion ratio between products 2 and 1 the analogous result is $s_1(1 + s_2)$. Adding both expressions yields $s_1 + s_2 + 2s_1s_2$, the sum of the market shares plus the change in the HHI, *i.e.* the post-merger level of the HHI. See Shapiro (2010:721). Monte Carlo simulations of mergers using the Antitrust Logit Model (ALM) where the independence of irrelevant alternatives is satisfied and diversion ratios are proportional to market shares have shown that the increase in the HHI is a far better predictor of the price and welfare effects of a merger than the combined share of the merging firms or the level of the HHI *post* merger. See Werden and Froeb (1996:75f.).

¹⁰⁸ Baker (2010:23).

¹⁰⁹ Of course this presupposes a correct market definition.

¹¹⁰ Baker (2010:24f.).

¹¹¹ Of course this response is conditional on firms not being capacity constrained. The term strategic substitutes implies that a change in a decision variable of one firm, for example quantity, leads to an inverse reaction on the part of the other firms with respect to this variable. Stated otherwise, the best-reply

incentives to reduce quantity by the merged firm etc. Considering only the quantity reduction by the merged firm would thus overestimate the competition effects of the merger as the partly compensating quantity expansion by the non-merging firms is not taken into account. Therefore, measuring the increase in concentration by the delta of the HHI ($2s_1s_2$) overestimates the size of the merged firm and can only be considered an approximation.¹¹² As explained in section 2.3 above, in markets with homogenous product Cournot (quantity) competition, the effects of mergers depend on market shares, the level of concentration and the change in concentration as measured by the HHI.¹¹³

120. A similar analysis would also apply in case of a two stage game where firms chose capacities in a first stage and then compete in prices afterwards. This situation has been shown to be equivalent to a Cournot model with quantity competition as the firms, when choosing their capacities anticipate that they will compete in prices and will therefore choose capacities that are subsequently fully utilised.¹¹⁴ Therefore, the above analysis applies also to cases where capacities are chosen first and competition is then based on prices.

121. Thus, in markets with competition in quantities or capacities, market definition and measures of concentration are useful tools as there is a clear relationship between these indices, market power and changes in market power.

4.5 Bidding markets

122. Bidding markets appear in a wide variety of forms. A common characteristic is that firms compete by submitting bids in response to tenders by buyers. To define a relevant market in such a situation using the HMT might lead to some conceptual problems:

“Market definition by use of the SSNIP test (small but significant and non-transitory increase in price test) can sometimes be difficult in markets characterised by bidding processes for two reasons. First, the price is different potentially for each contract. The same is true in any other market in which prices are set individually for each contract. Second, there is no obvious price on which to add the SSNIP since competition occurs simultaneously rather than through sequential moves. Notwithstanding these difficulties, the notion of substitutability which underlies the SSNIP test can be used in defining the relevant market. Non-price factors can help to identify the extent of substitutability on both the demand and supply side. These may include inter alia distinct product characteristics and uses, unique production facilities or processes, distinct purchasers, specialisation of sellers and the views of industry participants.”¹¹⁵

123. To identify the competitive constraints a hypothetical monopolist faces, more weight has to be placed on identifying the (potential) market participants, *i.e.* those suppliers that have the capacity to compete for the contract and can participate in future bidding competitions.

functions of the firms have a negative slope. Strategic complements imply that the change has the same direction, *i.e.* an increase in price by one firm will allow for an increase in price also by other firms, *i.e.* best-reply functions have a positive slope.

¹¹² See Farrell and Shapiro (1990). However, as Werden (1991) has shown, this problem would not arise if shares are based on capacities instead of output as the former do not adjust after a merger at least in the short run.

¹¹³ This has also been pointed out by Froeb and Werden (2011:6).

¹¹⁴ See Kreps and Scheinkman (1983) – additional conditions have to be satisfied for this result to hold, *e.g.* rationing must be optimal. For a discussion see Davidson and Deneckere (1986) and Osborne and Pitchik (1986).

¹¹⁵ OECD (2006:8).

124. There is a large variety of bidding markets covering a wide range of possible situations. In its purest form, a bidding market has been characterised by Klemperer (2008:586) as exhibiting four characteristics. First, competition is of the “winner takes all” type meaning that there is no smooth demand function, *i.e.* no relationship between price and quantity. Second, competition is lumpy as contests are large with respect to the total sales of any particular firm. Third, competition begins afresh for each contract and customer and fourth, market entry is easy.

125. In this case, a bidding market comes close to a perfectly contestable market and can be characterised by a one-shot Bertrand-competition with a homogenous product. Here, *ex post* market shares have no particular relation to market power. An *ex post* market share of 100% and a high level of concentration in a perfect bidding market is in general no indication of competitive constraints during the bidding process. Therefore, market shares are only a weak indicator of market power and even a large market share is no clear indication of dominance.

126. Most bidding markets differ, however, from this ideal or pure bidding market in one or even all respects so that this argument does not apply in general. In multi-unit auctions, there could be several winners and also a negative relationship between quantity and price as for example in electricity or financial securities auctions. Also, the number of bidders can have an impact on the price.¹¹⁶ The assumption of independence between auctions is often not satisfied as the winning of one auction could have an impact on the chance of winning a second bidding process, for instance if an incumbent has a competitive advantage over other bidders. In case of incumbency advantages, a large market share could be indicative of market power. Finally, market entry could be difficult as for example competing for a large contract might require substantial investments, small scale entry might not be attractive if there are large competitors present or reputational effects could be vital.

127. If one or several of the conditions for a perfect or pure bidding market are not satisfied, bidding markets may not differ substantially from ordinary markets implying that the competition analysis does not need to be adapted. In a market with frequent and similar tenders, where firms bid for contracts to supply a certain product, the relation between the average winning bid and the number of firms participating in the market can be analysed. If the average winning bid is a declining function of the number of bidders, then the level of concentration could be considered as an indicator of the competitiveness of the market. If there are three or four bidders in the market, it could, however, turn out that the appearance of additional participants has no impact on the average winning bid. In this case, only a small number of participants may be sufficient for a competitive outcome and market shares and the level of concentration do not contribute much to the assessment of the competitiveness of the market. In case of only a small number of (equally sized) bidders, co-ordinated effects may be a concern.

128. Another important aspect in bidding markets is the closeness or intensity of competition between bidders which is related to competition in markets with differentiated products. As Shapiro (2011:734) puts it: “To see the connection, consider a situation in which suppliers submit sealed bids to win a particular piece of business. The customer picks the most attractive bid, accounting for price, other terms and conditions, and differences among the suppliers in the products and services they offer, their reputation, etc. As a matter of formal economics, this is very similar to the situation just discussed, where suppliers set prices and each of many customers each picks his or her preferred product. In the bidding setting, each supplier tries to judge the relationship between its bid and the probability it will win the business. In the consumer products setting, each supplier tries to judge the relationship between its price and the number of consumers who pick its product.”

¹¹⁶ Gupta (2002).

129. There also exist important differences between bidding markets and markets with differentiated products. While in markets with differentiated products, there is usually one price per product, in auction models one price per product per auction is assumed. This difference could be substantial as mergers in bidding markets generally produce no output effects.¹¹⁷

130. To assess the intensity of competition between bidders and to evaluate the competitive constraints imposed on a firm by other suppliers a win/loss or a frequency analysis could be employed. If the analysis shows that the two suppliers often compete in similar tenders but never submitted the lowest or second lowest bid, than the firms should not be considered close competitors. A merger would not lead to a price increase for the buyers as other bidders made more competitive offers. If in turn the two firms regularly submitted the most competitive bids, they have to be considered as close competitors. In this case, the merger could lead to a substantial reduction of competition.

131. If the bidding process can be characterised as an English or second price auction, the dominant strategy for each supplier is to make a bid according to its cost. The winner is the bidder with the lowest cost and is paid the second lowest cost. If the lowest and second lowest cost firms merge, the equilibrium price would increase to the level of the cost of the next most efficient supplier, *i.e.* the third-lowest cost. If the difference between the second and the third lowest cost is large, the merger could lead to a substantial price increase for the buyers. This holds even if the market shares of the merging firms are small.¹¹⁸ For example, assume that the lowest and second lowest bidder have costs of 15 and 18 and the third lowest bidder has cost of 25. *Pre* merger, the firm with cost of 15 would submit the lowest bid, would win the auction but would be paid 18 as it is a second-price auction. Before the merger, the customer thus pays a price of 18. After a merger of the lowest and second lowest cost firm, the bid of the merged entity would increase to 18 but it is paid 25, the cost of the third lowest bidder. The price for the customer thus increases to 25.

132. In contrast to markets with differentiated products where the closeness of products is determined by the cross-price elasticities of demand, “closeness of bidders in an auction model is determined by the frequency with which one draws the second-highest value when the other draws the highest value.”¹¹⁹

133. While market shares and concentration levels in a perfect bidding market are only a weak indicator of market power and competitiveness, many bidding markets differ substantially from this ideal. Market shares and concentration levels could be indicators of market power, for instance if incumbency effects are present or if the average winning bid is a decreasing function of the number of bidders. Market shares and the level of concentration could also provide information about possible competitive harm caused by co-ordinated effects of a merger. In other bidding markets, however, inferences from market shares or the change in concentration with respect to the competitive effect of a merger cannot be drawn. Similar to markets with differentiated products, the closeness of competition is the most important factor.

4.6 *Two-sided markets*

134. Two-sided markets (or platforms) serve two or more distinct groups of customers that would like to interact but cannot do so without the platform. Examples of two-sided markets include *inter alia* online auction platforms, dating clubs, payment card systems, newspapers, video game platforms. A common

¹¹⁷ See Werden (2006). As Froeb and Werden (2008:61f) point out, there are also significant differences between unilateral effects in bidding markets and unilateral effects in markets with differentiated products, for instance with respect to diversion and the effects of synergies.

¹¹⁸ The effects of mergers in different auction settings have been thoroughly analysed by Froeb and Werden (2008). Depending on the type of auction (private or correlated values, first- or second price etc.) the effects of mergers can substantially differ.

¹¹⁹ Froeb and Werden (2008:58).

feature of two-sided platforms is that the size of one group of customers, for example the number of sellers active on an online auction platform, has a positive impact on the utility of the buyers and *vice versa*. These effects are termed indirect network effects. A two-sided platform enables these groups to internalise the indirect network externalities thereby creating value for at least one side, something that would not be possible absent the platform.

135. Two-sided platforms can have different functions. They can facilitate exchange between members of different groups as for example in a credit card payment system where a larger number of credit card holders increases the demand from shops for the use of credit card terminals. Also most media markets can be considered a two-sided platform, for example newspapers and magazines selling content to the readers and advertisement space to firms. Profits from a larger audience and readers are influenced (positively or negatively) by the amount of advertisement.

136. To maximise its profit, a two-sided platform has to take into account the indirect network effects between the different groups to find the right balance between the two sides. An auction platform is not very interesting for potential buyers if there is only a small number of sellers present and *vice versa*. Therefore, a two-sided platform has to choose a price structure, that is, a price for both sides of the market that induces both groups to join the platform in the optimal quantity. Thus, not only the price level matters for the platform but the price structure has a considerable impact on the number of transactions. In two-sided markets, a change in the price structure affects the size of the two groups. Usually, an increase in the price for one side adversely affects the other side because it causes demand among the first group to fall. Because of the indirect network effect, the platform becomes less attractive to the other side and the demand will also decrease on this side.

137. Thus, the prices that the two groups are charged are highly dependent on the magnitude and direction of the indirect network effect. The group causing the greater indirect network effect will usually be charged a lower price than the one with the lesser network externality.¹²⁰ While these feedback effects restrict the platform's ability to raise its prices, they may cause the profit-maximising price to be considerably higher than marginal cost on the one side, and below marginal cost (or even negative) on the other. It would thus be misleading to focus on *e.g.* the market side charged the high price, since this would indicate market power where in fact there is none. As a consequence, in the case of two-sided markets, the fact that one group of buyers is charged a high price does not necessarily imply the existence of market power. Just as a high price on one side of the market does not imply that the price is excessive, a price below marginal cost does not imply predation.¹²¹

138. Another factor that determines the price structure of two-sided platforms is whether customers are active on one or on several platforms. If consumers use several platforms, this practise is called multi-homing as for example, a firm that advertises in several newspapers. Such multi-homing restricts the platform's ability to raise prices above the competitive level. If no substitutes for the service provided are available to customers on market side A, but there is fierce competition on market side B, any attempt to increase profits by raising the price in market A will be counteracted by competition on side B. A platform's competitors can be either other platforms that supply similar goods or services or firms that merely serve one side of the market. In short, the market power of two-sided platforms is restricted both by the feedback effects between the consumer groups and by competitors on either side of the transaction. Prices above marginal cost on any side do not necessarily indicate market power, since account has to be taken of both sides of the market.

¹²⁰ See for example Rochet and Tirole (2006).

¹²¹ See OECD (2012a).

139. Because of the two sides of the market, the indirect network effects between the customer groups and multi-homing, the definition of the relevant market is more involved than in most traditional (one-sided) markets. If the indirect network effects are small or insignificant, a one-sided market definition is appropriate. Therefore, it is important to identify those two-sided markets where indirect network effects have a substantial impact, something that has for example been negated by some for payment cards.¹²²

140. If the indirect network effects between customer groups are substantial, a mechanical application of the HMT to only one side of a two-sided market could lead to an incorrect assessment of the competitive constraints a platform faces. A price increase of 5% on just one side of the market will reduce demand on this side but, due to the indirect network effect, also demand on the other side and this again has an effect on the first side etc. When implementing the HMT by a critical loss analysis, the profitability of a SSNIP should be assessed with respect to the critical and the actual losses on both sides of the market.¹²³ Otherwise, overly narrow markets with high market shares and high levels of concentration would result. A market definition that concentrates only on one side of the market disregards the competitive constraints exerted by the other, thereby missing the central purpose of market definition, namely the identification of competitive constraints.¹²⁴

141. When performing a HMT in a two-sided market, all the competitive constraints a hypothetical monopolist faces should be considered. Therefore, the SSNIP should be performed in such a way as to find the smallest set of products and regions that is worth monopolising. In a two-sided market, not only the price level but also the price structure is of importance and the question arises, how this affects the way a SSNIP test should be performed. This problem is similar to applying the SSNIP to a multi-product firm. It is useful to distinguish between platforms where transactions between members of different groups take place or where interactions are observable, as for example in the case of credit card payment systems or online-auction platforms and two-sided markets where no transactions between the members of the different groups actually occur or interactions are not observable, as for example in media markets.¹²⁵

142. In a two-sided market with transactions (or observable interactions), a fee for every transaction or a two-part tariff can be charged. For example, in a credit card payment system the cardholder and the merchant can be charged for every transaction and the price structure determines the number of transactions.¹²⁶ For two-sided markets with transactions, it has been suggested that the SSNIP should be performed by increasing the price level, *i.e.* the sum of the two prices while the price structure should be adjusted optimally.¹²⁷

143. In a market without transaction (or with non-observable interactions), as for example in media markets, transaction-dependent prices are impossible and only a fixed fee could be charged.¹²⁸ In this case, the SSNIP should be performed differently as a separate increase in one price, optimally adjusting the price

¹²² See for example Filistrucchi *et al.* (2012).

¹²³ A critical loss formula that applies to two-sided platforms has been developed by Evans and Noel (2005).

¹²⁴ Another question is whether both sides together should be considered as a single antitrust market or should be defined as separate markets, taking into account the indirect network effects at a later stage of the analysis. On this, see for example Evans (2010).

¹²⁵ Filistrucchi *et al.* (2012), Filistrucchi (2008a).

¹²⁶ See for example Rochet and Tirole (2006).

¹²⁷ See Alexandrov *et al.* (2011), Emch and Thomson (2006) or Filistrucchi (2008a). The price per transaction remains unchanged as this is chosen by the platform to maximise the number of transactions which is efficient behaviour.

¹²⁸ See for example the model by Armstrong (2006).

structure, would be preferable, *i.e.* a sequential procedure which takes account of the consumers' ability to substitute.¹²⁹

144. Irrespective of the market type, a price increase will induce feedback effects between the two consumer groups that may render the measure unprofitable. These effects have to be taken into consideration when applying the HMT. In addition, the fact that consumers will respond to a price increase by switching to substitute products that are supplied by other platforms, or by one-sided firms has to be considered.¹³⁰ In this context, it is important that both sides of the market are taken into consideration. Thus, the feedback effects between the two consumer groups may cause the substitution behaviour on one side of the market to be substantial enough to render a price increase unprofitable. Of course it may also be the case that a price increase will become unprofitable only after the substitution behaviour of both sides has been taken into account.

