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UPP Analysis in Five Recent Merger Cases

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Abstract

A recent development in merger review has been the shift from an approach committed to market definitions, market shares and concentration index appraisals to more effect-based analyses. This paper attempts to provide an all-in-one guide for practitioners who are interested in getting a full grasp of how the UPP framework has been developed and how to apply it. In this paper we review and summarize the underpinnings of what has become a popular tool in identifying potentially problematic mergers, known as the Upwards Pricing Pressure (UPP) methodology and discuss how it has been applied in five recent cases reviewed by Konkurrensverket (the Swedish Competition Authority).

Keywords: unilateral effects, merger review, diversion ratio, GUPPI, UPP, IPR, CMCR

JEL Codes: K21, L40

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1 Introduction

In recent decades, following the decline of the Structure-Conduct-Performance (SCP)-paradigm[1], merger review has shifted towards an almost exclusive emphasis on the unilateral effects of mergers. Two unilateral approaches currently dominate quantitative merger analysis; merger simulation and various simplified approaches, of which Upward Pricing Pressure (UPP) is the most well-known.

In this paper we present a concise survey of the theoretical underpinnings and derivations of those UPP-style models that, through our experience of applying them, we have come to consider as the most useful ones for inclusion in a practitioner's toolbox. Our focus is less on detailing analytical proofs and more on connecting the UPP equations to the original optimization problem of the merging parties as well as showing how the various equations relate to each other. We supplement this discussion on derivations of formulas with a step-by-step guided tour of how Konkurrensverket has been applying these tools in five recent cases. We provide, in broad strokes, some information about the cases so as to place our discussion of the application of the UPP in the right context; we provide a detailed discussion on how the relevant parameters were estimated; and conclude by discussing the role the UPP calculation played in the overall analysis of the merger.

Our aim is to provide an all-in-one guide for practitioners interested in getting a full grasp of how the UPP framework has been developed and how to apply it. This is important for several reasons. First of all, we found most practitioners' guides currently in circulation lacking in providing an appropriate level of detail in connecting the formulas to the underlying optimization assumptions. We find this problematic because the simplicity of the formulas makes it all too attractive to abstain from considering their appropriateness in each particular case. Second of all, we are not aware of any other paper summarizing all the theories discussed herein in a similar fashion. It is important to have a proper understanding of the differences between the various methods that fall under the term "UPP-methodology" so as to better evaluate the values produced by closely related but still distinct formulas. Lastly, we believe that connecting the formulas to real-world examples would help others get a better understanding of how to apply these tools in practice.

The paper is structured in the following manner. Section 2 presents a short historic perspective on the UPP methodology and its real-world applications so far. Section

[1] See a survey article by (Schmalensee R. , 1989).

3 presents the theoretical underpinnings and a detailed derivation of the formulas that we consider most relevant for a practitioner interested in applying the UPP methodology in an antitrust investigation. The reader, who is already familiar with the methodology, or more interested in practical applications, may wish to skip ahead. Section 4 presents the five recent merger reviews carried out by Konkurrensverket in which the UPP methodology was used. Section 5 concludes the paper with some critical points.

2 Background

2.1 Theoretical developments

Merger simulation, pioneered by amongst others Werden and Froeb, was introduced in the 1990's as an explicit modeling framework for predicting the unilateral price effects of mergers; see (Werden & Froeb, 1994) and (Werden G. J., 1996). Under this approach, a differentiated demand system where firms compete in prices is estimated, often using sales data obtained from the main industry participants. A merger is modeled as introducing two changes to this system; the internalization of the cross-price effects between the merging parties, as well as marginal cost efficiencies. The price effects of the merger are then simulated based on the estimated demand system where the merging parties' first-order conditions are altered for these two effects.

Several difficulties arise when attempting to simulate mergers in this way. To handle problems of dimensionality stemming from the large number of own- and cross-price elasticities that need to be identified, one needs to assume a simple demand system such as logit, nested-logit or AIDS (*Almost Ideal Demand System*) as the functional form for demand. The predicted price effects are also sensitive to the system specified, as demand curvature determines how much of the recaptured sales, and similarly, how much of the marginal cost reduction, would be passed on to consumer prices.

In addition to these principal shortcomings, implementing the simulation in practice, in the short amount of time available for a merger review, also imposes practical complications. Attempting to estimate a demand system requires the identification of reliable instruments, which would give practical difficulties even in the absence of time constraints. By aiming to estimate a large number of parameters, the quality of individual elasticity estimates tends to suffer. Finally, the simulation itself is relatively opaque as it is not a closed-form solution, making it

difficult to gauge the reliability of the prediction for economists and non-economists alike.

(Shapiro, 1996) and (Werden G. J., 1996) suggested simplified approaches that avoid some of these shortcomings by focusing on how the pricing incentives of merging parties change, while holding the pricing of third party firms constant. This approach enables a simplified empirical implementation by not considering any other elasticities but the own- and cross-price elasticities between the merging parties. In addition, both Werden and Shapiro used the classic Lerner indexto further simplify the empirical requirements through: (i) deriving own-price elasticities from markups rather than from demand estimations, and instead of cross-price elasticities using diversion ratios, which are defined as the share of lost sales due to a price increase that spills over to the acquired party. These approaches required data only on markups, which can be obtained from the merging firms, and diversion ratios, which can be measured by empirical methods.

Werden and Shapiro approached the above-mentioned problem of demand curvature and pass-through in two different ways. Werden's approach focused on the marginal cost reductions required for offsetting the increase in market power created by a merger. This approach bypasses the problem of curvature entirely, since the cost reductions are measured at the initial prices.[2] Shapiro, on the other hand, initially calculated the effects of price increase assuming linear or constant elasticity of demand, which is referred to as Indicative Price Rise (IPR).[3] Later this approach was refined to circumvent the curvature problem, which is now known as Upward-Pricing Pressure (UPP).

(Farrell & Shapiro, 2010) dealt with the problem of demand curvature similar to Werden by analyzing the effects only from the viewpoint of initial prices. In subsequent literature this approach has been extended to Gross Upward-Pricing Pressure Index (GUPPI) and the First-Order Approach to Mergers (FOAM)[4].

Throughout the paper, the UPP-approach refers to this general methodology including specific indices computed such as UPP, GUPPI, IPR, and CMCR as part of the methodology.

[2] For further discussion on Compensating Marginal Cost Reduction (CMCR), see (Werden & Froeb, 2011) and (Goppelsroeder, Schinkel, & Tuinstra, 2008).
[3] For further discussion on IPR, see (Hausman, Moresi, & Rainey, 2011).
[4] For further discussion on FOAM, see (Jaffe & Weyl, 2013)

2.2 Applications of UPP

Among the enforcement agencies the Office of Fair Trade (OFT), currently the Competition and Markets Authority (CMA), was an early adopter of the UPP-approach, which assessed mergers using IPR as early as Somerfield/Morrison (2005), Waterston/Ottakar (2006) and CGL (Co-operative Group Limited)/Somerfield (2008)[5]. The Department of Justice (DOJ)/Federal Trade Commission (FTC) endorsed GUPPI in their Horizontal Merger Guidelines in 2010.[6] The UPP-approach was hereafter applied to mergers on both sides of the Atlantic.

In Sweden, the UPP-approach was first used by Konkurrensverket in a phase I merger investigation, Office Depot/Svanströms (2011). It has subsequently been used in several phase I and phase II merger investigations, which will be presented in this paper.

Hutchison 3G Austria/Orange Austria (2012) marked the European Commission's first use of the UPP-methodology in a phase II merger assessment. The GUPPIs were computed on a per-user basis using the merging parties' figures for the average revenue and the diversion ratios, which were calculated based on the national mobile number portability data. The predicted price increases for respective products appeared to be highly significant. In addition, the competitors were expected to respond to the price increase by the merged entity and to increase

[5] The OFT used the UPP-methodology in the phase I investigation of the merger "Unilever/Albert Culver (2011)"(*OFT decision ME/4805/10 of 18 March 2011 – Unilever N.V. and Unilever plc (Unilever) and The Alberto Culver Company (Albert Culver)*) . The GUPPI was calculated based on a consumer panel data provided by the merging parties. The OFT concluded that the diversion ratios were high enough to raise concerns over unilateral effects and decided to refer the case to the Competition Commission (CC). The OFT analyzed the anticipated acquisition by Shell of Rontec's 253 petrol stations (Shell/Rontec, 2012 - OFT decision ME/5191/11 of 13 February 2012 – Shell UK Limited (Shell) and Consortium Rontec Investments LLP (Rontec)) using the GUPPI-analysis in local areas. The OFT found that in some areas a substantial lessening of competition was expected, while other areas raised no significant concerns. The OFT cleared the merger subject to remedies. The CC investigated the merger between Zipcar and Streetcar in 2010 (The Competition Commission's decision of 22 December 2010 in case 44/10 – Zipcar Ink (Zipcar) and Streetcar Limited (Streetcar)). A survey was carried out among current and recently lapsed members of the merging parties. The CC's analysis of diversion ratios and margins were consistent with at least a moderate incentive for Zipcar to raise prices post-merger. However, the CC finally decided to clear Zipcar's acquisition of Streetcars given that low entry barriers in the market for car club services would prevent the merged entity from exploiting its position and damaging consumer interests in the medium term

[6] For further discussion on the revised horizontal merger guidelines, see (Carlton, 2010).

their price, which is only partially reflected in the UPP calculation. The European Commission cleared the notified merger subject to conditions[7].

The UPP-methodology was also used on the other side of the Atlantic. In the case of AT&T's acquisition of T-Mobile (2011)[8] the (Federal Trade Commission (FTC) presented the GUPPI as a measure of the competitive constraints that T-Mobile currently exerted on AT&T prices. The diversion ratio was estimated from the local number portability data[9], i.e. the percentage of customers for each firm that ported their number to each competing provider. The computed GUPPI indicated that the merged entity had a unilateral incentive to raise price. The FCC also estimated the compensating marginal cost reduction (CMCR) and concluded that marginal costs reduction required for offsetting the upward pricing pressure created by the anticipated merger were larger than the projected marginal cost savings claimed by the parties. The DOJ concluded that the proposed transaction would substantially lessen competition for mobile wireless telecommunications service across the United Sates and decided to block the merger.

3 Derivation of UPP and related measures

3.1 Basic set-up of unilateral analysis

Unilateral effects analysis begins in a static Bertrand framework with a demand system $q_i(p_1, \ldots, p_N)$ for products *i=1, …, N*. In the baseline model firms are assumed to be single-product firms with constant marginal cost c_i. Firm i sets its price p_i independently to maximize profits $\pi_i = (p_i - c_i)q_i$. Assuming profits are strictly concave in price for simplicity, the resulting first-order conditions are:

$$(1)\quad \frac{\partial \pi_i^o}{\partial p_i} = q_i^o + (p_i^o - c_i^o)\frac{\partial q_i^o}{\partial p_i} = 0 \text{ for } i = 1, \ldots, N,$$

where the superscript *o* denotes that a function is evaluated at pre-merger prices $p_1^o,\ldots,p_N^o$. Defining markups as $m_i^o \equiv \frac{p_i^o - c_i^o}{p_i^o}$, own-price elasticities as $\varepsilon_{ii} \equiv -\frac{\partial q_i}{\partial p_i}\frac{p_i}{q_i}$, and cross-price elasticities as $\varepsilon_{ij} \equiv \frac{\partial q_i}{\partial p_j}\frac{p_j}{q_i}$, equation (1) can be rewritten as the inverse relationship between markup and own-price elasticity

[7] The approval was conditional upon the implementation of a commitments package that would facilitate the entry of new players into the Austrian mobile telecommunications market.

[8] Case 1:11-cv-01S60 31 August 2011

[9] The local number portability data track the number of customers who port their mobile wireless telephone number from one provider to another in each month by rate center.

$$m_i^o = \frac{1}{\varepsilon_{ii}^o},$$

which is known as the Lerner index.

A merger between firm 1 and 2 yields marginal cost efficiencies Δc_1 and Δc_2 on the respective products.[10] Following the merger, the merged firm now sets prices p_1 and p_2 to maximize joint profits;

$$\pi(p_1, p_2) = (p_1 - c_1^o + \Delta c_1)q_1 + (p_2 - c_2^o + \Delta c_2)q_2,$$

resulting, for the merged firm, in the post-merger first-order conditions (FOC):

(2) $\frac{\partial \pi^*}{\partial p_i} = q_i^* + (p_i^* - c_i^o + \Delta c_i)\frac{\partial q_i^*}{\partial p_i} + \left(p_j^* - c_j^o + \Delta c_j\right)\frac{\partial q_j^*}{\partial p_i} = 0$ for $i, j = 1,2$ and $i \neq j$,

where the superscript * denotes that the functions are evaluated at post-merger prices $p_1^*,\ldots,p_N^*$.