145. Considering the conceptual problems with respect to delineating markets for two-sided platforms, Evans (2012:35) concludes: "market definition analysis in such cases is likely to be more difficult in practice and subject to greater error than in cases involving only single-sided businesses."

146. These problems also have an impact on the interpretation and the indicative power of market shares and concentration in two-sided markets. On a conceptual level, market shares are only weak indicators of market power in two-sided markets. A large market share on one side of the market does not necessarily imply that the firm has pricing power. If consumers on the other side of the market multi-home, price competition on this side of the market is intensified.¹³¹ There is therefore no clear negative correlation between concentration and the competitiveness of a two-sided market. Market shares in two-sided markets should therefore be considered as especially problematic proxies for market power.¹³²

147. A different problem concerns the relation between concentration and welfare in two-sided markets. As it is known from one-sided markets with direct network effects, the size of the network has a positive effect on consumer welfare. Therefore, an increase in concentration that increases price could nevertheless lead to an increase in consumer welfare as the product becomes more valuable and consumers are willing to pay the increased price. If consumers' willingness to pay increases more than the price, consumer welfare will increase.

148. In two-sided markets, things are more complicated because of the indirect network effects between the two groups interacting on the platform. A merger between two platforms could change the price structure substantially and it could happen that the price on one side of the market increases while the price on the other side actually falls.¹³³ Also in two-sided markets the network effects might be strong enough to increase consumer welfare even if total price increases. A recent model of mergers in two-sided

¹²⁹ See Filistrucchi (2008a) and (2008b). Alternatively, a uniform price increase on both sides of the market could be considered as in Evans and Noel (2008:675). In that case markets would be defined broader than under an optimal adjustment of the price structure.

¹³⁰ Evans and Noel (2008); Filistrucchi (2008a). Evans and Noel distinguish between short-run effects, where only the direct effects of an increase in price are considered, and long-run effects, where the feedback effects between the two groups of consumers are also taken into account. Filistrucchi, however, does not make a distinction between short-run and long-run effects as the HMT considers a non-transitory price increase.

¹³¹ Evans (2003:359).

¹³² Evans (2003:359).

¹³³ Evans (2003:360).

markets has demonstrated that mergers can be welfare enhancing if the indirect network effects are sufficiently large – otherwise, the traditional merger analysis applies and the merger decreases welfare.¹³⁴

149. Co-ordinated effects in two-sided markets could be considered as less likely compared to one-sided markets because co-ordination with respect to both sides of the market has to be achieved. If co-ordination occurs only on one side of the market, there is a tendency to compete away the profits from co-ordination on the other side. Therefore, more agreements and monitoring is required.¹³⁵

150. These considerations show that with modified and refined methods to implement the HMT, relevant markets for two-sided platforms can be defined. As market definition in these cases is considerably more complex than in one-sided markets, market shares can be measured only with a considerable degree of uncertainty. In addition, in markets with two-sided platforms and substantial indirect network effects, market shares, measures of concentration and changes in concentration will not be particularly helpful for an assessment of market power or the prediction of the competition effects of a merger. In these markets a more direct assessment of market power, for example by analysing the barriers to entry, seems preferable.

4.7 *Dynamic and innovative markets*

151. Some industries such as the media industry, telecommunications, biotech or medical technology are characterised by rapid technological progress. New products are developed, formerly separate functionalities are integrated into one product and process innovations lead to the entry of firms from other industries thereby increasing the competitive pressure on incumbent firms. These developments are often unpredictable, leading to the creation of new markets or the convergence of formerly separate markets. As a result, market boundaries may shift rapidly. Some of these dynamic industries can be considered as ‘Schumpeterian’ where through a ‘creative destruction’ the competitive position of firms can change very quickly. In such industries it is not the price that is the main competitive parameter but innovation or the introduction of a new superior product. Competition does not take place ‘in the market’ but ‘for the market.’¹³⁶ In such markets “one firm may serve the entire market or at least a large portion of it for a period of time, only to be displaced by another firm with a leapfrogging technological innovation that delivers dramatically improved performance or dramatically lower cost.”¹³⁷

152. Defining markets in highly dynamic industries raises some conceptual difficulties. The HMT is mainly based on the static concept of demand substitution. It considers to what extent the products that are currently available are substitutes. In industries with rapid technological change, however, new products become available by definition, thereby increasing the substitution possibilities. In addition, process innovations can reduce the production cost of products that were formerly too expensive to be considered as viable substitutes for most consumers.¹³⁸ Therefore, applying the HMT with respect to the existing substitutes could lead to overly narrow markets because substitutes that might become available in the future cannot be taken into consideration.¹³⁹

¹³⁴ Leonello (2009) An empirical analysis of the Canadian newspaper market has led to similar results. See Chandra and Collard-Wexler (2009).

¹³⁵ Evans and Schmalensee (2007).

¹³⁶ Important factors that influence this type of competition are economies of scale, network effects or intellectual property rights. Baker (2007a).

¹³⁷ Kolasky (2002:3).

¹³⁸ Katz and Shelanski (2005:123).

¹³⁹ Therefore, markets should be defined more broadly projecting observable technological trajectories into the near future.

153. Having defined the relevant market, the assignment of market shares could also cause some problems if a firm with a small market share introduces a new and superior product, while a firm with a larger share fails to improve its product. The future competitiveness of the small firm would obviously be much higher than the low current market share suggests.¹⁴⁰

154. In a Schumpeterian market where competition is rather ‘for’ than ‘in the market’ and where the winner takes all or most of the market, the winner of the competition becomes a dominant firm or even a monopolist implying a high market share. But even a market share of 100% does not necessarily imply substantial market power. “In these markets an efficient monopolist, constrained by overall market demand and the threat of entry, will often charge quality-adjusted prices that, while above marginal cost, are still below the prices that would be charged by a group of less efficient competitors. To an economist, the competitive process is working in these markets, even if it results in only one firm serving the entire market for some period of time.”¹⁴¹

155. In this highly stylized case, even a market share of 100% would not allow any inference about the market power of a firm. Therefore, one could argue that market shares should not be assigned according to the market outcome but on the capabilities of firms to compete in the market. If all firms have the same cost and could supply market demand, each firm could be assigned a market share of $1/n$ if there are n firms in the market.¹⁴² Here the problem might arise that the market participants are not known at the time of the market definition as new firms may enter the industry.

156. These problems with the definition of the relevant market and the fact that market shares are only a weak predictor of market power should not lead to the conclusion that mergers in dynamic markets are unproblematic. A merger between two firms could reduce the incentives to innovate and could thereby retard technological development to the detriment of consumers. The only conclusion is that this can generally not be inferred from market shares or changes in the level of concentration. As a result, a more direct approach to assess market power and to evaluate the effects of a merger should be employed in dynamic markets rather than the usual market definition / market share paradigm.

4.8 Conclusion - reactions to these problems

157. The discussion has shown that market shares in some types of markets are only a weak indicator of market power and also that the level of concentration in a market and, more importantly, changes in the level of concentration as measured by the change in the HHI do not add much to the competitive analysis of mergers or anticompetitive behaviour. In markets with differentiated products it is the closeness of competition rather than market shares that is of primary importance. The merger of two comparatively small firms can have substantial competitive effects if they are close competitors while a merger of larger firms could have a negligible effect on the price if the firms produce products that are weak substitutes. A similar argument applies to auction markets where the closeness of competition is the most important factor. In perfect auction markets or in dynamic markets where competition is “for the market” and not “in the market” even large market shares are not necessarily indicative of market power. In two-sided markets, the definition of the relevant market and the application of the HMT implies additional difficulties. The calculation of market shares may therefore not be very reliable. In addition, market shares on one side of

¹⁴⁰ AMC (2007:40).

¹⁴¹ Kolasky (2002). Of course, the underlying assumption is that the market is fully contestable, an empirically dubious assumption.

¹⁴² See Werden (2002:13) “Candidates for the assignment of $1/n$ shares include markets for technology and Schumpeterian industries, in which competition occurs largely through the introduction of new products or technologies and competition is apt to be more ‘for the market’ than ‘in the market’.”

the market are only weak indicators of market power as competitive constraints from the other side might limit any existing pricing power. Also, due to the network effects, the relation between concentration and consumer welfare in two-sided markets (as well as in other markets with substantial network effects) can be fundamentally different as compared to traditional one-sided markets.

158. Therefore, more direct approaches to assess market power and to evaluate the competitive effects of a merger or of abusive behaviour have been suggested to complement or substitute for the market definition/market share analysis. The first method suggested was the direct simulation of a merger by means of an empirical oligopoly model of the industry. It has turned out, however, that simple merger models often fail to capture the essential features of an industry and that merger simulation models require substantial tailoring to the specifics of the case at hand to allow reliable predictions of the competitive effects of a merger. Because of the high complexity of merger models tailored to the specific facts of the case, they are unsuitable as simple screens or initial step in a competition analysis. Therefore, other, simpler tools have been suggested that could be employed in those cases, where market shares and concentration levels are only weak indicators of competitive effects. Also in EU dominance cases a more effects-based approach has been suggested and the focus on thresholds to assess whether a firm has a dominant position has been questioned.

5. New concepts and possible alternatives to market definition

159. As discussed in section 4, a competition analysis based on market definition, market shares and concentration measures may not be particularly useful for certain types of markets or competition problems. In this section, we discuss the most prominent suggestions to substitute or complement the concentration-based approach by other tools. In the context of merger cases, two different, but related concepts are discussed, pricing pressure indices (PPIs) and merger simulation models. There is a certain overlap between these groups as more elaborate measures of pricing pressure come close to basic merger simulation models. An important difference between the two groups is how the behaviour of non-merging firms is modelled. While the PPIs assume that the behaviour of non-merging competitors does not change, merger simulation is based on oligopoly models that take price and/or quantity responses of non-merging competitors into account.¹⁴³ An alternative to PPIs and simulation models is the concept of compensating marginal cost reductions which considers the efficiencies necessary to neutralize the unilateral effects of a merger. Following the sections on PPIs and merger simulation models, we briefly discuss the direct effects approach suggested for the analysis in abuse of dominance and monopolisation cases. The last section draws conclusions with respect to the use of these tools in competition analysis.

5.1 Pricing pressure indices – UPP, UPP*, and GUPPI

160. In the last couple of years several new concepts and alternatives to market definition in particular for mergers in markets with differentiated products have been suggested. These concepts are based on the incentives for merged firms to increase prices *post* merger. Pricing pressure indices (PPIs) have attracted considerable attention and are controversially discussed in the competition community.

161. The first pricing pressure index suggested as an alternative to market definition is the “upward pricing pressure” (UPP) as proposed by Farrell and Shapiro in 2008. UPP was designed as a simple first “diagnostic test” for mergers particularly in markets with differentiated products and price competition. As has been shown in section 4.3.1 above, the competitive effects of a merger in such markets depends more on the closeness of competition than on market shares. Therefore, measuring market shares and changes in concentration may not be particularly useful for an assessment of the competition effects. The UPP screen

¹⁴³ Other reactions as for example product repositioning, market entry, capacity expansion or changes in the product quality are usually not considered in merger simulation models.

suggested by Farrell and Shapiro does not require the definition of a relevant market and focuses on the incentives of a merged firm to increase the price of either of the two products or both.¹⁴⁴

162. UPP is based on the closeness of competition between the products produced by the merging firms and on the price-cost margins of the products.

Box 5. Derivation of the Upward Pricing Pressure Index

In its simplest form, *i.e.* for a two-firm, two-product merger, the upward pricing pressure can be derived as follows: We consider two single-product firms 1 and 2 in an n -firm industry producing differentiated goods and competing in price.¹⁴⁵ The firms produce with constant marginal cost c_1 and c_2 . Demand for each product is described by demand functions $Q_1(p_1, p_2)$ and $Q_2(p_1, p_2)$.¹⁴⁶ By assumption the demand for each product is falling in its own price but increases in the price of the other product as the products are substitutes.¹⁴⁷ It is further assumed that the merger creates efficiencies in the production of good 1 by reducing marginal cost to $(1 - e_1)c_1$ with $0 \leq e_1 < 1$. The profit for the merged firm is then given by

$$\pi(p_1, p_2) = (p_1 - (1 - e_1)c_1)Q_1(p_1, p_2) + (p_2 - c_2)Q_2(p_1, p_2).$$

The first-order condition of the profit-maximisation problem of the merged firm with respect to product 1 yields

$$\frac{\partial \pi(p_1, p_2)}{\partial p_1} = (p_1 - c_1) \frac{\partial Q_1(p_1, p_2)}{\partial p_1} + Q_1(p_1, p_2) + e_1 c_1 \frac{\partial Q_1(p_1, p_2)}{\partial p_1} + (p_2 - c_2) \frac{\partial Q_2(p_1, p_2)}{\partial p_1} = 0.$$

The first order condition for profit maximisation of firm 1 alone implies

$$(p_1 - c_1) \frac{\partial Q_1(p_1, p_2)}{\partial p_1} + Q_1(p_1, p_2) = 0.$$

Thus,

$$\frac{\partial \pi(p_1, p_2)}{\partial p_1} = (p_2 - c_2) \frac{\partial Q_2(p_1, p_2)}{\partial p_1} + e_1 c_1 \frac{\partial Q_1(p_1, p_2)}{\partial p_1}.$$

Therefore, an increase in the price of product 1 for the merged firm is profitable, if and only if

$$(p_2 - c_2) \frac{\partial Q_2(p_1, p_2)}{\partial p_1} + e_1 c_1 \frac{\partial Q_1(p_1, p_2)}{\partial p_1} > 0.$$

This expression can be reformulated using the diversion ratio between products 1 and 2. Dividing both sides of the inequality by $|\partial Q_1 / \partial p_1|$ yields the “upward pricing pressure” for product 1 as suggested by Farrell and Shapiro (2008).

$$UPP_1 = (p_2 - c_2)D_{12} - e_1 c_1.$$

The upward pricing pressure for product 2 can be derived analogously.

¹⁴⁴ Farrell and Shapiro consider single-product firms so that a merger of two firms implies that the new entity sells two products. For generalisations to multiproduct firms see Willig (2011) or Jaffe and Weyl (2012).

¹⁴⁵ Restricting the example to price competition is unproblematic as the same logic applies to quantity competition.

¹⁴⁶ As the prices of other commodities are kept constant, they are not considered in the demand function.

¹⁴⁷ Formally, $\partial Q_i(\cdot) / \partial p_i < 0$ and $\partial Q_i(\cdot) / \partial p_j > 0$ for $i, j = 1, 2, i \neq j$.

163. The upward pricing pressure for product 1 is given by

$$UPP_1 = (p_2 - c_2)D_{12} - e_1c_1.$$

164. The first term on the right side can be interpreted as follows. By marginally raising the price of product 1, the demand for product 2 increases because some consumers will substitute product 2 for product 1. The fraction of consumers that turn from product 1 to product 2 is given by the diversion ratio D_{12} . Multiplying this with the price-cost margin of product 2 gives the “value of diverted sales”. If the margin and the diversion ratio are positive, the first term on the right side shows an increase in profit for the new entity. Thus, the new entity has an incentive to increase the price of product 1 because *post* merger, some of the lost sales of product 1 are recaptured by product 2. Stated otherwise, the competitive constraint that product 2 exercised on product 1 has disappeared and this allows for a profitable price increase of product 1. The second term on the right side, e_1c_1 , shows the effect of the marginal cost reduction of the merger. As the marginal costs for the production of product 1 decrease, the new entity has an incentive to charge a lower price for product 1. This effect runs counter the incentives to increase the price of product 1 but if the combined effect is positive, the incentive to increase the price of product 1 prevails.

165. It is important to note that UPP_1 provides information only with respect to the direction of the price change but not about its magnitude.¹⁴⁸ In the absence of efficiencies, there would always be a positive upward pricing pressure as long as the margin for product 2 is positive and there is some diversion from product 1 to product 2. In this case virtually every merger in a differentiated product market would have to be flagged. Therefore, Farrell and Shapiro suggest that mergers create efficiency gains. As efficiencies are often difficult to estimate in practice, they suggest employing a “standard deduction” in the amount of 10% as an approximation for likely efficiencies.¹⁴⁹

166. The upward pricing pressure can intuitively be explained as follows: The larger the fraction of lost demand due to a price increase of product 1 that is recaptured by product 2, the more attractive the price increase is. This is expressed by the diversion ratio which indicates the closeness of competition between the two products. In addition, the larger the margin of product 2 (absolutely but also in relative terms to product 1), the bigger is the incentive to increase the price of product 1 and thereby to induce a shift in demand from product 1 to product 2. The upward pricing pressure for product 1 is therefore the stronger the closer the substitutability between the two products and the higher the profitability of product 2 is. In contrast, any decrease in marginal cost due to merger specific efficiencies will mitigate or may even (over)compensate the incentives to increase the price of product 1.¹⁵⁰

¹⁴⁸ In section 5.1.3 below it is shown how UPP and related indices can be extended allowing for predictions concerning the magnitude of price increases.