The FOCs for the non-merging firms remain unchanged except that they are now evaluated at the post-merger prices:

(3) $\frac{\partial \pi_i^*}{\partial p_i} = q_i^* + (p_i^* - c_i^o)\frac{\partial q_i^*}{\partial p_i} = 0, \qquad \text{for } i = 3, \ldots, N.$

3.2 Merger simulation and UPP

When conducting a full merger simulation, the N demand functions $q_i(p_1, \ldots, p_N)$ are estimated, identifying the N^2 pre-merger cross-price effects $\frac{\partial q_i^o}{\partial p_j}$.[11] From these demand estimates, marginal costs are inferred using the Lerner index. Based on these estimates and inferences, as well as information on marginal cost efficiencies, the post-merger prices that satisfy the N equations in (2) and (3) are obtained through iteration.

[10] The efficiency gains that are related to price-setting and are in turn relevant for the UPP are the potential cost savings that reduce marginal costs. A reduction in fixed costs (e.g. HQ overhead costs that are typically cut down to almost half following a merger) would be irrelevant in these calculations.

[11] In the absence of income effects, cross-price derivatives are symmetric $\frac{\partial q_j^o}{\partial p_i} = \frac{\partial q_i^o}{\partial p_j}$, so the number of derivatives to be estimated can be reduced to $\frac{N(N-1)}{2} + N$. This number can be reduced further by imposing restrictions on demand function, e.g. a nested-logit structure.

The UPP-approach involves several simplifications to the process of estimating unilateral effects. Firstly, all prices except those of the merging parties are held constant. This assumption allows the analysis to focus on the change of the incentives of the merging parties, as expressed in equation (2), which reduces the number of cross-price effects that need to be estimated to two only; namely $\frac{\partial q_1^o}{\partial p_2}$ and $\frac{\partial q_2^o}{\partial p_1}$. This simplification will tend to underestimate the true price effect to the extent that products are strategic complements.[12]

Secondly, instead of estimating the relevant own-price effects, $\frac{\partial q_1^o}{\partial p_1}$ and $\frac{\partial q_2^o}{\partial p_2}$, the UPP-approach suggests inferring these from marginal costs and pre-merger markups using the Lerner index. This means inferring the demand side from supply-side information on costs, instead of vice versa, as is done in merger simulation. The estimation strategy is thus very economical, as the only parameters left to estimate are the two cross-price effects.

Obtaining point estimates for the two *pre*-merger cross-price effects does not allow us to evaluate the *post*-merger first-order conditions in equation (2) however, since we do not know how demand and their derivatives change when moving away from pre-merger prices. For a full analysis, we would need to know the functional form of demand and more specifically the *curvature* of demand.

Within the framework of UPP-methodologies, there are several solutions to this problem. The first is the so-called *First-Order Approaches to Merger Analysis* (FOAM) approach, which avoids demand curvature entirely and includes the basic UPP method, and an even simpler method called *Compensating Marginal Cost Reductions* (CMCR). Other approaches include those that specify simple demand functions, yielding closed-form solutions to post-merger prices, such as the *Indicative Price Rise* (IPR) method.

3.3 First-Order Approaches

According to this approach, in order to estimate post-merger effects based on pre-merger variables without having to make further assumptions regarding demand

[12] See (Bulow, Geanakoplos, & Klemperer, 1985) for a discussion on strategic complements. With constant elasticity demand, the pricing of non-merging parties will in fact not change, while with strategic complementarity, price increases by the merging parties cause third-parties to raise their prices, which in turn gives increased incentives to raise prices further for the merging parties.

curvature, the post-merger FOCs, as expressed in equation (2), are evaluated at *pre-merger* prices which result in

$$(4)\quad \frac{\partial \pi^o}{\partial p_i} = q_i^o + (p_i^o - c_i^o + \Delta c_i)\frac{\partial q_i^o}{\partial p_i} + \left(p_j^o - c_j^o + \Delta c_j\right)\frac{\partial q_j^o}{\partial p_i} \text{ for } i,j = 1,2 \text{ and } i \neq j.$$

Note that, in general, the expression above is not equal to zero when evaluated at pre-merger prices. We can reduce it further by cancelling the terms from the pre-merger FOC in equation (1), which gives

$$(5)\quad \frac{\partial \pi^o}{\partial p_i} = \Delta c_i \frac{\partial q_i^o}{\partial p_i} + \left(p_j^o - c_j^o + \Delta c_j\right)\frac{\partial q_j^o}{\partial p_i} \text{ for } i,j = 1,2 \text{ and } i \neq j.$$

Let $V_i^o \equiv -p_i^o \frac{\partial q_i{}^o}{\partial p_i} = q_i^o \varepsilon_{ii}^o$ denote the value of sales lost on product i due to a price increase on product i. Furthermore, define the diversion ratio as the ratio of sales lost that are recaptured by product j $d_{ij} \equiv -\frac{\partial q_j / \partial p_i}{\partial q_i / \partial p_i} = \frac{\varepsilon_{ji}}{\varepsilon_{ii}}\frac{q_j}{q_i}$. Finally, let e_i^o denote marginal cost reductions expressed as a fraction of the price $e_i^o \equiv \frac{\Delta c_i}{p_i^o}$. Using these terms, equation (5) can be rewritten

$$(6)\quad \frac{\partial \pi^o / \partial p_i}{V_i^o} = -e_i^o + \left(m_j^o + e_j^o\right) d_{ij}^o \left(\frac{p^o}{p_i^o}\right) \text{ for } i,j = 1,2 \text{ and } i \neq j.$$

We note that both the CMCR measure in (Werden G. J., 1996) and the UPP-measure in (Farrell & Shapiro, 2010) are based on versions of equation (6), analyzing the merger from the viewpoint of post-merger FOCs evaluated at pre-merger prices.

3.3.1 Compensating Marginal Cost Reduction

We begin by following (Werden G. J., 1996), whose key insight is that it is possible to determine the size of efficiencies that would neutralize the merger without knowing the curvature of demand. What we do is to estimate the efficiencies needed for post-merger prices to stay unchanged at their pre-merger levels. These efficiencies are called the compensating marginal cost reductions (CMCR).

We here look at two cases; first, a partial solution where we calculate the marginal cost reduction on product 1 needed to keep the price of product 1 unchanged while the price of product 2 is held fixed at its pre-merger price (a so called one-sided efficiency), and secondly, the full solution where we calculate the cost reductions on both product 1 and 2 required to hold both prices unchanged (two-sided efficiencies).

First, the one-sided efficiency that balances the incentive to increase price on product 1, denoted as $e_{1,PARTIAL}$, is derived from setting equation (6) to zero and holding the price of product 2 fixed; i.e. solving

$$-e_{i,PARTIAL} + \left(m_j^o + 0\right)d_{ij}^o\left(\frac{p_j^o}{p_i^o}\right) = 0 \text{ for } i,j = 1,2 \text{ and } i \neq j.$$

After simple rearranging we get the following expression,

$$(7)\quad e_{i,PARTIAL} = m_j^o d_{ij}^o\left(\frac{p_j^o}{p_i^o}\right) \text{ for } i,j = 1,2 \text{ and } i \neq j.$$

The one-sided efficiency for product 1 is only a partial solution since it holds the price of product 2 exogenously fixed. In Werden's original treatment, both prices are endogenously determined and kept at their pre-merger levels, by introducing two-sided efficiencies, $e_{1,CMCR}$ and $e_{2,CMCR}$. The resulting efficiencies are the solutions to setting equations (6) equal to zero, which, with two linear equations and two unknows, gives the unique solution

$$(8)\quad e_{i,CMCR} = \frac{m_i^o d_{ji}^o d_{ij}^o + m_j^o d_{ij}^o\left(\frac{p_j^o}{p_i^o}\right)}{1 - d_{ji}^o d_{ij}^o} \text{ for } i,j = 1,2 \text{ and } i \neq j.$$

In short, the only information required to calculate the compensating marginal cost reductions are the pre-merger margins, diversion ratios and relative prices of the two products.

In the case of symmetric products[13], we obtain the compensating marginal cost reduction on product 1 even more straightforwardly by again setting equation (6) equal to zero. Using symmetric prices, markups, diversions and efficiencies, we have

$$-e_{CMCR} + (m^o + e_{CMCR})d_{12}^o = 0,$$

which yields

$$(9)\quad e_{CMCR} = \frac{m^o d_{12}^o}{1 - d_{12}^o}.$$

Thus, in the symmetric case, the information required to calculate the compensating marginal cost reduction narrows down to the shared pre-merger margin and

[13] That is when demand $q_1(p_1, p_2) = q_2(p_2, p_1)$ and $c_1^o = c_2^o$.

diversion. For example, a merger between two firms with 50 percent margins and 20 percent diversion between them requires a marginal cost reduction of 12.5 percent for prices to remain constant.[14] Note that here the cost reduction is expressed as a percentage of prices, not as a percentage of cost. Expressing it as a percentage of cost yields a required marginal cost reduction of 25 percent.[15]

3.3.2 Upward Pricing Pressure

While Werden focused on the case where the post-merger FOC in equation (6) is equal to zero at pre-merger prices, (Farrell & Shapiro, 2010) approached the same equation somewhat differently. They note that, if the FOC is positive at pre-merger prices, then the merged firm can increase its profits by increasing the price of product 1. Having a positive first-order condition at pre-merger prices is what Farrell and Shapiro define as there being *Upward Pricing-Pressure* (UPP) on product 1. The measure is defined for a one-sided efficiency on product 1, which, from equation (6) yields the following pricing pressure measure:

$$(10) \qquad UPP_1 \equiv \frac{\partial \pi^o / \partial p_1}{V_1^o} = -e_1^o + m_2^o d_{12}^o \left(\frac{p_2^o}{p_1^o}\right).$$

This is similar to the partial solution in equation (7). UPP captures the essence of all unilateral effects analysis; the greater the diversion ratios between the merging parties, the greater the markups, or the smaller the efficiencies are, the more likely price increases will be.

Note that, at pre-merger prices, recaptured sales, $m_2^o d_{12}^o \left(\frac{p_2^o}{p_1^o}\right)$, enter the first-order condition identically to a marginal cost efficiency, but with reversed sign. The increase in market power can thus be interpreted as a marginal cost increase for the merged firm; resulting in an incentive to increase prices.

This analogy to a marginal cost increase holds only at exactly the pre-merger price of product 2 however. If the merged firm changes its price on that product as well, which in general is to be expected, then the recaptured sales component $m_2 d_{12} \left(\frac{p_2}{p_1}\right)$ changes. While raising the price of product 2 increases the value of the part of the

[14] Note that, in the symmetric case, for very small diversion ratios, the partial one-sided efficiency in equation (7) offers a close approximation to the actual compensating marginal cost reduction, $e_{CMCR} \approx m^o d^o$.

[15] To express the marginal cost reduction as a fraction of marginal cost rather than as a fraction of price, multiply e by $\frac{c}{p}$,where $\frac{c}{p} = \frac{1}{1-m}$ from the definition of the markup, $m \equiv \frac{p-c}{p}$.

term $m_2\left(\frac{p_2}{p_1}\right)$, which in turn increases the incentives to raise the price on product 1, the shift in d_{12} depends upon the shape of the demand function. In fact, despite that prices are expected to increase if the UPP-measure is positive both for product 1 and product 2, the basic conditions that guarantee this are surprisingly hard to find.[16]

Farrell and Shapiro also consider two-sided efficiencies, similar to Werden's CMCR measure, but do not recommend applying such a measure as this would result in an efficiency penalty, where the pricing pressure index on product 1 would increase in the efficiencies on product 2.

3.3.3 Gross Upward Pricing Pressure Index

Closely related to the UPP measure is the *Gross Upward-Pricing Pressure Index* (GUPPI) proposed in (Salop & Moresi, 2009) and (Moresi, 2010). Whereas UPP is a net measure of the direction of the price change, GUPPI can be used for quantifying the size of the incentive. The index measures the gross incentives due to increase in market power absent any efficiencies. This is equivalent to the FOC in equation (6) when there are no efficiencies,

$$(11) \qquad GUPPI_1 \equiv \frac{\partial \pi^o / \partial p_1}{V_1^o} = m_2^o d^o \left(\frac{p_2^o}{p_1^o}\right).$$

GUPPI measures the recaptured sales, which as noted above, can be thought of as a marginal cost increase. Note also that GUPPI is equivalent in size to the compensating marginal cost reduction in the partial solution in equation (7).

3.4 Quantifying Price Effects

3.4.1 Demand curvature and pass-through

The next step of the analysis is to move from the initial pre-merger price p^o to a post-merger price, as an attempt to quantify the size of the price change. Leaving the initial point, we need to know more about demand.