¹⁴⁹ Farrell and Shapiro (2010:12).

¹⁵⁰ The UPP in the form discussed implies that the merger gives rise to efficiencies only with respect to product 1. However, it is conceivable that the efficiencies generated by the merger also have an impact on the marginal cost of firm 2. As Schmalensee (2009) has shown, allowing for efficiencies to affect the marginal cost of both firms would change the index to

$$UPP_1^s = (p_2 - c_2)D_{12} - e_1c_1 + D_{12}e_2c_2 = UPP_1 + D_{12}e_2c_2.$$

Here, all changes in marginal cost are taken into account. As the additional term is in general positive, the increase in the per-unit profit for product 2 due to the lower marginal cost is positive, so the incentive to raise the price for product 1 increases. Farrell and Shapiro (2010:12) have objected that this could lead to a flagging of a merger for further analysis because it generates higher efficiencies. Therefore, they suggest that the simpler screen would avoid this criticism. This is, however, not fully convincing. The effect of merger specific efficiencies in the production of product 2, which leads to an increase in the profit margin for product 2, increases the incentives to increase the price for product 1. While the price of product 2 falls compared to the pre-merger price, efficiencies in the production of product 2 increase the UPP with respect to product 1 even if they result in lower prices for product 2.

167. In general, for products that are close substitutes, one would expect a negative correlation between margins and diversion ratios: If there is intense competition between the products, diversion ratios tend to be high but intense competition should lead to lower margins. If competition is not intense, then diversion ratios will be low but margins could be high as the competitive constraints are not very strong.¹⁵¹

168. Notice that UPP_1 is expressed in absolute terms. An equivalent measure in percentage terms is given by

$$D_{12} \frac{p_2}{p_1} m_2 - e_1(1 - m_1)$$

where $m_1 = (p_1 - c_1)/p_1$ and $m_2 = (p_2 - c_2)/p_2$ denote the (relative) margins of the two products. In the symmetric case, *i.e.* with equal diversion ratios between the two products, equal prices, marginal cost and efficiencies, the condition for a positive upward pricing pressure for both products can be stated as:

$$D \frac{m}{1 - m} > e,$$

where D , m , and e denote the common diversion ratio, margin and efficiency respectively.¹⁵² For example, upward pricing pressure exists with a diversion ratio of 0.3, implying that 30% of the demand lost due to the price increase on product 1 is diverted to product 2, efficiencies of 10%, and margins above 25%.

169. In the absence of efficiencies or if efficiencies are not considered, e_2 would be set equal to 0. UPP_1 would then simplify to the gross upward pricing pressure index for product 1 ($GUPPI_1$)

$$GUPPI_1 = D_{12} \frac{p_2}{p_1} m_2.$$

170. Stated otherwise, the $GUPPI_1$ is the diversion ratio in terms of revenue times the (relative) profit margin for product 2. A similar expression holds for product 2.¹⁵³ For example, if the diversion ratios are given by $D_{12} = 0.20$, $D_{21} = 0.33$, the margins by $m_1 = 0.20$, $m_2 = 0.25$ and the prices by $p_1 = 4$, $p_2 = 3$, the gross upward pricing pressure for the two products is

$$GUPPI_1 = 0.2 \times 1.33 \times 0.25 = 0.066$$

$$GUPPI_2 = 0.33 \times 0.75 \times 0.20 = 0.0495.$$

171. In words there is a gross upward pricing pressure of 6.6% for product 1 and of 4.95% for product 2. Note that in the absence of efficiencies, the (gross) upward pricing pressure is always positive if margins and diversion ratios are positive.

5.1.1 An advanced UPP screen

172. As already mentioned, the UPP screen as suggested by Farrell and Shapiro does not consider efficiencies with respect to the cost for product 2. It also fails to take feedback effects from a re-

¹⁵¹ In some applications of the UPP screen to hypothetical mergers, implausible combinations of diversion ratios and margins have been used. See Froeb and Werden (2011).

¹⁵² Shapiro (2010:13).

¹⁵³ This is the concept of upward pricing pressure as stated in the 2010 US Merger Guidelines (sec. 6.1).

optimisation of the prices of the new entity into account: A price increase for product 1 increases the demand for product 2, allowing an increase in the price of product 2 leading in turn to a diversion of demand back to product 1 etc. If these feedback effects are taken into account, the upward pricing pressure for product 1 is calculated in the following way

$$UPP_1^* = (p_2 - c_2)D_{12} - e_1c_1 + (p_1 - c_1)D_{12}D_{21} + e_1c_1D_{12}D_{21}$$

173. A similar expression applies for product 2. This measure, also called the advanced UPP, gives a more accurate prediction of the incentive to increase the price of product 1 post merger as all the feedback effects, *e.g.* the spillover from product 2 to product 1 as expressed in the diversion ratio D_{21} are considered.¹⁵⁴

174. In this case – again for symmetric firms and products - the condition for a positive upward pricing pressure is given by

$$D \frac{m}{1-m} > e(1-D).$$

175. The difference between UPP and UPP^* in the symmetric case is the factor $1 - D$ by which the efficiencies are reduced. For close substitutes and in case of a high diversion ratio, the “simple” UPP keeping the price for product 2 constant would not signal any upward pricing pressure although such upward pricing pressure could be identified using UPP^* . Absent any efficiencies, the symmetric case would lead to a gross upward pricing pressure of

$$\frac{Dm}{1-D} > 0,$$

where the factor $1/(1 - D)$ indicates the increased incentive for the merged firm to increase the prices for both products.

5.1.2 UPP as a first screen in merger analysis

176. To employ the concept of upward pricing pressure as a first screen in merger analysis, the competition authorities would need information about the profit margins for the products under consideration, the diversion ratios and – if the “standard” efficiency deduction is not deemed appropriate – merger specific efficiencies. Data on substitution could be available for branded consumer goods where large quantities are sold, allowing for an estimation of substitution behaviour and diversion ratios.¹⁵⁵ Farrell and Shapiro (2010:18) point out that competition authorities are able to measure gross margins with great accuracy even in the first stage of a merger analysis and that slight deviations of actual versus estimated gross margins will not have a large impact on the results of an UPP screen.

177. It could be argued that the informational requirements for conducting an UPP test are in fact not very different from the data requirements associated with a correct implementation of the HMT using critical loss analysis. For the HMT, the margin of the hypothetical monopolist has to be estimated and the substitution behaviour of consumers, *i.e.* the aggregate diversion ratio between products inside and outside the candidate market are also required. There are cases, however, where the competition authorities lack the required information about diversion ratios. In such cases, diversion ratios could be estimated using market share information if there are good reasons to believe that the products are equally or similarly

¹⁵⁴ The information necessary to calculate UPP_1 and UPP_2 is the same as for calculating UPP_1^* and UPP_2^* but the information for each single upward pricing pressure is larger as both margins and diversion ratios are necessary.

¹⁵⁵ Other evidence of substitution behaviour could be available from the merging parties as firms often keep track of who they are losing business to or win customers from. See Farrell and Shapiro (2010:18).

differentiated. Diversion ratios in this case would be given by the relative shares $s_1/(1 - s_2)$ of the two products. For example, if the market shares were 15% for firm 1 and 20% for firm 2, the share-based diversion ratio is $15/80 = 0.1875$. Of course, to approximate diversion ratios by market shares implies that a relevant market has already been defined. Combining the market definition and the UPP screen could, however, lead to better predictions as opposed to using a single instrument. This has recently been shown for the case of the Marathon/Ashland Petroleum joint venture.¹⁵⁶

178. As the UPP screen is based on the first order conditions of profit-maximisation, the level of generality is quite high as no special assumptions about the form of the demand function are required. In addition, the only assumption made with respect to the new entity is that the optimal price of each product is an increasing function of the marginal production cost of this product and a non-decreasing function of the marginal cost of the other product. Also, different modes of competitive behaviour besides profit maximisation are compatible with UPP analysis. The formula derived here is, however, based on the assumption of Bertrand-competition.

179. The original formulation of the UPP framework has recently been extended in several respects. The assumption of an industry with one-product firms has been relaxed and the analysis has been extended to multiproduct firms.¹⁵⁷ Situations where firms change the quality of their products *post* merger can be dealt with by applying upward pricing pressure on quality-adjusted prices.¹⁵⁸

180. In principle, the fundamental methodology of UPP analysis can be extended to other forms of competition, *e.g.* quantity competition or to bidding markets. To apply UPP to Cournot-competition, the diversion ratio has to be modified. Instead of the “quantity diversion ratio” as used for markets with price competition, a “price diversion ratio” has to be employed that shows how the price of one product changes if the quantity of the other product is reduced.¹⁵⁹ Also for bidding markets a UPP analysis could in principle be carried out if the diversion ratio is modified according to a “winning probability diversion ratio” that indicates how the probability of one firm winning, for example in a sealed-bid procurement auction, increases with a slight increase in the bid of the other firm.¹⁶⁰ Recently, UPP analysis has also been applied to two-sided markets or more specifically to a merger between platforms. A price increase of a two-sided platform A consists of a price increase on both sides of the market, leading to an upward pricing pressure on both sides of the market of platform B. As the indirect network effects have to be taken into account, four different diversion ratios have to be considered, rendering the conditions for a positive UPP more complex.

181. Despite the clear intuition and the sound basis in economic theory, several objections against the use of pricing pressure measures in merger analysis have been raised. One criticism refers to the static character of the method that does not allow for post-merger repositioning of existing or the introduction of new products.¹⁶¹ Other objections refer to problems of measurement of diversion ratios and margins¹⁶², the

¹⁵⁶ See Zimmerman (2011). This corroborates the idea that a UPP screen and market definition should not be considered as substitutes but rather as complements. In other cases, depending *inter alia* on the mode of competition, UPP could outperform market share based approaches and *vice versa*.

¹⁵⁷ See Jaffe and Weyl (2012).

¹⁵⁸ See Willig (2011).

¹⁵⁹ See Moresi (2010). As in the case of Cournot competition with homogeneous products, market shares are a good predictor of unilateral effects. Under such circumstances, a UPP analysis based on a difficult to interpret and measure diversion ratio will not add much to a market share based screen.

¹⁶⁰ See Moresi (2010). As Froeb and Werden (2011:23) point out, this diversion ratio indicates the frequency by which the merger affects what a consumer pays but not the magnitude of the effect.

¹⁶¹ See Keyte and Schwarz (2011), Coate and Simons (2012), and Hausman (2010).

need for testing and validation of pricing pressure screens¹⁶³ and the importance of the mode of competition for the applicability.¹⁶⁴

182. These criticisms are certainly justified, but it could, nevertheless, be argued that most of the objections equally apply to alternative screens such as the implementation of the HMT and the measurement and interpretation of market shares. Also it has to be pointed out that UPP analysis was never conceived as a substitute for a thorough analysis of all competitive effects of a merger. It was designed as an initial screen, to flag mergers that may cause concern. It should not be taken to imply that a merger that fails the UPP screen should be prohibited:

“Failing the UPP test is relevant ‘circumstantial’ evidence of adverse unilateral effects. It is not a proof that the proposed merger likely would lead to a substantial lessening of competition. It is only one factor among others. In particular, the UPP test does not account for several other factors that are potentially important for evaluating the likely competitive effects of a merger, including potential supply-side responses (i.e. entry and repositioning), the multi-product nature of many firms (i.e. the impact on pricing incentives of the merging firms’ sales of other substitutable or complementary products), potential pricing interdependencies (i.e. how the merging firms’ pricing initiatives might trigger particular responses by other firms), and dynamic factors such as network effects and learning by doing. The UPP test, therefore, is a useful screen and might be used as supporting evidence, but it is not a complete analysis of all the relevant factors.”¹⁶⁵

183. One further objection against UPP analysis in merger control refers to the fact that pricing pressure indices only show the expected direction of a price change but not its magnitude. Therefore, pricing pressure indices do not provide information about the magnitude of the competitive effects of a merger. Two mergers with the same upward pricing pressure could lead to substantially different price increases.¹⁶⁶ Therefore, even at a first screening stage, it might be preferable to have some indication of the expected price effect of a merger. As the upward pricing pressure approach is rather general in using only the slope of the demand function, some more structure is needed to transform these indices into measures of predicted price effects of a merger. In particular, additional information about the demand function is required, as the changes in price are determined by the curvature of the demand function.

5.1.3 *From incentives to increase the price to the magnitude of price increases*

184. Pricing pressure indices can be extended to measures of estimated price increases if additional information about the demand function is included in the analysis. To make the transition from an indicator signalling the incentive to increase prices to an indicator estimating the magnitude of price increases *post* merger, it has been considered useful to interpret the value of diverted sales, *i.e.* $D_{12}(p_1 - c_1)$, as an opportunity cost that is internalised by the merged firm. The larger these opportunity cost, the larger is the incentive to increase the price of product 1.¹⁶⁷ To estimate the price effect of a merger it is important to know how this increase in cost is converted into a price increase, *i.e.* how costs are passed-through to price.¹⁶⁸ If costs increase, a firm has an incentive to raise the price of its product to compensate for the

¹⁶² Carlton (2010), Lopatka (2011).

¹⁶³ Carlton (2010), Garza (2010).

¹⁶⁴ Coate and Simons (2009).

¹⁶⁵ Moresi (2010:6).

¹⁶⁶ Carlton (2010:28).

¹⁶⁷ Shapiro (2011:728).

¹⁶⁸ Note that the change in cost, *i.e.* the increase in opportunity cost, affects only the new entity, not the other firms in the industry.

increased cost. The amount of the cost increase that can optimally be passed-through to price depends on the curvature of the demand function, *i.e.* the change in the slope of the demand function.

185. Pass-through rates can be calculated for different shapes of demand functions. In the simple two-firm, two product scenario with constant marginal cost the pass-through rate ρ in case of a linear demand function is $1/2$. For demand functions with a concave shape, $\rho < 1/2$, for convex demand, $\rho > 1/2$. If the demand function is isoelastic, *i.e.* has a constant elasticity, the pass-through rate is given by $\rho = \varepsilon/(1 - \varepsilon) > 1$. This shows that pass-through rates can substantially differ depending on the underlying demand function, thereby having an important bearing on the estimated magnitude of price increases.

186. Without any efficiencies and with symmetric firms and products, a profit maximising firm has an incentive to increase the price for one product by an amount of Dm , *i.e.* the gross upward pricing pressure (GUPPI) keeping the price of the other product constant. In case of a linear demand function, the effective price increase, $(p^* - p)/p$ is determined by the gross upward pricing pressure multiplied by the pass-through rate of $1/2$:

$$\frac{p^* - p}{p^*} = \frac{Dm}{2} = \frac{GUPPI}{2}$$

187. For a diversion ratio of 0.33 and a margin of 0.25, the effective price increase would be 4.12%. The predicted price increase for one product is 50% of the gross upward pricing pressure. This calculation does, however, not take into account the incentive of the merged firm to increase the price of the other product as well. Considering this yields the relation

$$\frac{p^* - p}{p^*} = \frac{Dm}{2(1 - D)} = \frac{GUPPI}{2(1 - D)}$$

188. Here, the factor $1/(1 - D)$ shows how the single price increase underestimates the effective price rise as the other products' price will go up in turn inducing another price increase for the first product etc.¹⁶⁹ For a diversion ratio of 0.33 and a margin of 0.25, the price increase becomes 6.16%.¹⁷⁰ The price increase would be reduced if the merger generates synergies, *i.e.* efficiencies reducing the marginal cost of the merged firm. If efficiencies are symmetric, the equilibrium price increase is given by¹⁷¹

$$\frac{p^* - p}{p^*} = \frac{GUPPI}{2(1 - D)} - \frac{e(1 - m)}{2}$$

189. For an isoelastic demand function, the pass-through rate is higher than under a linear demand function and is given by $\varepsilon/(1 - \varepsilon)$ where ε denotes the price elasticity of demand.¹⁷² Therefore, the predicted profit maximising price increase is also substantially larger than in case of a linear demand function

$$\frac{p^* - p}{p^*} = \frac{GUPPI}{1 - D - m} \quad .^{173}$$

¹⁶⁹ See Shapiro (2010). This analysis has been generalised for the asymmetric case by Hausman *et al* (2011). He shows that for the calculation of the expected unilateral effects the information is the same as for the symmetric case – only the formula is more complicated.