Demand curvature determines the so-called pass-through, the rate at which marginal cost changes translate into price changes (as we know from the analysis above, the increase in market power following a merger enters the FOC similar to a marginal cost change). Pass-through for a monopoly can be expressed as the ratio

[16] Farrell and Shapiro offer some high-level assumptions that guarantee that positive UPP-measures on both products yield higher prices; see p.14 (Farrell & Shapiro, Antitrust Evaluation of Horizontal Mergers: An Economic Alternative to Market Definition, 2010). For an example of when a positive UPP-measures cause the price of one product to fall, see (Weyl & Fabinger, 2013).

of the slope of the demand curve to the slope of the marginal revenue curve (Bulow & Pfleiderer, 1983),

$$(12) \qquad \rho \equiv \frac{\partial p_1}{\partial c_1} = \frac{\frac{\partial p_1}{\partial q_1}}{2\frac{\partial p_1}{\partial q_1} + q_1 \frac{\partial^2 p_1}{\partial {q_1}^2}}.$$

This can be rewritten as $\rho = \frac{1}{2-\sigma}$, where σ is the elastisticity of the slope of inverse demand, $\sigma \equiv -q_1 \frac{\partial^2 p_1 / \partial {q_1}^2}{\partial p_1 / \partial q_1}$, or the inverse demand curvature.[17] This implies that the greater the curvature is, i.e. the more convex demand is, the higher pass-through will be. For zero curvature, i.e. linear demand, pass-through is one half. For exponential demand, pass-through is one, whereas for iso-elastic demand, pass-through is $\frac{\varepsilon}{\varepsilon - 1} > 1$.[18] (Crooke, Froeb, Tschantz, & Werden, 1999) and (Froeb, Tschantz, & Werden, 2005) investigate the role of demand curvature and pass-through for determining the size of price effects of mergers in oligopoly. They find, as indicated by the expression for pass-through in monopoly, that strong demand convexity imply both high pass-through rates and large price effects.

3.4.2 IPR with linear demand

As mentioned above, the pass-through of linear demand is one half, which is at the lowest end of commonly used functional forms for demand (demand with convex curvature). Linear demand therefore provides a conservative estimate of price effects. An additional advantage of this functional form is that it is easy to work with, since both price derivatives and diversion ratios are constant.

To understand the price effects with linear demand intuitively, assume first that there are no efficiencies, and keep prices on product 2 fixed. This implies that recaptured sales as measured by GUPPI enters the FOC identically to a marginal cost increase (at pre-merger prices), as mentioned earlier. Post-merger prices can be approximated by the pass-through of this "cost increase" into prices, i.e. $\rho \times GUPPI$. Since the pass-through rate of linear demand is one-half, intuitively the price-rise post-merger should be half the value of GUPPI.

[17] Note that by assumption the profit function is concave, so demand must not be too convex, with $\sigma<2$.

[18] These three demand forms all exhibit a pass-through that is constant in price.

To verify this, divide the first-order condition at post-merger prices in equation (2) by the value of lost sales at pre-merger prices, V_i^o, and define the percentage price change as $s_i \equiv \frac{p_i^* - p_i^o}{p_i^o}$ to obtain, for $i = 1$

$$(13) \qquad \frac{\partial \pi^* / \partial p_1}{V_1^o} = \frac{q_1^*}{V_1^o} - (m_1^o + s_1 - e_1) + (m_2^o + s_2 - e_2) d_{12}^o \left(\frac{p_2^o}{p_1^o}\right) = 0,$$

where we have cancelled out terms using the constancy of the price derivatives of linear demand, $\frac{\partial q_i^*}{\partial p_j} = \frac{\partial q_i^o}{\partial p_j}$. Making use of linearity, demand can be rewritten as

$$(14) \qquad q_1^* = q_1^o + \frac{\partial q_1^o}{\partial p_1}(p_1^* - p_1^o) + \frac{\partial q_1^o}{\partial p_2}(p_2^* - p_2^o)$$

Noting that the Lerner index can be rewritten as $\frac{q_1^o}{V_1^o} = m_1^o$, dividing demand in (14) by V_1^o and rearranging the terms, we obtain

$$(15) \qquad \frac{q_1^*}{V_1^o} = m_1^o - s_1 + d_{21}^o s_2 \left(\frac{V_2^o}{V_1^o}\right).$$

Inserting (15) into (13) and simplifying the expression, we have

$$(16) \qquad \frac{\partial \pi^* / \partial p_1}{V_1^o} = -2s_1 + e_1 + (m_2^o - e_2) d_{12}^o \left(\frac{p_2^o}{p_1^o}\right) + s_2 \left(d_{12}^o \frac{p_2^o}{p_1^o} + d_{21}^o \frac{V_2^o}{V_1^o}\right) = 0$$

Equation (16) allows us to analyze various effects of the merger. First, holding the price of product 2 fixed ($s_2 = 0$), with symmetric products and no efficiencies, the price change is [19]

$$(17) \qquad s_1 = \frac{1}{2} m_2^o d_{12}^o,$$

which is equal to half the value of GUPPI as anticipated, and follows (Hausman, Moresi, & Rainey, 2011). The next step is to allow both prices to be optimized post-merger. Again using symmetry, and with no efficiencies, the resulting price change obtained from equation (16) is:

$$(18) \qquad s_1 = \frac{1}{2} \frac{m_2^o d_{12}^o}{1 - d_{12}^o}.$$

The price increase is scaled up by $\frac{1}{1 - d_{12}^o}$ due to the feedback effect from adjusting both prices (i.e. strategic complementarity). This is the measure derived in (Shapiro,

[19] Symmetry implies $d_{12}^o = d_{21}^o$, $p_1^o = p_2^o$ and $V_1^o = V_2^o$.

1996), a measure which is often referred to as the *Indicative Price Rise* (IPR) with linear demand.

The same exercise can be performed with symmetric products and symmetric two-sided efficiencies ($e_1 = e_2$). Following (Schmalensee R. , 2009), the price change from equation (16) is:

$$s_1 = \frac{1}{2}\left(\frac{m_2^o d_{12}^o}{1-d_{12}^o} - e_1\right). \quad (19)$$

In the general case with asymmetric products, but with no efficiencies, the price increase can be obtained by solving the equation system formed by (16) and the equivalent equation for product 2, $\frac{\partial \pi^*/\partial p_2}{V_2^o}$. Following Hausman, Moresi & Rainey (2011), as they point out, when income effects are negligible, cross-derivatives are roughly equal,[20] so that (16) simplifies to:

$$\frac{\partial \pi^*/\partial p_1}{V_1^o} = -2s_1 + e_1 + (m_2^o - e_2)d_{12}^o\left(\frac{p_2^o}{p_1^o}\right) + 2s_2 d_{12}^o\left(\frac{p_2^o}{p_1^o}\right) = 0 \quad (20)$$

Solving this equation system, we obtain the following general expression for the price increase:

$$s_1 = \frac{1}{2}\frac{d_{12}^o m_2^o\left(\frac{p_2^o}{p_1^o}\right) + d_{12}^o d_{21}^o m_1^o}{1-d_{12}^o d_{21}^o} \quad (21)$$

and similar for s_2.

3.4.3 IPR with iso-elastic demand

Another functional form for demand that is easy to work with is the iso-elastic demand i.e. constant elasticity demand. Since iso-elastic demand is convex, pass-through and price changes are greater than the values attained by linear demand.[21] An important characteristic of this demand form is that products are strategically neutral, so that changing the price of product *i* will not affect the pricing of product *j*.[22] Note also that diversion ratios are constant in the symmetric case. Using this, it

[20] Equal cross-derivatives, $\frac{\partial q_1^o}{\partial p_2^o} = \frac{\partial q_2^o}{\partial p_1^o}$, implies that $d_{21}^o \frac{V_2^o}{V_1^o} = d_{12}^o \frac{p_2^o}{p_1^o}$.

[21] With the pass-through, $\rho \equiv \frac{\varepsilon}{\varepsilon-1} = \frac{1}{1-m} > 1$. Pass-through can be obtained by differentiating the Lerner index with respect to cost, using the constancy of elasticity. Note that there are demand forms with even higher degree of convexity for which profit maximization is well defined, so that pass-through in principle can be even higher.

[22] This is immediately apparent from the Lerner index, since own-price elasticity with iso-elastic demand is independent of price.

is simple to derive the post-merger price change in the symmetric case without efficiencies.

Recall that the pre-merger margin is the inverse of the own-elasticity, $m^o = \frac{1}{\varepsilon^o}$. In the symmetric case in the absence of efficiencies, the merger implies that a fraction d^o of previously diverted sales are recaptured by the newly acquired partner. The elasticity adjusted for recaptured sales therefore decreases post-merger to $\varepsilon = \varepsilon^o(1 - d^o)$, which in turn implies that the post-merger markup increases to $m^* = \frac{1}{\varepsilon^o(1-d^o)} = \frac{m^o}{1-d^o}$, i.e. by a factor of $\frac{1}{1-d^o}$.

To see this formally, divide the post-merger first-order condition in equation (2) by the value of lost sales *post*-merger, $V_1^* \equiv -p_1^* \frac{\partial q_1^*}{\partial p_1} = q_1^* \varepsilon_{11}^*$,

$$(22) \qquad \frac{\partial \pi^*/\partial p_1}{V_1^*} = \frac{q_1^*}{V_1^*} - (m_1^*) + (m_2^*) d_{12}^* \left(\frac{p_2^*}{p_1^*}\right) = 0.$$

We have $\frac{q_1^*}{V_1^*} = \frac{1}{\varepsilon_{11}^*} = m_1^o$ where the last equality again follows from the Lerner index. Using the constancy of the diversion ratio in the symmetric case, we can write, by suppressing subscripts for simplicity,

$$(23) \qquad \frac{\partial \pi^*/\partial p_1}{V_1^*} = m^o - m^* + m^* d^o = 0.$$

We consequently obtain the increase in the markup post-merger, as above,

$$(24) \qquad m^* = \frac{m^o}{1-d^o}.$$

Noting that the markup can be rewritten as $p = \frac{c}{1-m}$ and rearranging the terms give the corresponding price increase as[23, 24]

$$(25) \qquad s = \frac{m^o d^o}{1-d^o-m^o}.$$

This is the price rise with iso-elastic demand as derived by (Shapiro, 1996), which is often referred to as the Indicative Price Rise (IPR) with iso-elastic demand.

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[23] Where $s = \frac{p^*-p^o}{p^o} = \frac{\frac{c}{1-m^*}}{\frac{c}{1-m^o}} - 1 = \frac{m^*-m^o}{1-m^*}$ and $\frac{m^*-m^o}{1-m^*} = \frac{\frac{m^o}{1-d^o}-m^o}{1-\frac{m^o}{1-d^o}} = \frac{m^o-m^o(1-d^o)}{1-d^o-m^o} = \frac{m^o d^o}{1-d^o-m^o}$.

[24] Note that for the profit maximization problem to be well defined for constant elasticity demand, it must be that $m^o + d^o < 1$.

3.5 IPR as a SSNIP-test

An exercise similar to IPR can be performed to conduct a SSNIP-test with linear symmetric[25] demand (or a linear approximation of symmetric demand).

3.5.1 Uniform Price Increase

To apply the SSNIP-test in this context, we ask the question of whether, following a merger, it is profitable to increase the prices on all products, *1, …, n*, by *s* percent (normally 5-10 percent), similarly to (Farrell & Shapiro, 2008).[26,27]

For n products, profits equal to $\pi^o = n(p^o - c)q^o$ and $\pi^s = n(p^s - c)q^s$ at pre and post SSNIP, respectively, where $p^s = p^o(1+s)$. Consequently, the relevant test is whether profits after a uniform price increase by s percent are at least as high as before, i.e. whether $\pi^s \geq \pi^o$. Dividing this profitability condition by p^o yields

$$(26) \qquad n(m^o + s)q^s \geq nm^o q^o.$$

By defining the percentage decrease in demand due to the price increase as Actual Loss (AL), so that $q^s \equiv q^o(1 - AL)$, we can rewrite the profitability condition in (26) to obtain a Critical Loss-test that compares Actual Loss to Critical Loss (CL):

$$(27) \qquad CL \equiv \frac{s}{s+m^o} \geq AL.$$

In order to evaluate this condition, Actual Loss needs to be quantified empirically. To do that, we need a specification for linear demand for product i after a uniform price increase, which can be written as follows:

$$(28) \qquad q_i^s = q_i^o + \frac{\partial q_i}{\partial p_i} p^o s + (n-1)\frac{\partial q_i}{\partial p_j} p^o s \quad \text{for } j \neq i$$

With Actual Loss equal to $1 - \frac{q^s}{q^o}$, we can rearrange equation (28) to rewrite the loss as

$$(29) \qquad AL = \varepsilon_i^o s - (n-1)\frac{\partial q_i}{\partial p_j}\frac{p^o}{q_i^o} s \quad \text{for } j \neq i,$$

after simplifying and suppressing subscripts, we obtain

[25] For a discussion of the SSNIP-test with asymmetric demand, see (Daljord, Sorgard, & Thomassen, 2014).

[26] See also (O'Brien & Wickelgren, 2003).