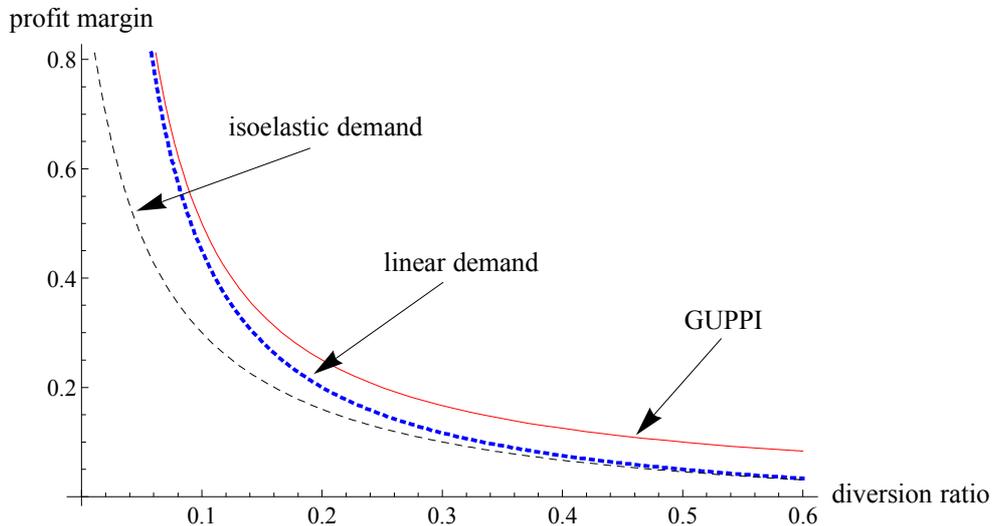
¹⁷⁰ This measure of the price effect of a merger is the same as the IPR (illustrative price rise) as employed by the OFT for linear demand functions.

¹⁷¹ Schmalensee (2009).

¹⁷² Notice that for unit-elastic demand, pass-through rates are not defined. This is related to the fact that no solution for the profit maximisation problem exists if demand is unit-elastic.

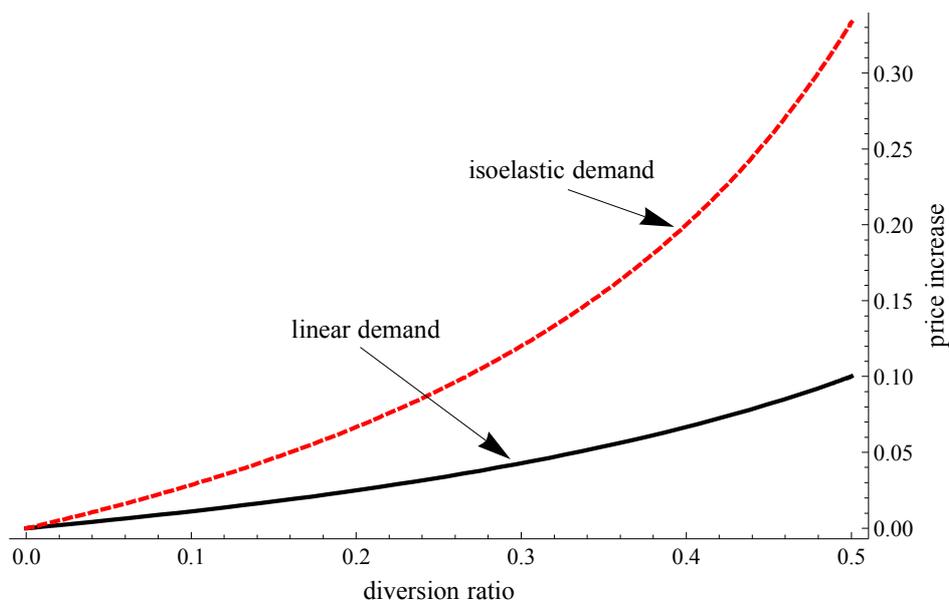
190. The combinations of margins and diversion ratios that yield a given price increase of 5% can be shown as follows:

Figure 1. Combinations of diversion ratios and margins for linear and isoelastic demand curves leading to a price increase of 5%



191. Figure 1 shows that the magnitude of price effects using a GUPPI is always larger than the predicted magnitude of price increases using other methods. Given an isoelastic demand curve, a price increase of 5% is generated by lower margins / diversion ratios than in the linear case. For any given margin, the difference between the predicted price increases for a linear and an isoelastic demand curve become larger as the diversion ratio increases. This is also shown in Figure 2:

Figure 2: Predicted price increases for a linear and an isoelastic demand function for a margin of 20%



¹⁷³ This corresponds to the IPR as used by the OFT for the case of an isoelastic demand curve.

192. For a margin of 0.2 and a diversion ratio of 0.3, the predicted price increase is 4.3%, assuming a linear demand curve while it is 12% assuming an isoelastic demand curve. This illustrates that the magnitude of the predicted price increases are extremely sensitive to the assumed shape of the demand curve (or pass-through rate) even for moderate levels of margins and diversion ratios. If pass-through rates cannot be measured with a sufficient degree of confidence, predicting the magnitude of price increases by combining pricing pressure indices with pass-through rates could lead to substantial differences in predicted price effects.

193. In addition to this lack of robustness with respect to the underlying shape of the demand function, the magnitude of the predicted price increases relies on the assumption that the prices of the non-merging firms are kept constant. In markets with price competition, as discussed in section 4.3.1 above, a price increase by the new entity will in general lead to price increases of non-merging firms. This opens up the possibility of further profitable price increases of the new entity and in turn new adjustments by non-merging firms etc. These second order effects are not taken into account and will tend to underestimate the magnitude of the price increases to be expected *post* merger. In practice, it would be rather complicated to estimate these effects as they depend on the demand system, *i.e.* the demand functions for all products of all the competitors. From a theoretical point of view, this problem has been analysed in a recent paper by Jaffe and Weyel (2012). To apply the methodology suggested there, however, could necessitate information on all own- and cross-price elasticities or diversion ratios between all products in the market. This information is usually not readily available and can if at all, only be provided by a structural demand analysis.

194. This shows that predicting the magnitude of price increases with the simple instruments of pricing pressure indices combined with assumptions about demand functions or pass-through rates may not lead to robust results.

5.1.4 *Compensating marginal cost reductions*

195. An alternative approach that avoids making any assumptions about the shape of the demand function or pass-through rates has been suggested in a very important paper by Werden (1996).¹⁷⁴ Rather than estimating the price increases caused by the merger, the reductions in marginal cost necessary to keep prices at the pre-merger level could be considered, in other words, the compensating marginal cost reductions (CMCRs). Werden considers price competition in a differentiated product market where firms produce with constant marginal cost. Mergers are assumed to create efficiencies by reducing the marginal cost of the new entity.

196. As shown in section 5.1.1 above, the UPP^* index, which takes into account the feedback effects from firm 2 on firm 1, is given by

$$UPP_1^* = (p_2 - c_2)D_{12} - e_1c_1 + (p_1 - c_1)D_{12}D_{21} + e_1c_1D_{12}D_{21}$$

197. Setting the expression equal to 0 and solving for the marginal cost reduction in the production of product 1, $E_1 = e_1c_1$, yields the reductions in marginal cost necessary to neutralise a merger-induced price increase for product 1:¹⁷⁵

$$E_1 = \frac{m_2D_{12} \frac{p_2}{p_1} + m_1D_{12}D_{21}}{(1 - D_{12}D_{21})}$$

¹⁷⁴ See also Froeb *et al.* (2001) and Froeb and Werden (2011).

¹⁷⁵ Froeb and Werden (2011) suggest that for small diversion ratios this expression can be approximated by $m_1D_{12} \frac{p_2}{p_1}$ or even by m_1D_{12} if the prices are similar.

198. In the symmetric case, this condition reduces to

$$E_1 = \frac{mD}{(1-D)} = \frac{GUPPI}{(1-D)}$$

199. If marginal cost in the production of product 1 are reduced by this amount, the upward pricing pressure for product 1 as measured by UPP* is 0. As prices are required to remain at the pre-merger level, only the slope but not the curvature of the demand function matters.¹⁷⁶ Stated otherwise, the necessary reduction in marginal cost equals the gross upward pricing pressure when feedback effects are taken into account. This shows that the GUPPI is a useful concept - not primarily to estimate the magnitude of increases in prices which depend on the curvature of the demand function entailing all the problems previously discussed, but as an indicator of the marginal cost reductions necessary to neutralise a merger-induced price increase.

200. The CMCRs thus provides a benchmark for the efficiencies that have to be generated by a merger to neutralise price effects. To screen a merger, the expected reductions in marginal cost have to be compared with the benchmark. If the expected efficiencies are substantially below the benchmark, the merger should get closer scrutiny.

201. It has to be noted, however, that the CMCRs as derived above is based on the assumption that firms compete in prices. Therefore, it should be assured that the industry to which the test is applied can be described by Bertrand competition.¹⁷⁷ A further objection which, however, equally applies to the other concepts introduced before, is that only efficiencies in the form of marginal cost reductions are considered. Lower fixed cost could, however, increase the incentives to invest in R&D, in particular in industries characterised by substantial fixed cost.¹⁷⁸ Furthermore, reductions in fixed cost could render market entry more attractive and could therefore increase price competition. All these effects could, however, be taken into account at a later stage in the analysis once a merger has been considered warranting more thorough scrutiny.

5.1.5 Relation to market definition

202. The concepts of pricing pressure, in particular the GUPPI bear a close relationship to market definition under the HMT because the underlying notion of buyer substitution is central to both concepts:

“Therefore, in considering how the hypothetical monopolist’s incentive to raise the price of one product differs from the pre-merger incentives of the firm controlling that product, a key question is what percentage of the unit sales lost, when that product’s price rises, are recaptured by other products controlled by the hypothetical monopolist.”¹⁷⁹

203. In addition, the HMT assumes that the cost structure of the hypothetical monopolist does not change with the merger, an assumption that corresponds to the no-efficiencies assumption in the GUPPI.

¹⁷⁶ This has the immense advantage of being able to dispense of any assumption concerning the shape of the demand function. Irrespective of the curvature of demand, the slope, *i.e.* the first derivative, of any differentiable demand function is linear at any given point.

¹⁷⁷ The compensating marginal cost reductions in a Cournot model can also be calculated. As Froeb and Werden (1996, 2001) show, they are given by $2s_1s_2/\varepsilon(s_1 + s_2)$, where ε is the price elasticity of demand. The numerator is the change in the HHI induced by a merger indicating a positive correlation with concentration.

¹⁷⁸ Carlton (2010).

¹⁷⁹ Shapiro (2011:751).

The HMT asks whether a profit-maximising hypothetical monopolist will impose a SSNIP of at least S on at least one of its product. In contrast, the GUPPI considers the incentive or the extra opportunity cost for a merged firm to increase the price which is then converted into a price increase whose magnitude depends on the curvature of the demand function or the pass-through rate. The products of the firms would constitute a relevant market if the profit-maximising price increase imposed by the merged firm were larger than the SSNIP. As the profit maximising price increase for each product in the linear and symmetric case is given by $GUPPI/2(1 - D)$, the condition for the two products to constitute a relevant market is

$$\frac{GUPPI}{2(1 - D)} = \frac{Dm}{2(1 - D)} \geq S \Rightarrow D \geq \frac{2S}{2S + m},$$

where S denotes the SSNIP and m the margin. If a large fraction of demand is recaptured by the merged firm, a price increase is profitable and the products would constitute a relevant market. The size of that fraction of demand recaptured depends on the magnitude of the price increase and the margin. If the margin is large, a lower fraction needs to be recaptured to make a given price increase profitable. Notice that this formula is identical to the condition derived for the profit-maximising critical loss in case of a linear demand function, *i.e.* the condition that a group of products constitutes a relevant market. Here, D has to be taken as the aggregate diversion ratio, the fraction of demand that is recaptured by the hypothetical monopolist.

204. This indicates that the seemingly new indices bear in fact a very close relationship to the traditional market definition by a critical loss analysis. This could be considered as an important point with respect to a possible adoption of pricing pressure indices as an additional tool for merger analysis. In addition, it shows that the size of the market as defined by the SSNIP test depends on the shape of the demand curve or, stated otherwise, on the pass-through rates.

5.1.6 Empirical research on pricing pressure indices

205. As pricing pressure indices are a rather recent concept, the empirical research on UPP and other measures is still rather limited. There is an early empirical paper by Walker (2007) estimating diversion ratios that are necessary to calculate the pricing pressure or to generate predictions about price increases caused by a merger. Walker uses data from two retail chain mergers (cinemas and bookshops), examined by the OFT and the CC (Vue/A3 Cinema and HMV/Ottakar's). He arrives at the conclusion that the data collected by the competition authorities, *e.g.* the characteristics of local markets may be used to calculate the relevant diversion ratios. He suggests that this measure would allow a ranking with respect to the degree that retail chain mergers give rise to competitive concern. He suggests that thresholds for diversion ratios could be derived but points out that these should be assessed in the context of other evidence.

206. Zimmerman (2011) evaluates the relative performance of the UPP screen compared to the traditional concentration based approach when diversion ratios are approximated by market shares. In the context of the Marathon/Ashland Petroleum joint venture (gasoline wholesale and retailing), he examines the question whether a market-share based on a UPP screen may provide a "better" approximation of effects than a concentration-based screen, in particular with respect to type I errors, *i.e.* false positives or the fact of flagging a merger as potentially problematic that ultimately does not increase prices. He compares the predictions of the UPP screen with the post-merger pricing outcomes of the retail portion of the transaction. The concentration-based approach would have caused substantial competitive concerns as the market is moderately concentrated and the transaction would have increased the HHI by 195. No price increase was, however, observed after the merger. Zimmerman shows that for efficiencies of 5% or more, the UPP is negative for both products. The GUPPI (no efficiencies) shows low positive values (3.2% and 2.4%). He concludes that the UPP screen would perform better than the concentration-based approach in

this case and that combining the market definition/market share approach with pricing pressure indices yields even better outcomes.

207. Using data from the American West/US Airways merger, Cheung (2011) compares the performance of a UPP screen with a concentration-based approach and with a merger simulation model. She demonstrates that the concentration based-approach is a more severe test if the HHI thresholds defined in the US merger Guidelines of 1992 and 2010 are used. There is, however, a weak positive correlation between increases in the HHI and predicted UPP in particular in the absence of efficiencies. The results of the UPP analysis and the merger simulation show no significant differences. Unsurprisingly, if the same structural demand model is used for both, UPP analysis and merger simulation, the predicted magnitude of the price increase is similar.

208. An application of UPP analysis to a two-sided market has been provided by Filistrucchi *et al.* (2011). They study several hypothetical mergers in the Dutch newspaper market and compare different approaches to predict the unilateral effects of these transactions. They consider the concentration based approach using the HHI, ask whether the merged firm would impose a small but significant price increase, estimate the UPP and carry out a full merger simulation. As the concentration-based approach does not take into account the indirect network effects, the results of this method are in contrast to the estimates of the UPP, the SSNIP and the merger simulation. While the concentration-based approach would lead to competitive concerns and a further investigation of the mergers, UPP, SSNIP and merger simulations show only small effects on prices on the readership and on the advertisement side of the market with no substantial differences between the three approaches. The two-sided nature of the market has, however, an important impact on the results: If the mitigating indirect network effects in a two-sided market are not taken into account, as is the case for the HHI, the pricing incentives of the platform are incorrectly assessed which leads to an overestimation of the anticompetitive effects of the merger.

209. The limited empirical literature to date shows that pricing pressure indices can be employed in practice and that they seem to perform reasonably well as compared to the concentration-based approach. Also, the results do not confirm the often voiced concern that UPP is more severe than the HHI screen.¹⁸⁰ Despite the fact that the first results are promising, much more research is necessary to assess the performance of pricing pressure screens in comparison to the structural concentration-based approach. This is particularly important for the development and the fine tuning of thresholds under GUPPI or UPP.

5.2 *Merger simulation models*

210. Merger simulation models have been employed in antitrust analysis for about 20 years. A merger simulation model is an oligopoly model that is calibrated so that the non-cooperative Nash-equilibrium reproduces the observed prices and quantities in the industry. The impact of a merger is simulated by computing the new prices and quantities in the non-cooperative Nash-equilibrium *post* merger.¹⁸¹ The unilateral effects of the merger are determined by the difference in prices and quantities in the pre- and post-merger equilibrium.¹⁸²

¹⁸⁰ See *e.g.* Simons and Coate (2010) or Varma (2009). This is also reflected in actual cases. See for example the US Whole Foods/ Wild Oats case or the UK Thomas Cook/ Co-operative Group/ Midland's Co-operative case demonstrating that the use of UPP/GUPPI may be more or less severe than HHI based approaches.

¹⁸¹ It is generally assumed that the pre- and the post-merger equilibrium is unique.