[27] Note that the SSNIP-question is whether a particular price increase is *profitable* or not, not whether that same price increase is *profit maximizing*.

(30) $$AL = \varepsilon^o s(1-(n-1)d^o)$$

Using the Lerner index, equation (30) can be written as

(31) $$AL = \frac{s}{m^o}(1-AD),$$

where $AD \equiv (n-1)d^o$ denotes the Aggregate Diversion ratio, i.e. the sum of individual diversion ratios from all other products to product i. Equation (30) gives us the relation between the Actual Loss for the hypothetical monopolist and the lost sales recaptured by the other products, as measured by Aggregated Diversion. Having derived Actual Loss, we can now express the Critical Loss-test in equation (27) as

(32) $$AD \geq \frac{s}{s+m^o} = CL.$$

Consequently, the SSNIP is profitable if the Aggregate Diversion ratio is greater than Critical Loss. Rearranging the above equation also yields a maximum profitable uniform price-rise, denoted as $s^*_{UNIFORM}$,[28]

(33) $$s^*_{UNIFORM} = \frac{m^o AD}{1-AD}.$$

Note that the individual components of Aggregate Diversion, i.e. the diversion ratios $d_{ij} \equiv -\frac{\partial q_j/\partial p_i}{\partial q_i/\partial p_i}$, are measured based on unilateral price changes on good i, and not on uniform price changes on all goods $1, \ldots, n$; while the aggregate diversion ratio is based on a uniform price rise (which keeps relative prices within the group of goods unchanged). This adding up of diversion ratios from unilateral price changes to form an aggregate diversion ratio from uniform price changes is made possible by the additive separability of linear demand (where individual diversion ratios are constant as prices on other products change).

If we want to avoid having to invoke this additive separability, which is a strong restriction when goods are close substitutes, we can also consider an alternative SSNIP-test.

[28] Note again that the maximum profitable price rise is not the same as the profit maximizing price rise. In the case of linear demand, the profit maximizing price rise is half of the maximum.

Unilateral price-increase (single-product price-increase)

An alternative to the uniform SSNIP is to evaluate whether the price of a single of the merged products can be raised profitably.[29] The relevant test is then whether profits are at least as high as before, following a single price increase by s percent on product *i*.

Again with linear demand, the change in demand for product *i* from a price rise on that product is:

$$q_i^s = q^o + \frac{\partial q_i}{\partial p_i} p^o s \,, \tag{34}$$

while the change in demand for all other products is

$$q_j^s = q^o + \frac{\partial q_i}{\partial p_j} p^o s \quad \text{for } j \neq i. \tag{35}$$

Adjusting the profitability condition in (26) for a unilateral price rise on product *i* gives

$$(m^o + s) q_i^s + (n-1) m^o q_j^s \geq n m^o q^o \quad \text{for} \quad j \neq i. \tag{36}$$

Dividing the profitability condition by the pre-merger value of lost sales $V_i^o \equiv -p_i^o \frac{\partial q_i}{\partial p_i} = q_i^o \varepsilon_i^o$ and suppressing subscripts, we have

$$(m^o + s)\left(\frac{q^o}{V^o} - s\right) + (n-1) m^o \left(\frac{q^o}{V^o} + d^o s\right) \geq n m^o \frac{q^o}{V^o}. \tag{37}$$

Using the Lerner index, $V^o = q^o \frac{1}{m^o}$, and dividing equation (37) by s

$$-s + (n-1) m^o d^o \geq 0. \tag{38}$$

With Aggregate Diversion defined as $AD \equiv (n-1) d^o$, we have the maximum profitable unilateral price-rise $s^*_{UNILATERAL}$ as follows:

$$s^*_{UNILATERAL} = m^o AD. \tag{39}$$

[29] Note that this test, with a unilateral price-increase, does not follow the SSNIP-methodology as outlined by the European Commission, in the "Commission notice on the definition of relevant market for the purposes of Community competition law" (97/C 372/03). That notice outlines a test with a uniform price-increase.

For a two product SSNIP, this measure can be compared with the optimal price increase with linear IPR in (17), which is half of this maximum profitable price increase.

In the symmetric case, the maximum profitable uniform SSNIP is greater than the maximum profitable unilateral SSNIP. Since the products are strategic complements, raising the price of all these products allows for a greater price increase than raising the price on only one of the products.

4 Applications in Five Recent Merger Cases

After going through the theoretical underpinnings of the various UPP-like measures, we now turn to Konkurrensverket's experiences with applying the methodology in practice in five recent merger cases. We shall focus on describing how the necessary parameters in the analysis were obtained as well as questions arising during the investigations and other considerations that were factored into the final decisions.[30] We avoid using the actual cost data from the analyses, since these are generally confidential business information. The actual diversion numbers are sometimes altered in order to improve the exposition.

4.1 Case 1: Office Depot/Svanströms (2011)

4.1.1 Background information

In spring 2011, Konkurrensverket carried out a phase 1 investigation of the planned merger between two office supply retailer chains, Office Depot and Svanströms. Svanströms had 41 outlets and Office Depot had 13 outlets across Sweden. In the metropolitan Stockholm, there were 15 Svanströms outlets and 10 Office Depot outlets. The unilateral effects of the horizontal merger in the consumer market[31] were screened using the UPP-method.

4.1.2 The customer survey and the diversion ratios

The diversion ratio required when computing the measures of the UPP was obtained through a customer survey. Konkurrensverket carried out a customer

[30] The cases Office Depot/Svanströms (2011), Arla/Milko (2011), Cloetta/Leaf (2012) and Eniro/Teleinfo (2012) were mentioned briefly in (Sweden, 2012) and ((Sweden, 2012)

[31] Office products were mainly sold through three channels; brick-and-mortar stores, contract sales to commercial or public sector customers, and wholesales to other commercial customers. Our economic analysis focused mainly on the first channel, sales via outlets.

survey in the form of exit-interviews outside five out of 25 outlets of Office Depot and Svanströms located in the Stockholm metropolitan area.

Conducting a customer survey during the 25 days given for a phase 1 investigation indicates that the time schedule was extremely tight, since it is necessary to also include time for the procurement process necessary for selecting a survey firm, time for formulating the questionnaires and for the parties to give their feedback on them[32], as well as time to perform a pilot survey. This means that the case team needs to decide whether a customer survey would be a proper tool for a particular merger investigation as soon as the parties contact the competition authority.