¹⁸² Recently, despite fundamental problems on a conceptual level, merger simulation models have been employed to predict the co-ordinated effects of a merger. For co-ordinated effects, an approach based on market definition and concentration measures in combination with the identification of maverick firms seems currently the best method available.

211. Merger simulation models and pricing pressure indices are related but differ in several fundamental ways: First, pricing pressure indices indicate only whether a merger could lead to an increase in prices while merger simulation models predict the magnitude of a price rise. Only if the pricing pressure indices are combined with a demand function or pass-through rate, do they allow estimates of the magnitude of price increases. Second, pricing pressure indices, including UPP*, are based on the assumption that the non-merging firms do not react to any change in prices by the merged firm, *i.e.* it is not an equilibrium approach while in a merger simulation model the reactions of non-merging competitors are explicitly taken into account, *i.e.* merger simulation is an equilibrium approach.¹⁸³ Third, merger simulation models are a much more flexible tool than pricing pressure indices as they allow for competitive actions of the merged firm in other dimensions than price or quantities.¹⁸⁴ Also, reactions of competitors such as product repositioning, market entry or exit can be incorporated in the model. Merger simulation models can also be used for different types of competition for example in Cournot-type markets but also to simulate auctions.¹⁸⁵ Furthermore, merger simulation models can be employed to analyse the effect of remedies such as partial divestitures.¹⁸⁶

212. The data requirements to carry out a full-fledged merger simulation are substantial. Demand systems have to be econometrically estimated or assumptions about the demand behaviour of consumers have to be made that approximate as closely as possible the observed demand behaviour. The model has to be calibrated according to the data and the supply side has to be integrated, *i.e.* assumptions about the competitive process and the cost functions of the firms have to be made. The simulation model has to be checked for internal consistency and external consistency with respect to current and past information about the industry before the post-merger equilibrium can finally be computed. This implies that a thorough merger simulation is a time-consuming and difficult task and has to be based on the specifics of the market.¹⁸⁷ A detailed merger analysis is therefore best carried out in cases where initial screens already indicate potentially serious competition concerns.¹⁸⁸

213. Merger simulation analysis cannot be considered an alternative or a substitute for market definition in its role as a simple first screen and will, therefore, not be discussed further. Nevertheless, the question arises whether simplified versions of merger simulation models could be employed as a first diagnostic test in a similar way as the pricing pressure screens. While there seems to be a substantial difference between pricing pressure indices and a full-fledged merger simulation model, the gap between

¹⁸³ On a conceptual level, this difference is analogous to the difference between the SSNIP and the FERM test in market definition.

¹⁸⁴ Noel (2011).

¹⁸⁵ For a short survey on merger simulation in auction markets see Froeb and Werden (2008:70) or Budzinski and Ruhmer (2009:292f.).

¹⁸⁶ An often emphasised advantage of merger models is the explicit recognition of efficiencies. If information about the expected efficiencies of a merger is available, it could, however, also easily be integrated in pricing pressure indices.

¹⁸⁷ Despite the fact that merger simulation models are used for about 20 years, the reliability of the predictions remains a problem. As Peters (2006) for mergers in the airline industry, Weinberg and Hoskens (2008) for two mergers in branded consumer goods markets and Weinberg (2011) for the Tambrands-Procter & Gamble merger have shown, merger simulation models could only modestly predict the factual *post* merger price effects. A recent study of the Hyundai-Kia merger by Yoshimoto (2012) has shown that merger simulation could predict short run price effects reasonably well while large discrepancies appeared. This could be due to changes in marginal cost or consumer preferences not taken into account by the merger simulation models. This indicates that more research in particular based on an *ex post* review of mergers is necessary. This is also true for other methods to predict the effects of mergers.

¹⁸⁸ Baker (2011).

the two approaches narrows once pricing pressure indices are combined with a demand function or a pass-through rate to estimate the magnitude of the price increase caused by a merger and if the general equilibrium approach of merger simulation models is dropped, allowing prices of competitors to remain fixed. The reason for this is that the pass-through rate in a merger simulation model is implicitly determined by the choice of the demand system and therefore equivalent to the pass-through rate derived in the context of upward pricing pressure indices as long as the underlying demand function is the same.

214. For example, the Antitrust Logit Model (ALM) or the Proportionally Calibrated Almost Ideal Demand System (PCAIDS) have been proposed to estimate the price effect of a merger with mild data requirements. In these models, diversion ratios are proportional to market shares. As Froeb and Werden (2011:18) point out, these simple merger simulation models are well suited for initial screening. If it is assumed that diversion ratios are proportional to market shares as the ALM or the PCAIDS do, information about market shares, the price elasticity of demand for one product (or the margin of one firm) and an estimate of the price elasticity of the aggregate demand function are sufficient to calibrate the model. The margins of the other firms or the other elasticities can be estimated via the equilibrium condition in the oligopoly model. In this sense, data are replaced by assumptions.¹⁸⁹

215. As the predictions of price increases of merger simulation models depend on the assumed demand system and thereby on the pass-through rates, Hausman (2010) suggests carrying out two simulations, one with a linear and a second with an isoelastic demand function to derive lower and upper bounds for price increases of the products of the merged firm. As he considers asymmetric firms, the price increases can differ between products. He suggests that the price increases for the products should be weighted with the market shares and that concern arises only if the average price increase for the products is substantial.

216. This indicates that simple merger simulation models could be considered similar to pricing pressure indices. Thus, simulation models could substitute or complement market definition. In the case of equally differentiated products, information about market shares can be combined with information about the margins and the elasticity of the aggregate demand that could lead to better results than using only information about market shares. Due to their simplicity, it is not to be expected that these models are able to give a precise estimation of the magnitude of the price effects of a merger. But they could be useful as an indicator identifying those mergers that require closer scrutiny.

5.3 *Direct effects approach in monopolisation and abuse dominance cases*

217. As pointed out in section 3.2.4, the role of market definition in abuse of dominance cases under EU law serves a dual role: first, it is used to assess whether the firm has a substantial degree of market power, *i.e.* a dominant position or monopoly power. In the second stage, if substantial market power or a dominant position has been found, market shares are employed to assist in the assessment of an alleged anticompetitive behaviour similar to the role of market definition in monopolisation cases in the US.

218. In EU competition law, a firm is assumed to have a dominant position if it can "...prevent effective competition being maintained on the relevant market by affording it the power to behave to an appreciable extent independently of its competitors, its customers and ultimately of the consumers..."¹⁹⁰ Under US competition law, a firm is considered to have monopoly power if it has "...the power to control prices and exclude competition."¹⁹¹ A dominant position or monopoly power is not per se illegal as a firm

¹⁸⁹ Froeb and Werden (2011:18).

¹⁹⁰ Case 85/76 *Hoffmann-La Roche & Co AG vs. Commission* (1979), ECR 461 (38).

¹⁹¹ *United States v. E.I. du Pont de Nemours & Co.* (Cellophane), 351 US. 377, 391 (1956).

could have achieved this position because it was more efficient than its competitors, supplied superior products or outperformed its rivals through some other legitimate means. Nevertheless dominant firms will tend to have a wider range of instruments to their disposal to abuse market power to exclude competition. In addition, the durability of a dominant position or of monopoly power has to be assessed by considering barriers to entry and expansion or countervailing buyer power. If *e.g.* barriers to entry are low and if fringe firms could increase their supply, a dominant position may not be durable and attempts to increase the price above the competitive level would be defeated by market entry or supply substitution.

219. To assess whether a firm has a dominant position or monopoly power based on its market share, the relevant market has to be defined. As discussed in section 3.2.4, there is a distinction between market definition for establishing dominance and defining a market to analyse potential anticompetitive effects. Concerning the latter, in cases where the dominant firm has already abused its market power to increase the price above the competitive level, *i.e.* if competitive harm has already occurred, market definition becomes difficult as the counterfactual price has to be estimated to implement the HMT. Otherwise, the substitution behaviour of consumers would be evaluated at a price that already has been raised above the competitive level, markets would be defined overly broad and the market shares would understate the market power of the firm. In prospective harm cases, however, the analysis refers to the future effects of the alleged anticompetitive behaviour and the currently prevailing price should be taken as the starting point for the definition of the relevant market.¹⁹²

220. In the US, the courts have found that monopoly power should be found only for market shares substantially above 55% and figures of 70% seem *de facto* to be a lower bound.¹⁹³ In any case, market shares below 50% were often found to be insufficient to infer monopoly power.¹⁹⁴

221. In the EU, a dominant position is usually assumed if the market share of the firm is larger than 40%-50%. In Germany, the thresholds are even lower as a firm is assumed to be dominant if its market share is larger than 33%. Firms with market shares in excess of these thresholds, *i.e.* dominant firms, are assumed to have a “special responsibility not to allow its conduct to impair genuine undistorted competition on the common market.”¹⁹⁵ For those firms certain types of behaviour were virtually *per se* prohibited, *e.g.* fidelity discounts, below variable cost pricing, price discrimination etc. A detailed effects analysis of these practices was usually not considered necessary on a case-by-case basis and decisions on the illegality were mainly based on the form the practice took. This approach is based on the implicit assumption that a certain practice if employed by a dominant firm, necessarily has an anticompetitive effect.¹⁹⁶ Dominance was thus treated as a binary variable – if the market share exceeds the threshold, the

¹⁹² As already pointed out, the retrospective and the prospective market definition is distinct from the market definition that is conducted to determine dominance, the latter being based on LRAIC. While this is typically not done in practice, the theory would paradoxically suggest that the market defined to establish dominance is different from the market that is defined to analyse anticompetitive effects. This is clearly a remnant from the past where dominance and the identification of certain conduct were considered enough to demonstrate abuse. While market definition today is used to determine whether the firm is dominant or not, its role in the effects analysis is more limited as will be shown using a simple example below.

¹⁹³ DOJ (2009:21). The document has been withdrawn.

¹⁹⁴ *Ibid.*

¹⁹⁵ Case 322/81 *Nederlandsche Banden-Industrie Michelin NV v Commission* (1983), ECR 3461 (*Michelin I*).

¹⁹⁶ The roots of this approach can be traced to the German *Ordo*-liberal school and its very sceptical position regarding economic power for both, efficiency but mainly also political reasons (see Maier-Rigaud (2012)) To some extent the idea that dominance itself is already an indicator of potential competition law problems also emanates from the structure-conduct-performance paradigm. See Kerber and Schwalbe (2008) for a general discussion of the development of competition laws in the US and EU including a section on German competition law.

firm has a dominant position otherwise it has no substantial market power and the practice has no anticompetitive effects. The approach to Article 102 TFEU, has changed in the meantime and an effects based approach to the assessment of abusive behaviour is now added to establishing dominance.¹⁹⁷

222. Dominance, however, is a matter of degree as the effect of a certain practice could vary substantially with the degree of market power a firm has. For example, tying by a firm with a market share of 50% will generally have a different effect on competitors and consumers than if the tying strategy is employed by a firm with a market share of 90%. In general the larger the market power of a firm, the greater are usually the possibilities and incentives to abuse its dominant position. In special circumstances, however, a firm with a market share below 50% could have substantial market power. “The structural indicators which traditionally serve as proxies for “dominance” provide an appropriate measure of power in some markets, but not in others. In a market where these indicators do not properly measure the firm’s ability to impose abusive behaviour on others, the competition authority’s intervention under traditional modes of procedure is likely to be inappropriate, too harsh in some cases and too lenient in others.”¹⁹⁸ Therefore, a simple market share threshold to assess whether a firm has a dominant position or monopoly power seems not to be adequate to deal with the problem of dominance. That degrees of market power, given dominance, may matter has been implicitly recognised in the EU through the concept of ‘super dominance’ for very high market shares close to a pure monopoly.¹⁹⁹

223. This shows that the market definition / market share approach to finding a dominant position or monopoly power alone is not sufficient to assess whether a firm has a substantial degree of market power. High market shares could be a first indicator, but other factors, in particular barriers to entry and expansion, the supply substitution of a competitive fringe or countervailing buyer power have to be considered.

224. As an alternative to the indirect assessment of dominance or monopoly power the direct measurement of market power has been suggested. As has been pointed out in section 2.2., a direct assessment of market power by estimating the elasticity of the (residual) demand function or to analyse the profitability of the firm to figure out whether supra competitive profits have been earned is usually difficult. “In short, direct evidence of a firm’s profits, margins, or demand elasticities is not likely to provide an accurate or reliable alternative to the traditional approach of first defining the relevant market and then examining market shares and entry conditions when trying to determine whether the firm possesses monopoly power.”²⁰⁰

225. Using market definition and market shares as indicators for the competition effects of a certain business practice is also problematic. In some cases, there may be a positive correlation between the market share and the effects of a business practice. A refusal to deal, for example, will generally have a smaller effect if it is carried out by a firm with a market share of 35% than if the firm is super dominant. Often, however, a certain business practice has pro-competitive as well as anticompetitive effects and it depends on the circumstances of the case which effect dominates. A retroactive rebate, for example, could be used by a dominant firm as an instrument to exclude rivals by creating a suction effect that reduces the demand for competitors.²⁰¹ On the other hand, the same rebate could have the function of an incentive mechanism to generate the efficient sales effort on the part of the retailers of the firms’ products. The

¹⁹⁷ European Commission (2009).

¹⁹⁸ EAGCP (2005:14).

¹⁹⁹ Szyszczak (2011).

²⁰⁰ See DOJ (2009:29). The document has been withdrawn.

²⁰¹ See for example Inderst and Schwalbe (2009) or Maier-Rigaud (2006).

economic effect therefore does not depend on the size of the market share but on the specific features of the market in which this practice is used and market shares can be considered only as a weak indicator of the competition effects. An approach that is based on the economic effects of a practice seems thus more appropriate.

226. The definition of the relevant market and resulting market shares provide important information for the assessment of dominance or monopoly power. This information is, however, not sufficient to infer the existence of a dominant position or of monopoly power and has to be combined with other indicators, e.g. supply substitution, barriers to entry, etc. to arrive at a reliable assessment of dominance or monopoly power. With respect to the assessment of the economic effects of business practices the value of market shares is *a priori* undetermined.

227. Instead of indirectly assessing monopoly power or dominance via definition of a relevant market, measuring market shares and combining this with information about specifics of the market, a ‘direct effects approach’ has been suggested. This method would bypass the market definition stage of the analysis and would infer the existence of market power by direct evidence of an abusive behaviour. “If a dominant firm’s conduct has been demonstrated to cause competitive harm, one could rely simply on that evidence and dispense with the market definition requirement entirely.”²⁰²

228. In the European context where this was first proposed, this would integrate the two step procedure of defining a relevant market to assess dominance and evaluating the economic effects of a practice into one unified methodology. A similar approach has been suggested by the Economic Advisory Group for Competition Policy (EAGCP) of DG Competition:

*“If an effects-based approach yields a consistent and verifiable account of significant competitive harm, that in itself is evidence of dominance. Traditional modes of establishing “dominance” by recourse to information about market structure are merely proxies for a determination of “dominance” in any substantive sense, i.e., the ability to exert power and impose abusive behaviour on other market participants. If an effects-based approach provides evidence of an abuse which is only possible if the firm has a position of dominance, then no further separate demonstration of dominance should be needed - if no separate demonstration of dominance is provided, one may however require the abuse to be clearly established, with a high standard of proof.”*²⁰³

229. While convincing from a conceptual point of view, this effects-based approach could in practice lead to problems regarding legal certainty (see section 6).²⁰⁴

230. Whether the direct effects approach that would dispense of market definition altogether as suggested by the EAGCP is a viable alternative to the indirect approach of assessing dominance via market definition and market shares or not will depend on whether or not the abuse can be established and the evidence is sufficient and cannot be interpreted differently.²⁰⁵ If direct evidence of anticompetitive effects is available, than it should, however, be possible to dispense with market definition in these cases.

²⁰² See DOJ (2009:30). The document has been withdrawn.

²⁰³ EAGCP (2005:14).

²⁰⁴ As the authors are not aware of any case where actually two separate market definitions were conducted, one to establish dominance and one to assess effects, current practice seems to already follow this approach if market definition is considered an integral part of an effects analysis.

²⁰⁵ See DOJ (2009:30). The document has been withdrawn.

5.4 *Conclusions on alternative tools and methods*

231. The discussion of the different tools and methods that have recently been suggested as alternatives to market definition has shown that these instruments may allow a better assessment of the competitive effects of mergers or of an anti-competitive conduct. It has to be recognised, however, that these tools, in particular the PPIs, have been designed for special circumstances under which the traditional concentration-based approach is not particularly useful. This is the case for example in markets with price competition and differentiated products where the central competitive concern is unilateral effects. In other circumstances, such as in markets with quantity competition, or in cases where the main competitive concern is the co-ordinated effects of a merger, these tools could lead to incorrect predictions.²⁰⁶

232. Before deciding which tool to employ, a competition authority should thus consider the nature of competition in the industry, and chose the tool that is most suitable for the analysis of the competitive situation.²⁰⁷ If the industry is characterised by a homogeneous product and competition is in quantities or capacities, the industry could be described by a Cournot model. In this case, a market definition, the assignment of market shares, the measurement of concentration and the change in the HHI caused by the merger would be a sensible approach to assess the competitive effects of a merger. This would also apply if the main competitive concern was co-ordinated effects, where the level of concentration and the identification of market participants and potential mavericks is important. If the merger takes place in a differentiated products industry where competition is in prices and the main concern is short-run price increases, the industry is probably best described by a Bertrand model, and the use of a PPI or the CMCRs could be taken into consideration, since in such a market, these indicators could be considered superior to the concentration based approach.²⁰⁸

233. If the industry is characterised by firms bidding for the business of customers, the closeness of competition between the merging firms could be of more importance than their market shares, and the focus should be on possible unilateral effects.²⁰⁹ In such cases, frequency or win/loss analyses could be employed to assess possible unilateral effects of a merger. But in principle, the definition of the relevant market is an important first step in the analysis since the competitors have to be identified. Similarly, in two-sided markets, an approach that is based on diversion ratios and dispenses with market definition is currently not a convincing alternative. Because of the indirect network effects in two-sided markets, the estimation of the diversion ratios is considerably more complex than in a one-sided market.

234. The tools a competition authority can employ depend of course on the information that is available. Different tools require different amounts or types of information, depending on the complexity of the instruments. The HHI requires information about the market shares of the participants and is based on market definition. The GUPPI requires information about the margins and market shares if the diversion ratios are approximated by the relative market shares of the merging firms. In this case, market definition and GUPPI are complementary. If direct information about diversion ratios and margins is available, market definition could be dispensed with and the GUPPI could be used to assess the pricing pressure directly. In this case, market definition and the GUPPI could be considered as substitutes. If information

²⁰⁶ Doane *et al.* (2010), Froeb and Werden (2011).

²⁰⁷ One could argue that the intensity of competition that is observed in a market could be taken as an indicator of the most suitable model to characterise the industry, independent of whether competition is in quantities or in prices.

²⁰⁸ This requires that the indicators are computed according to the facts of the case, *i.e.* if diversion ratios between two products are different, one should not use the simple formula that applies to the symmetric case only.

²⁰⁹ If the number of bidders in a market is small, co-ordinated effects could also be an issue.

about margins, diversion ratios (or market shares) and efficiencies is available, UPP, UPP* or CMCRs could be used. If in addition, information about the demand function is available, or if competition authorities are willing to make assumptions about the shape of the demand function, the magnitude of the price increase could be predicted by combining PPIs with the respective pass-through rates or by using simple merger simulation models. On the other hand, the type of competition could indicate which type of information the competition authorities should collect. Thus, under certain rather restrictive conditions, these new methods could be considered as an alternative to market definition as a first step in a merger analysis. But even in these cases and setting aside legal requirements, the definition of the relevant market will remain an important and useful first step in a competitive analysis because market shares can be used to estimate diversion ratios which could be combined with margins or estimated efficiencies to use pricing pressure indices, to estimate the compensating marginal cost reductions, or to carry out a simple merger simulation.

235. All these recently developed instruments, independent of whether they complement or substitute market definition, have been designed as a first screen in a merger analysis to flag mergers that could give rise to competitive concern and require closer scrutiny. They are not meant to predict the final competitive effects of a merger. An in-depth analysis of the competitive effects of a merger requires the evaluation of many other competitive conditions, *e.g.* repositioning of products, barriers to entry or to expansion, countervailing buyer power, investments in R&D and many others. But such in-depth analysis is carried out only after a merger has been flagged for closer scrutiny.

236. There is considerable concern in the literature that merger enforcement could become considerably stricter, compared to the concentration-based approach that employs the level of and the change in the HHI. Using simulated hypothetical mergers, some authors tried to demonstrate that under a UPP screen, substantially more mergers would be scrutinised than under the HHI screen.²¹⁰ Some of the simulated mergers are, however, based on implausible combinations of margins and diversion ratios. It has also to be taken into account that PPIs will be applicable only to mergers in differentiated products industries with price competition where unilateral effects are a major concern. For mergers in other industries, or in cases where co-ordinated effects are the major concern, the usual procedure will generally have to be applied even if new tools are fully embraced. Therefore, merger policy could change since some mergers would be flagged that would have escaped under the HHI and vice versa, in particular if independent information of the diversion ratios is available and if these diversion ratios between products are substantially different from the ratio of the market shares.²¹¹ Overall it does not seem plausible, however, to associate new tools with either a strengthening or a softening of merger control.

237. New and unfamiliar tools could create some uncertainty with respect to their application and outcome. These new tools are, however, rather intuitive, focusing on the incentives to increase price after a merger that depends on the value of sales diverted to other products of the merged firm. To reduce this uncertainty, safe harbours for PPIs could be introduced. It has been suggested to use a GUPPI of 5% as a safe harbour as this would lead – given a linear demand function – to a price increase of 2.5%.

238. With respect to the definition of the relevant market in cases of abuse of dominance or of monopolisation, the direct effects approach cannot be considered as a method that can be applied uniformly to all cases, and could thus replace market definition. This stage of a competitive analysis can be dispensed with only if clear and verifiable evidence of the anticompetitive effects of a practice is available. Otherwise, the definition of the relevant market – despite the problems in particular in retrospective harm cases – adds valuable information and allows for a coherent assessment of the alleged abusive behaviour.

²¹⁰ See Simons and Coate (2010) or Varma (2009).

²¹¹ Froeb and Werden (2011).

239. To summarise, it can be said that there are circumstances where market definition could be dispensed with as a first step in a competition analysis since *e.g.* PPIs could constitute a better screen than the traditional concentration-based approach. In many cases, however, market definition will remain an important and valuable first screen, as well as a tool for setting the stage for a more thorough competition analysis. Thus, to paraphrase the famous words of Mark Twain: “The reports on the death of market definition are greatly exaggerated.”²¹²

6. Market definition as legal concept

240. The discussion in the previous sections has not only presented an overview of the methods used to define markets and traced the economic roots of these methods (section 2 and 3), discussed some conditions under which the correct application of these methods is particularly difficult and results may nevertheless be problematic as market shares may not give a good indication of market power (section 4) but has also given an overview of alternative tools and approaches that economists have developed in the last 20 years to measure market power and the likelihood of anticompetitive effects.

241. The ultimate inquiry in any competition analysis is whether a given transaction or behaviour produces anti-competitive effects. Market definition as introduced in section 2 and 3 is typically just a first step in this analysis. It is instrumental to the extent that it allows the calculation of market shares from which competition authorities typically infer the existence of market power. This makes the market definition/market power paradigm one of the most disputed issues in any particular case.²¹³

242. Certainly, there are a number of scenarios where market definition is problematic,²¹⁴ and in response to problems that continue to persist in the assessment of individual cases, economists have put forward tools that may allow a better assessment of the competitive effects of an investigated conduct or transaction. Supposing that competition authorities and courts have all the required information for directly evaluating effects or giving an initial indication of likely competitive harm readily at their disposal, such a direct assessment should be preferred to an indirect approach based on market definition.²¹⁵ One may therefore ask whether in such circumstances market definition is still a useful and necessary indicator of market power or method for screening cases. This question has both a legal and an economic dimension.

243. The debate on the changing and potentially diminishing role of market definition and the possibility of supplanting it with alternative tools has mainly focused on the economic aspects, and in particular on the properties and the alleged analytical superiority of alternatives in contrast to the market definition / market share paradigm. The legal repercussions that such a potentially substantial shift may produce have, however, not found much attention in the debate.²¹⁶ While the analysis of the legal aspects is

²¹² After hearing that his obituary had been published in the New York Journal, Mark Twain is reported to have proclaimed: “The reports of my death are greatly exaggerated”.

²¹³ For the European Union see, for example, Commission Notice on the Definition of the Relevant Market for Purposes of Community Competition Law, OJ C 372 [1997]. The “definition of the relevant market in both its product and its geographic dimension often has a decisive influence on the assessment of a competition case”. For the US, see Pitofsky (1990) “Knowledgeable antitrust practitioners have long known that the most important single issue in most enforcement actions – because so much depends on it – is market definition.”

²¹⁴ Some of the most important general conditions under which market definition is problematic both due to the difficulty of its correct application but also due to the fact that market shares are not a good indication of market power are discussed in section 4.

²¹⁵ OECD (2011).

²¹⁶ While most of the current discussion about the de-emphasis of market definition is driven by the developments in the merger area, and in particular by the use of the pricing pressure indices, the findings

mostly conceptual, the observations formulated below should contribute to the ongoing discussion by providing an objective analysis of legal implications that allowing alternative tools alongside market definition may entail. In this section particular issues that competition authorities and courts should take into account when embracing alternative tools as substitutes or complements to traditional market definition are identified.

244. A legal discussion is of a particular importance given that the notion of ‘relevant market’ is now commonly used in virtually all countries where antitrust/competition laws exist. Depending on the degree that market definition concepts permeate competition law, allowing alternative methods may require lawyers and economist, practitioners and legislators to rethink the way in which antitrust analysis is and should be carried out. As the previous discussion suggests, a substantial shift in approach – implying possibly abandoning the concept altogether - continues to be nothing more than a remote possibility. Nevertheless, even complementing market definition with alternative methods or substituting it in specific circumstances requires an understanding of the extent to which market definition is inextricably embedded in the law and can be ‘surgically’ removed in certain parts of it. Indeed, market definition has taken on a life of its own that goes far beyond the role of an instrument allowing the prediction of likely anticompetitive harm in any individual case in many jurisdictions. Whether alternative instruments can be added to the analyst’s portfolio and whether these instruments may be allowed to replace or complement market definition is determined in particular by the answers to the following two questions: (1) To what extent is market definition legally required, and (2) To what extent has the embeddedness of the concept allowed market definition to take on a life of its own. To answer these two questions it is necessary to differentiate between the legal requirement of using market definition in the analysis of potential anticompetitive harm in any individual case and market definition as a concept employed outside a case specific effects analysis, for instance defining the scope of the law in case of safe harbour’s, Article 102 TFEU or even as a necessary ingredient to the calculation of fines.

6.1 *Substituting or complementing market definition?*

245. To facilitate further discussion it may be useful to distinguish between (i) partial (or complete) replacement of market definition, and (ii) a complementary use of alternative tools in addition to market definition. The emphasis under (i) is on partial replacement as complete replacement both as instrument in the effects analysis and in its wider roles seems unwarranted and unrealistic.²¹⁷ If market definition were to be removed completely from competition law, be it in the context of a dominance/monopolisation or merger, competition authorities would no longer delineate relevant markets. Partial replacement would refer to the removal (or replacement) of market definition only from a specific area of competition law, for instance merger control. A further possibility is to replace market definition only in certain categories of cases for which the alternative tools were designed (for example in horizontal mergers involving differentiated products). If total and partial replacement turn out to be either impossible or undesirable, competition authorities may still benefit from the use of new economic/econometric tools as complements to traditional market definition analysis.

246. Furthermore, partial replacement and complementary use are not necessarily mutually exclusive as in some instances new tools could be used in addition to, or instead of, the traditional structural

presented in this paper should be applicable to any future developments that may further put into question the utility of market definition. See for example Farrell and Shapiro (2010), Simons and Coate (2010), Epstein and Rubinfeld (2010).

²¹⁷ Kaplow (2011) and (2010) has been the most prominent recent proponent of the argument that market definition should be abandoned entirely. For a critical discussion of his arguments see Werden (2011).

approach based on market definition and market shares.²¹⁸ Moreover, recent developments, in particular in the area of merger analysis, indicate that at least in the nearest future, only complementary use and partial replacement may become a viable alternative to antitrust analysis based exclusively on market definition.²¹⁹

6.2 *Legal permissibility: market definition as a prerequisite*

247. The discussion of alternative tools to market definition and the idea of possibly dispensing with market definition at least in part, raises the question of whether market definition is legally required *per se*. As it is predominantly used to calculate market shares, identify competitors, measure concentration and make inferences about market power, it is possible that national laws may not explicitly require market definition to be established.

248. Where antitrust analysis under national laws is constructed with a focus on market power instead of market shares or market definition, there is a certain degree of flexibility that would allow the use of techniques other than market definition. Even if national law requires a market to be defined and mentions for example HHIs, laws can be changed.²²⁰ The feasibility of changing the relevant law and the time required varies across jurisdictions and depends on the level of a specific law in the hierarchy of sources of law.

249. First of all, one should distinguish between the use of hard versus soft law instruments. Putting aside disagreements among legal theorists about the precise meaning of the definitions, hard law commonly refers to “legally binding obligations that are precise (or can be made precise through adjudication or the issuance of detailed regulations) and that delegate authority for interpreting and implementing the law.”²²¹ Soft law, in contrast, refers to rules of practice that in principle are not binding, but which may nevertheless have practical effects.²²² The extent to which such effects may arise, however, varies across jurisdictions. For instance, in the EU the use of soft law instruments may create legitimate expectations, so that the competition authority should not depart from it without reason.²²³

250. To date, a substantial number of jurisdictions have opted for using soft law instruments as a means of providing guidance as to how the concept of relevant product and geographic market has to be applied. Competition authorities may choose to issue guidelines or notices that determine the analytical

²¹⁸ Such a view has been expressed by the expert of the plaintiff in US case: *The City of New York v. Group Health Incorporated, Hip Foundation, Inc., and Health Insurance Plan of Greater New York* (2010).

²¹⁹ According to Werden (2012) “a more detailed examination of modern merger analysis reveals that market delineation can be dispensed with only in some cases.” The most compelling case for such a shift, in his view, can be made in terms of consummated mergers and cases concerning unilateral effects.

²²⁰ Lopatka (2011).

²²¹ Abbott and Snidal (2000).

²²² Snyder (1993).

²²³ The European Court of Justice recognised soft law instruments as an important means to ensure the uniform interpretation and thereby also the uniform application of the Community customs rules. In 1989, the Court ruled in the *Grimaldi* case that national courts are to take into account not only hard law, but also legally non-binding instruments, such as recommendations, etc. *Grimaldi v. Fonds des Maldies Professionnelles* [1989] ECR 4407. The Commission must comply with self-imposed rules, such as guidelines, because even if they “may not be regarded as rules of law which the administration is always bound to observe, they nevertheless form rules of practice from which the administration may not depart in an individual case without giving reasons that are compatible with the principle of equal treatment.” Case C-397/03 P *Archer Daniels Midland Co. v. Commission* [2006] ECR I-4429, para. 91.

framework for the application of the relevant market concept for the purposes of the application of competition law. The European Commission's *Notice on the Definition of the Relevant Market* is a case in point.²²⁴ Alternatively, guidance on market definition may be provided in guidelines concerned with the assessment of specific categories of cases. This is the case for the US Horizontal Merger Guidelines²²⁵ or various guidelines issued by the European Commission in relation to the applicability of Article 101 TFEU.²²⁶

251. In addition, or as an alternative to soft law instruments, the concept of market definition may be defined and a procedure for its use may explicitly be established in primary sources of law, such as statutes, regulations and case law.

252. Some countries have in fact chosen to incorporate the term 'relevant market' into their competition statutes. By doing so, they have turned market definition into a statutory prerequisite.²²⁷ Codifying the concept of relevant markets may have been particularly tempting for countries that relatively recently adopted a competition law.²²⁸ For instance, in contrast to competition acts of many other EU member states, the Polish Act on Competition and Consumer Protection contains in Article 4 an explicit definition of several fundamental concepts including market definition.²²⁹ Similar provisions can also be found in other jurisdictions.²³⁰

253. In addition to the explicit definition, but also in its absence, national laws may include references to the notion of relevant market in various provisions and regulations accompanying competition acts. Take as an example "Form CO" used in the EU, which requires a very detailed reporting of information requested under the merger notification procedure. In accordance with Section 6 to 8 of the form, the

²²⁴ *Notice on the Definition of the Relevant Market for the Purposes of Community Competition Law*, O.J. [1997] C372/5. Guidelines of such a generic nature have also been adopted in China (May 2009) and Malaysia (2010). In fact the extensive use of guidelines by the Commission may in addition to its administrative, civil law tradition be a reason for the popularity of EU competition law in jurisdictions wanting to adopt a competition law regime.

²²⁵ Similar guidelines have been adopted in a number of jurisdictions. See for example Canada and UK.

²²⁶ *US Horizontal Merger Guidelines* (2010), *EU Commission's Guidelines on the application of Article 101 to technology transfer agreements* O.J. [2004] C 101/2, paras. 19-25; *Guidelines on the applicability of Article 101 of the Treaty on the Functioning of the European Union to horizontal co-operation agreements* O.J. [2011] C11/1, paras. 112-126 *et al*; *Guidelines on Vertical Restraints* O.J. [2010] C130/1, paras. 86-95.

²²⁷ One may suggest here that pricing pressure indices may be used to reverse engineer market definition as discussed in section 5 allowing a relevant market to be defined.

²²⁸ To some extent this tendency to orient the law on the most recent generally accepted standard is true also for European and German competition law that both were adopted at a time when dominance in itself was considered suspect. The early phases of both laws also fall into the peak times of the structure-conduct-performance paradigm which may explain why Article 102 TFEU for example was based on a "simple" dominance test that under per se violations would be sufficient to prohibit certain conduct. Even if per se prohibitions have now widely made way to an effects analysis, the initial dominance analysis remains. As has been hinted at before, this even implies two types of market definition, one for determining the applicability of the law based on competitive prices (based on LRAIC) and possibly another where market definition is used as an instrument in the effects analysis either based on current or but-for prices depending on whether the suspected infringement is pro- or retrospective.

²²⁹ Polish Act of 16 February 2007 on competition and consumer protection (Journal of Laws of 2007, No. 50, item 331, available at: http://www.uokik.gov.pl/competition_protection.php).

²³⁰ This is for instance the case in the Slovak Act on Protection of Competition, the Hungarian Competition Act 2009, the Indian Competition Act of 2002, amended in 2007, and the Mexican law of 2012.

notifying parties have to provide information concerning ‘affected markets’. Also, provisions relating to dominant position and decisions/agreements of minor importance will typically explicitly refer to the market definition/market share paradigm.²³¹

254. Alternatively, even in civil law systems, a requirement to define the relevant market may be established in the case law. Continuous reference to leading cases clearly shows that it will not be easy to avoid existing precedents in attempts to challenge future conducts or transactions without establishing a relevant market first. In the US, courts often invoke *Brown Shoe* where the US Supreme Court ruled that “determination of the relevant market is a necessary predicate to a finding of a violation of the Clayton Act.”²³² In Ireland, in its first case that dealt with substantive competition law issues, the Supreme Court held that “identification of the relevant products and markets are the necessary starting point in every case.”²³³

255. Cases, however, should be and are best assessed in a historical context. When the US Supreme Court accepted market shares as the “base upon which to build conclusions of the probable future effects of the merger”, which in turn rendered market delineation a “necessary predicate”,²³⁴ the then-prevailing structure-conduct-performance paradigm in industrial organisation created a direct link between high concentration and poor market performance. Moreover, the Court did not have alternative economic tools at its disposal at the time. With the advancements in economic theory, econometrics and the availability of data, however, such tools are now more readily available, and start to be used more frequently by competition authorities,²³⁵ while the developments in industrial organisation have led courts and scholars to recognise that in some instances “high concentration can be compatible with vigorous competition and efficient market performance.”²³⁶

256. When the law explicitly requires market definition, the feasibility of introducing amendments or possibly removing given legislation altogether, depends on relevant national procedures and the level of a given law in the hierarchy of sources. While legislation and statutes would require parliaments to take necessary steps, case precedents would have to be set aside by the courts. Overturning them may not be an easy task, but as the landmark US case, *Leegin Creative*, shows, it is not impossible.²³⁷

257. As already pointed out, where under national legislation antitrust analysis hinges on market power rather than market shares, the use of other tools should pose less problems. The possibility to

²³¹ For instance, in accordance with Article 9 item 4 of the Polish Act on competition and consumer protection a “*dominant position* shall mean [a] position of the entrepreneur which allows him to prevent (the) efficient competition on the relevant market thus enabling him to act in a significant degree independently from competitors, contracting parties and consumers; it is assumed that entrepreneur holds a dominant position where his market share exceeds 40%”. See also European Commission’s Notice on Agreements of Minor Importance, O.J. [2001] C 368/13.

²³² *Brown Shoe*, 370 U.S., quoting *United States v. E.I. du Pont de Nemours & Co.*, 353 U.S. 586, 593 (1957).

²³³ Judgment of the Irish Supreme Court in Competition Authority -v- O'Regan & ors, [2007] IESC 22. This is also the case in Australia. Note, however, that these requirements can also be fulfilled only in cases brought and would therefore not generally preclude the use of other screens.

²³⁴ The US Supreme Court in *Brown Shoe Co. v. United States* (1962).

²³⁵ See OECD (2011).

²³⁶ Farrell and Shapiro (2010).

²³⁷ In a landmark 5-4 decision, *Leegin Creative Leather Products, Inc. v. PSKS, Inc.*, the US Supreme Court overruled a nearly 100 years old precedent established in *Dr. Miles Medical Company v. John D. Park & co.*, 220 U.S. 373 (1911). In *Dr. Miles*, the Court held that resale price maintenance (RPM) was *per se* illegal under Section 1 Sherman Act. Overruling its earlier decision, the Court held that RPM should be examined under the rule of reason in light of case specific facts.

embrace new tools will depend not only on the status of market definition, but possibly also on the type of enforcement. In the US, where antitrust laws are mostly privately enforced, courts may more readily accept the use of new tools instead of or in addition to market definition. While an attempt to invoke the UPP test was rejected by the District Court in *City of New York v. Group Health Incorporated*, the Second Circuit on the appeal held that while the plaintiff explained the UPP test's usefulness in assessing the impact of a merger, it did "not explain how the test can substitute for a definition of the relevant market in the pleadings". In light of such wording, one could speculate that if a plaintiff were to convincingly explain how UPP, or any other tool, could substitute for market definition, courts would at least consider the viability of such arguments.²³⁸

6.3 *Legal repercussions of removing or complementing market definition*

258. Assuming that obstacles such as legislation and cases that explicitly require market definition can be overcome, there are still a number of other issues that have to be taken into consideration. First of all, the notion of the relevant market may be intrinsically embedded in competition law analysis, in which case abandoning it would be extremely difficult. Second, where market definition can actually be "surgically" removed, the shift away from market definition can increase the level of uncertainty for the ultimate addressees of competition law provisions but also for competition authorities and courts.

6.3.1 *Embeddedness and the internal consistency of competition law*

259. The extent to which the concept of market definition is embedded in competition law varies across jurisdictions. In the EU for example, market definition generally plays an important role in all areas of competition law (Article 101 and 102 TFEU as well as mergers), but the approach to market definition differs depending on the type of case in which the relevant market is to be defined.²³⁹

260. In accordance with the EU Guidelines on market definition, "market definition is a tool to identify and define the boundaries of competition between firms. [...] The main purpose of market definition is to identify in a systematic way the competitive constraints that the undertakings involved face."²⁴⁰ In certain circumstances, it may, however, not be necessary to arrive at a firm conclusion on the scope of the relevant market since the transaction is unlikely to inflict harm on competition irrespective of how narrow the market is defined.²⁴¹

²³⁸ In the UK tools such as IPR have already been used for several years. See for example the UK Competition Commission's cases such as *Somerfield/Morrisons*, *JBB/Sports Direct*, *Masschash/Finro, Co-op/Somerfield*, and *Asda/Netto*.

²³⁹ Case T-62/98, *Volkswagen AG v. Commission* [2000] ECR II-2707, para. 230: "As regards the scope of the Commission's obligation to define the relevant market before finding an infringement of the Community competition rules, the Court points out that the approach to defining the relevant market differs according to whether Article 101 or Article 102 TFEU is to be applied. For the purposes of Article 102, the proper definition of the relevant market is a necessary precondition for any judgment as to allegedly anticompetitive behaviour, since, before an abuse of a dominant position is ascertained, it is necessary to establish the existence of a dominant position in a given market, which presupposes that such a market has already been defined. On the other hand, for the purposes of applying Article 101, the reason for defining the relevant market, if at all, is to determine whether the agreement, the decision by an association of undertakings or the concerted practice at issue is liable to affect trade between Member States and has as its object or effect the prevention, restriction or distortion of competition within the common market."

²⁴⁰ EU Guidelines on market definition [1997], para. 2.

²⁴¹ See for instance Case No. COMP/M.5747 – *Iberia/British Airways*.

261. While the EU Guidelines apply to all areas of competition law, market definition has historically been of a much higher importance in merger and abuse of dominance cases.²⁴² Nevertheless, market definition has also played a role in identifying competitive constraints in the context of agreements. The increased emphasis on market definition in the context of Article 101 TFEU cases can be explained by two developments: (i) Commission's policy on vertical and horizontal restraints, which rely on market shares, and (ii) the abolition of the notification system of agreements for individual exemption under Article 101(3) TFEU.²⁴³ As a result, the responsibility for the assessment of possible anti-competitive effects of contracts and other practices has been relegated to the concerned undertakings. Parties to an agreement now have to decide themselves whether their agreement qualifies for an exemption or violates competition law. That in turn requires that they carefully assess the economic context of the agreement, which involves, among others, the definition of the relevant product and geographic market.

262. This need to self-assess one's own position in the market is equally important for the application of Article 102 TFEU and other national provisions inspired by it. In the EU only dominant firms fall under Article 102 TFEU and have to ensure that their conduct does not violate the law. This means that otherwise lawful practices become unlawful when implemented by a dominant firm. Historically this was in line with the Structure-Conduct-Performance presumption that large market shares combined with certain conduct would be sufficient to establish abuse. Today it is recognised that market shares can only be a first indication, but the idea prevails that they provide "valuable information about the structure of the market and of the relative importance of the undertakings active in it".²⁴⁴ Therefore, when specific provisions either explicitly or implicitly rely on a certain market share threshold, only the calculation of the shares, which in turn requires definition of the relevant market, can trigger the application of such provisions.

263. If market definition served only the purpose of arriving at case specific conclusions about market power and ultimately competitive harm, replacing it could be considered relatively easy. As outlined above, however, at least in some jurisdictions market definition is much more than just a method to answer the technical case specific question of whether a given transaction or conduct produces anti-competitive effects even if historically it was only considered an instrument indicative of competition law abuses.

264. In addition to its role as a trigger for the application of certain provisions, market definition may also play an important role in the determination of fines. In accordance with §13 of the EU Guidelines on setting fines, "the Commission will take the value of the undertaking's sales of goods or services to which the infringement directly or indirectly relates in the relevant geographic area within the EEA"²⁴⁵ as a starting point "in determining the basic amount of the fine to be imposed". In Switzerland in accordance with Article 4 of the Ordinance on Sanctions, fines are determined on the basis of the turnover achieved by the undertakings concerned in the relevant market in the last three years.²⁴⁶ Also in the UK, the starting

²⁴² As merger analysis is prospective, market definition as for instance implemented using the SSNIP test would start from pre-merger prices. In abuse of dominance cases the effects analysis would either start – as in merger control – by using current prices in case the suspected infringement is prospective and, typically, with but-for prices that try to reconstruct prices in the absence of the alleged infringement. In addition to this effects oriented instrumental use of market definition, Article 102 TFEU requires an initial dominance test that would be conducted by market definition based on competitive prices as hypothetically arrived at using LRAIC or AAC. See European Commission (2009), para. 26.

²⁴³ The replacement of the individual exemption regime established by Regulation 17/62 by means of Regulation 1/2003 abolished the Commission's monopoly in the application of Article 101(3) TFEU that is now also enforced by national competition authorities.

²⁴⁴ Whish (2012:181).

²⁴⁵ *Guidelines on the method of setting fines imposed pursuant to Article 23(2)(a) of Regulation No 1/2003*, O.J. [2006] C 210/2.

²⁴⁶ Ordinance on Sanctions imposed for Unlawful Restraints of Competition [2004].

point for calculating the level of financial penalty is the ‘relevant turnover’, which refers to the turnover of the undertaking in the relevant product and relevant geographic market.²⁴⁷

265. Definition of the relevant market is equally important in private enforcement cases. In February 2009, the *Corte Suprema di Cassazione* (Italian Supreme Court of Cassation) delivered an important judgment in which it underlined the need for an accurate and precise market definition in antitrust damages cases. The Court quashed a judgment of the Court of Appeal of Bari that excluded the existence of a dominant position, and consequently, the existence of a violation of competition law on the grounds that the Court of Appeal had not carried out a proper analysis concerning the definition of the relevant market.²⁴⁸

266. To fully appreciate the extent to which the concept of market definition is embedded in competition law, one should also take into account repercussions that dispensing it would have on other areas of law with procedures that have been directly inspired by competition law.

267. For instance, sector-specific regulation, such as the 2003 regulatory framework for electronic communications applies *ex ante* as opposed to competition law, which applies *ex post*. While competition law intervention is triggered by an anti-competitive conduct, sector-specific regulation is triggered by the presence of specific market characteristics, which put market definition at the centre of regulatory intervention.²⁴⁹ In contrast to the 1998 regulatory framework, relevant markets under the 2003 framework are to be defined in accordance with competition law methodologies, and in particular the HMT/SSNIP test.

6.3.2 *Legal certainty*

268. Uncertainty is an all-pervasive problem in competition law and to a certain extent it cannot be divorced from competition law analysis. The discussion of partial replacement or complementing market definition begs the question whether alternative tools affect the existing level of legal certainty. To proceed with the analysis, the following section distinguishes between the use of market definition in a narrow technical sense in the analysis of potential anti-competitive effects in a specific case and the role that market definition plays more widely as a legal requisite or instrument that either triggers the application of certain provisions or is required to calculate fines. An example of this distinct use of market definition is Article 102 TFEU where market definition may be incorporated in the effects analysis but where (a different) market definition first has to establish dominance of the concerned undertaking. To illustrate potential problems, we discuss uncertainty in three different dimensions, all of which refer to the role of market definition in a narrow technical sense.

269. In addition to the uncertainty considerations on the instrumental level that follow below, reducing the role of market definition in competition law poses some more general questions as it may make it more difficult for businesses to enjoy some degree of predictability in business planning. Predictability is particularly important when application of competition law is triggered by the achievement of a specific threshold expressed in the percentage of a market share, for instance in case of dominance requirements or the use of safe harbours. To the extent new tools are not suitable for defining thresholds or do not allow the calculation of thresholds over a range of conducts or are more difficult to calculate, legal certainty is likely to suffer.

²⁴⁷ OFT's guidance as to the appropriate amount of a penalty [2004].

²⁴⁸ Corte Suprema di Cassazione, *Cetel/Enel*, 13 February 2009.

²⁴⁹ In accordance with Article 15 of the Framework Directive, the Commission adopts a recommendation on the relevant product and service markets. This recommendation, subject to revision, identifies those product and service markets within the electronic communications sector, the characteristics of which render them susceptible to *ex ante* regulation.

6.3.2.1 *The value of market definition as a precedent*

270. One of the advantages of market definition over alternative tools directly aiming at establishing anticompetitive effects is its ability to act as a precedent in subsequent investigations.²⁵⁰ Technological or other developments in an industry could have a bearing on market definition, as the boundaries of the market may change over time.²⁵¹ Such changes are, however, not sufficiently frequent to invalidate the general precedence value of a defined market in the context of one case for another in the same market. Even if ultimately the market definition has to be adjusted or even replaced, a once defined market is a solid starting point for any subsequent competition analysis.²⁵² So while the definition of the relevant market must be identified according to the particular facts of each case, in the absence of substantial changes in the market, earlier definitions may provide useful precedence and guidance to market players.²⁵³ Having therefore defined a relevant market in the context of a merger case for example, this market definition can be used as a basis²⁵⁴ for subsequent (merger and non-merger) cases, saving resources of the authority and allowing a better self-assessment of companies.²⁵⁵

271. A relevant market defined in one case will therefore have a precedent value for defining a market in any subsequent case irrespective of its type. The application of alternative tools to market definition, however, does not allow the same type of “portability” as the focus of these methods is directly on effects. While such an effects analysis may of course allow some conclusions as to what the relevant market is likely to be, a description of effects in an abuse of dominance case in any particular industry is unlikely to be of much help if subsequently a merger in that industry is to be considered.²⁵⁶ An indirect approach to effects is therefore likely to have a much more important precedence value than any direct assessment of competition effects.

6.3.2.2 *Degree of predictability in a technical economic sense*

272. Concerns about the reduced degree of predictability in essence refer to the precision of a given method. In considering partial replacement, competent bodies and authorities should therefore compare the

²⁵⁰ The distinction between direct effects analysis and market definition is not always as clear-cut as suggested here. For instance, many merger simulations are based on logit models, which require estimates of market shares. These clearly require a prior definition of the relevant markets. Werden (2012:11), for instance, submits that it is not always possible to satisfactorily predict unilateral effects using solely new tools without delineating a relevant market.

²⁵¹ For instance a geographic market definition is likely to change with a substantial decrease of transportation cost.

²⁵² It has of course to be acknowledged that there are limits to this as remarked by the EU General Court in *Coca-Cola Co v. Commission* where it was stated that a market definition from a previous decision can not automatically be considered binding in the case of subsequent investigations. Cases T-125/97 and T-127/97 [2000] ECR II-1733 [2000] 5 CMLR 467.

²⁵³ For instance in Case COMP/M.2416, *Tetra Laval/Sidel*, the Commission adopted market definition previously accepted by the Court in Case C-333/94P, *Tetra Pak II* [1996] ECR I-5951.

²⁵⁴ This is also standard practice for other competition authorities such as the German Federal Cartel Office.

²⁵⁵ While undertakings in the EU cannot have a legitimate expectation that the Commission will follow the market definition adopted in previous cases, the Commission has to give an account of its reasoning if a decision deviates from previous decision-making practice. See Case T-151/05 *Nederlandse Vakbond Varkenshouders v Commission* [2009] ECR II-1219, [2009] 5 CMLR 1613, para. 136-140; Case 73/74 *Groupement des fabricants de papiers peints de Belgique and Others v Commission* [1975] ECR 1491, para. 31.

²⁵⁶ Some of the methods discussed in section 5 allow a reverse engineering of market definition.

variability of results produced by the application of the market definition / market share paradigm with results produced by alternative methods. If a particular method results in a higher variability, parties may put forward arguments supporting more extreme positions, resulting in a wider spectrum of plausible assessments. A particularly plausible example of this risk is the lack of robustness of pricing pressure indices with respect to predictions about the magnitude of price effects. The fact that pricing pressure indices require assumptions about the shape of the demand function potentially open the door to substantially different outcomes in the analysis as the magnitude of the calculated price effect crucially hinges on such information. While this argument concerns the intrinsic variability of any given instrument, it would of course not be surprising to find that a newly introduced method initially produces higher variability in light of the relative inexperience of its advocates.

273. This could also be observed with respect to market definition, for instance in the context of submarkets²⁵⁷ or in its early days when the cellophane fallacy was committed. It would therefore not be surprising that any new methodology, irrespective of its inherent degree of variability, creates some (additional) uncertainty until sufficient experience in handling it has been gained by all relevant parties to competition cases.

274. In a technical economic sense and as previously discussed in section 4 it seems already clear today that under certain circumstances market definition will not perform as well as alternative tools. As stated previously, this is not only due to the difficulties of applying market definition correctly in certain circumstances but more importantly to the fact that the underlying rationale, namely that market shares will be indicative of market power, is not generally true.

275. What is relevant from a policy perspective is clearly the maturity and empirical robustness of alternative tools. For now, even the most likely candidate, namely pricing pressure indices, have not, at least according to critics, “achieved the level of support in the economics community that is necessary to support firm legal doctrines”²⁵⁸.

276. As long as the use of a particular tool or methodology cannot be supported by convincing empirical evidence testifying to its performance, attempts to de-emphasise market definition in courts may be rare and limited as beginning the case with market definition is “the smart way to secure an appellate victory” (FTC Commission Rosch).²⁵⁹

277. On a more practical note, it is worth adding that the opportunities for using alternative tools may more often arise in merger than in monopolisation cases. This is due to likely divergent incentives firms may have to provide competition authorities with information necessary to use complex economic tools. In light of the interest of seeing a merger cleared quickly, parties may be more forthcoming in providing the data necessary for economic analysis than in cases where firms generally benefit from delay and may anyhow prefer not to reveal too much information.

6.3.2.3 *Repercussions of methodological pluralism*

278. The market definition approach to assessing effects in competition law cases exhibits an important flexibility allowing the analysis of a wide range of potential competition law problems from

²⁵⁷ See Baker (2007:150).

²⁵⁸ Lopatka (2011).

²⁵⁹ *FTC v. Laboratory Corporation of America*: “The failure to properly define a relevant market may lead to the dismissal of a Section 7 claim”, see *Freeman Hospital*, 69 F.3d at 268.

mergers to monopolisation cases. This flexibility in turn affects its degree of sophistication when it comes to the assessment of highly specific cases.²⁶⁰

279. From this perspective it may not be surprising that certain alternative methodologies outperform market definition under specific circumstances thereby raising the question of methodological pluralism. On the face of it, it may appear very attractive to use different methodologies depending on the circumstances and needs of the case.

280. While allowing for a large toolkit of methods for analysing economic effects in competition law cases may allow a more accurate assessment of competition effects in each case, market definition allowed for a relatively uniform antitrust analysis across cases.

281. The use of any approach, be it based on market definition, pricing pressure indices or any other method, implies a certain variability in analytical outcomes that creates uncertainty. This uncertainty is, however, unavoidably exacerbated when another layer of uncertainty is added through methodological pluralism, *i.e.* the choice of instrument.

282. The possibility to directly assess the competitive constraints faced by a firm or firms whose conduct or transaction is subject to investigation seems both more appealing and preferable to an indirect approach based on market definition at least with respect to the accurateness of the findings. It is furthermore very tempting to allow for a choice in method that would allow a customised approach to competition analysis. Indeed, such plurality of methods gives competition authorities more flexibility in carrying out a thorough analysis as they can choose the tool that best suits the particular circumstances of any given case. Setting aside the potential drawbacks of this increased discretion of the enforcement authority, it is clear that such methodological pluralism increases uncertainty and may lead to a possible fragmentation of competition law.²⁶¹ In addition to any uncertainty regarding the application of any particular method, methodological pluralism implies that there is the additional uncertainty about what method is the most pertinent one. In addition, when two methodologies complement each other, there is a risk that they produce conflicting results, further exacerbating the problem.

6.3.2.4. *Conclusions concerning legal certainty*

283. In addition to the general certainty created by the fact that market definition is embedded in competition law, as for example exemplified in the concept of dominance or safe harbours, used in varying degrees in different jurisdictions, this section has introduced three dimensions of uncertainty that may be relevant for considering whether market definition should be complemented or possibly even replaced as a tool in investigating anticompetitive effects in any particular case.

284. The first argument presented was the differing precedence value of market definition as opposed to alternative instruments across cases. A direct identification of anti-competitive effects in any particular case may not allow many inferences to be drawn for a different case even if similar markets, products and geographic locations are concerned.

²⁶⁰ To that end, it should be recalled that market definition as conducted on the basis of the SSNIP test was originally devised in the context of mergers with homogenous products.

²⁶¹ Fragmentation of the law is of course not an additional concern to uncertainty. A rule of reason or case-by-case approach is, however, generally not ideal if similarly accurate general rules can be devised. Economists, in particular consultants, seem too often willing to embrace shortcuts by simply calling for a case-by-case analysis instead of embracing the much more complicated task of devising economically sound general rules. See Maier-Rigaud (2006:100).

285. The second argument concerned the variability of results under any particular method. While this is also influenced by the experience all relevant parties to an antitrust case have with respect to the method, there are direct reasons for differences in variability that are linked to data requirements for example but also to the method in itself (visible under theoretically perfect conditions of applicability).

286. The third point concerns the additional uncertainty that is brought about by methodological pluralism. In *FTC v. Whole Foods Mkt., Inc.*, the US Court of Appeals acknowledged that “although the framework for a prima facie §7 of the Clayton Act, 15 U.S.C.S. § 18, case rests on defining a market and showing undue concentration in that market, this analytical structure does not exhaust the possible ways to prove a § 7 violation on the merits.”²⁶² Therefore, in theory other tools could be used as well.²⁶³

287. As soon as it is possible to choose among several methods, however, uncertainty inherent to the use of any given method is further increased given that it may not be clear which particular method should apply in any particular case.

6.4 Institutional constraints

288. Competition law does not exist in a vacuum. It is applied and enforced by various actors and institutions. Assessment of the implications of (partially) dispensing or complementing market definition would be incomplete if it did not account for the ability of the competent bodies to embrace new tools.

289. New tools certainly require economic expertise, and to the extent that some competition authorities may not have a sufficient number of well-qualified economists, the use of more sophisticated tools may be undesirable.²⁶⁴ These arguments have, however, to be taken with a grain of salt as evidence on price effects under pricing pressure indices is likely to be a much more intuitive concept than the squaring of market shares in the context of an HHI that was also met with considerable resistance when initially introduced in the US. Nevertheless, with all its shortcomings, an advantage of using market definition is that it has been applied extensively over a lengthy period of time in a number of jurisdictions. Consequently, there is an extensive body of case law that less experienced authorities may find useful and

²⁶² *FTC v. Whole Foods Mkt., Inc.*, 548 F.3d.

²⁶³ The US Department of Justice acknowledged that this could also be the case in the context of monopolisation cases. In its 2008 Report on Single-Firm Conduct, the DoJ explained that “if a dominant firm’s conduct has been demonstrated to cause competitive harm, one could rely simply on that evidence and dispense with the market definition requirement entirely.”²⁶³ However, having said that, the DoJ also recognised that “there are concerns with taking such an approach. One important concern is that effects evidence, while very valuable, is generally imperfect, and sometimes subject to differing interpretations. For this reason, also requiring a traditional market-definition exercise—incorporating, perhaps, available evidence of alleged effects—likely adds value by strengthening inferences and thereby avoiding potentially costly errors”. Moreover, “direct evidence of a firm’s profits, margins or demand elasticities is not likely to provide an accurate or reliable alternative to the traditional approach of first defining the relevant market and then examining market shares and entry conditions when trying to determine whether the firm possesses monopoly power.

²⁶⁴ Lopatka (2011) for instance warns that the use of more sophisticated tools risks that “antitrust lawyers and judges who are not well versed in economics” may be excluded from the dialogue that determines the result. Courts exhibit, however, a long history of judges deciding in technical medical or other cases so that this concern may be exaggerated. From a more fundamental point of view it is unsustainable to argue against superior methods simply on the basis that those currently applying the olds methods may have some difficulty adjusting. If that were a decisive criterion it is difficult to perceive of any progress in any area.

informative.²⁶⁵ In addition market definition is often used as an initial screen, not as a replacement for a full analysis. In that function market definition is probably the most resource efficient approach an authority can consider.

290. While the problems of institutional constraints may be less severe for administrative law systems, concerns have also been raised by economist in adversarial systems. Carlton (2010), for instance, argues that “any suggestion that the court should abandon the use of market definition when analysing the competitive effects of mergers is unwise, as the failure to define markets would likely increase the number of erroneous decisions reached by courts”. With an increased use of econometric techniques, one could expect a serious discrepancy between tasks judges are required to perform and tasks judges will actually be capable of performing.²⁶⁶

6.5 *International alignment*

291. Discussions concerning the diminishing role of market definition have up to date taken place in a few jurisdictions with mature and well-established competition law regimes. In light of the widespread adoption of competition laws all over the world, it may be useful and informative to take into account the impact that complementing or partially replacing market definition may have on less experienced jurisdictions.²⁶⁷

292. While realistically speaking it is unlikely that inspired by such instruments as the US Horizontal Merger Guidelines other foreign agencies would simply ignore market definition altogether, effective and consistent implementation of antitrust may be put at risk even when the authorities simply decide to downplay market definition as a tool.²⁶⁸

293. With the adoption of alternative tools by only some jurisdictions there is a risk that the assessment of international mergers when authorities involved use completely different approaches, could more often lead to inconsistent and mutually exclusive findings.

²⁶⁵ A similar concern is for young authorities to skip the phases of development that the mature competition law regimes went through and directly delve into an effects-based analysis where any economic tool may be allowed. It would seem more advisable for authorities to start with an arguably less cutting edge but ultimately much more robust approach to competition law and that would certainly take substantial recourse to market definition.

²⁶⁶ Baker and Bresnahan (2008).

²⁶⁷ The impact that developments in the leading jurisdictions tend to have on others should not be underestimated. Take as an example the revision of the Canadian Merger Enforcement Guidelines (MEGs). The Competition Bureau explicitly asked in its Discussion Paper whether it should consider revising the Guidelines to shift emphasis away from the detailed assessment of market definition and more towards a direct assessment of competitive effects (Question 1a). It may be interesting to note that in response to the consultation, the Sections of Antitrust Law and International Law of the American Bar Association (ABA) replied that they do not support the view that the Bureau should move away from a detailed assessment of market definition. Actually, “to the contrary the Sections recommend that the Bureau reaffirm in the MEGs that market definition is an indispensable element of any decision to challenge a transaction – including in cases for which facts and economic tools are available to enable the Bureau to assess competitive effects more directly”. Submissions available at: <http://www.competitionbureau.gc.ca/eic/site/cb-bc.nsf/eng/03338.html>

²⁶⁸ Carlton and Israel (2010).

7. Conclusion

294. Market definition was introduced into competition law in order to help competition authorities in assessing market power allowing the evaluation of anti-competitive effects and enforcing competition law. This tool has been developed as an answer to the question of the existence, the creation and the strengthening of market power in a historic context with a particular vision of what competition problems are and how they should be analysed. Over time, this perception has changed, and also the role of market definition has expanded. In addition to its function as an indirect method to assess market power, market definition currently also determines the applicability of competition law provisions including exceptions.

295. Market definition is an important first step in a competition analysis because a direct assessment of market power and competition effects is often either not possible or overly time consuming. In addition, the ubiquity of the market share approach provides a high degree of certainty across cases. It also has an important signalling function for companies, for example in the context of market dominance or safe harbours.

296. Market definition is usually carried out by using the hypothetical monopolist test which can be implemented by critical loss analysis. When applied as an instrument in the analysis of competitive effects, market shares and changes in concentration can be used as an indicator of (increased) market power and possible competition effects, for example in a merger context. Market definition is, however, not restricted to this role. It fulfils other case specific functions such as identifying the area of competition, the market participants, and the boundaries of the market, that are important in the analysis of market barriers.

297. Market concentration and changes in the HHI are, however, not always accurate indicators of (possible) negative effects on competition. This is particularly true for markets with differentiated products and for bidding markets, where the closeness of competition is more important than the level of and the change in concentration. In abuse cases, particular difficulties arise in the definition of the relevant market because it is closely linked to the theory of harm where it has to be determined whether the analysis is pro- or retrospective. Also, there is often no direct link between market shares and the competition effects of a particular business practice.

298. As a result, alternative tools have been developed that under certain circumstances allow for a more precise assessment of competition effects than the concentration-based approach. Various pricing pressure indices have been proposed that could provide a better screen for mergers in differentiated product markets than the market definition / market share approach which often does not yield satisfactory results because it does not take into account the intensity of competition. In principle, these tools allow authorities to dispense with market definition as a first step in a merger analysis, provided the necessary information is available. In abuse cases, it has been suggested to dispense with market definition altogether and replace it with a direct effects analysis. But this is also restricted to cases of clear evidence of anticompetitive effects.

299. Since these tools are specialised instruments designed for special circumstances, they have to be used with caution. If applied to situations for which they were not designed, pricing pressure indices for example will produce misleading results. While pricing pressure indices may perform well in differentiated products markets in flagging mergers that give rise to competition concern, they require information about the substitution behaviour of consumers and the margins of the firms. An estimate of the magnitude of the price effects of a merger by pricing pressure indices crucially hinges on assumptions about the shape of the demand function. This may lead to a higher variability in predictions than desirable.

300. Economic theory has developed a whole portfolio of tools and the choice of the appropriate method depends on several factors including the information available, the type of suspected competition problem and of course the type of industry concerned. This portfolio of methods could allow a competition

authority to choose the investigation methods according to the particulars of each case and thereby allow for a higher accuracy in individual cases.

301. From an economic point of view, it would indeed seem sensible not to concentrate on just one single method. Broadening the scope of analysis and allowing different methods to increase the precision in analysing potential anticompetitive effects may on balance be useful but also requires considering the repercussions with respect to the predictability of competition law. Flexibility in the use of different approaches that could either be substitutes or complements needs to be weighed against potentially negative repercussions on legal certainty.

302. Generally speaking the new proposed tools are not expected to change competition policy radically. In merger policy they are likely to play an important role only in markets with differentiated products and price competition where unilateral effects are the major concern. The impact on other areas of competition law is likely to be more muted.

303. Market definition is an important and indispensable tool for the analysis of potential anticompetitive effects in individual cases and, in a substantial number of jurisdictions, also for determining the applicability of competition law. Nevertheless, analytical progress should be allowed and it should therefore be possible to resort to tools that are more suited to certain cases than the market definition / market share approach. In some sense it is not surprising that the answer to the question of how best to assess market power for the purposes of establishing competition law infringements is changing and will continue to change. How this change can be accomplished depends not only on the respective legal system and its tradition but also on how deeply market definition is embedded in competition law.

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