The diversion ratios were measured as the share of Office Depot's respective Svanströms' marginal customers who revealed to choose certain stores or chains in case the store that he/she purchased the goods at was no longer available (*second-choice*[33]). A benefit of formulating a second choice question instead of a hypothetical price rise question to estimate a diversion ratio is that respondents are faced with a less complicated hypothetical situation and, therefore, are more likely to give consistent answers. However, it is important to identify how the marginal customers as compared with the average customers would react to the hypothetical closure of an outlet, since the second-choice answers of marginal rather than average customers are the relevant ones for estimating diversion ratios.[34]

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[32] Allowing the merging parties to comment on the questions to be asked is of course optional but highly recommended. The parties clearly have a better understanding of the market under investigation and can easily identify questions that might be poorly formulated. One can also get a good idea of the potential criticism the results of the survey might receive from the merging parties from their attitude towards the survey questions.

[33] There are two types of questions that are commonly used for estimating diversion ratios: i) hypothetical price-rise questions (e.g. "What would you do if the price of product A increased by a small but significant amount (e.g. 5%-10% or 5-10€)"), and ii) second-choice questions (e.g. "What would you do if product A you just purchased was not available at the store you just visited?").

[34] A common problem in interpreting the results of a customer survey is that these often measure the behavior of the average (typical) customer instead of that of the marginal customer (the customer that is most sensitive to price or quality changes, which would thus be the first to substitute to alternative or outside goods or services). In order to get a sense of the magnitude of the relevant price elasticities one is interested in the behavior of the latter rather than the former. Identifying marginal customers is not trivial however. Appropriate questions aimed to identify the price sensitivity of the respondent would be an example of such an effort. Demographic characteristics of the customers might in certain cases also help the identification process. When there is no obvious way of identifying marginal customers it is important to underline how the results are based on the responses of the typical customer instead and subsequently to treat them with the appropriate degree of reservation. Sometimes economic reasoning will let us infer how the marginal customers would behave compared to the average ones and we can therefore treat the results of the analysis as lower or upper bounds accordingly.

The exit-interviews were conducted outside selected outlets. The participants were customers who had just made a purchase at one of the outlets. The questionnaire consisted of questions about what type of products he/she had purchased, the value of the purchase, as well as second-choice questions such as what the respondent would have done if he/she had known that the outlet did not exist before the visit or as another option, what he/she would have done if they had found out that the outlet was unavailable upon visiting. A problem with measuring the diversion ratio from 5 out of 25 stores in the metropolitan Stockholm area[35] was that a large variation in measured diversion ratios among the outlets is expected. The variation in the diversion ratio can partly be explained by how the parties' outlets were located in relation to competitors. Konkurrensverket decided to carry out the interviews outside three Svanströms outlets and two Office Depot outlets, since the former has higher sales revenue than the latter.

The diversion ratios were calculated in terms of both the total value of goods purchased and the total number of customers; see Table 1. The diversion ratio based on the value of goods purchased is more relevant than that based on the number of customers, as the UPP-analysis is formally based on diverted revenue and firms consider the likely loss of sales revenue in response to price increase, not specifically number of customers. However, a common problem in estimating the revenue diversion ratio through a customer survey is the occurrence of outliers when total value of goods purchased is concerned. A few outliers can have a strong impact on the estimation of diversion ratios, making it problematic to generalize the results. For that reason, Konkurrensverket used the diversion ratios based on both measures to make sure that the estimates are not seriously biased.

Table 1 The diversion ratios between the parties measured in terms of the number of customers and the value of goods purchased

Diversion ratio	**Based on the number of customers**	**Based on the value of purchase**
From Office Depot to Svanströms (d_{12}^{o})	0.6	0.5
From Svanströms to Office Depot (d_{21}^{o})	0.4	0.3

4.1.3 Margins and Efficiencies

The gross profit margins were calculated separately for each outlet by taking the difference between the respective average price and the respective average variable

[35] These outlets were chosen according to several criteria; they should have relatively high sales revenue, relatively high private customers, and it should be a good geographical spread.

cost of sales. For variable cost, we use the Long-Run Average Incremental Cost (LRAIC) that reflects the sum of all costs incurred by the outlet for selling an additional good. Here we use a margin of 40%.

The efficiency gains that are related to price-setting and that are in turn relevant for the UPP are the potential cost savings that reduce marginal costs. The parties claimed that the merger would indeed result in cost reductions for Svanströms production due to the more favorable purchase condition facilitated by the merger. Here we use an efficiency claim of 5% that does not correspond to the actual claims made by the parties during the investigation.

4.1.4 The GUPPI and the CMCR

Konkurrensverket calculated the GUPPI according to equation (11) above and the CMCR (also called the efficiency offset, which quantifies the efficiencies that are required to mitigate the upward pricing pressure created by the merger as in equation (9)). For Office Depot, based on the diversion ratio measured by the total value of goods purchased, we have, using equation (11):

$$GUPPI_{Sv\to OD} = m^o_{OD} d^o_{Sv\to OD} \left(\frac{p^o_2}{p^o_1}\right) = 0.4 * 0.3 = 0.12,$$

whereas the equivalent GUPPI for Svanströms is

$$GUPPI_{OD\to Sv} = m^o_{Sv} d^o_{OD\to Sv} \left(\frac{p^o_1}{p^o_2}\right) = 0.4 * 0.5 = 0.2.$$

Assuming symmetry between the parties in terms of margins and prices, we calculated, using equation (9), the CMCR for Office Depot as percentage of price:

$$e_{Sv\to OD,CMCR} = \frac{m^o_{OD} d^o_{Sv\to OD}}{1-d^o_{Sv\to OD}} = \frac{0.4*0.5}{(1-0.5)} = 0.4.$$

The respective value for Svanströms is

$$e_{OD\to Sv,CMCR} = \frac{m^o_{Sv} d^o_{OD\to Sv}}{1-d^o_{OD\to Sv}} = \frac{0.4*0.3}{(1-0.3)} \approx 0.17.$$

The values of the efficiency offset calculations for the two companies calculated as percentage of cost can be found in Table 2.

This indicates that the merger would have potentially led to price increases. Efficiency gains that are required to alleviate this upward pricing pressure were higher than what the parties claimed. However, diversion ratios to other

competitors showed that there existed several actual and potential alternatives for consumers outside of the relevant market defined by the SSNIP-test, especially retailers who sell a wide range of products such as hardware stores and department stores. Konkurrensverket concluded that it is relatively simple for these retail stores to extend their product range in case the parties raised their price significantly or decreased their product range to the customers after the merger.

Table 2 The GUPPI and CMCR with a margin of 40 %

	Office Depot	**Svanströms**
GUPPI*	0.12	0.20
CMCR (% of price)**	0.17	0.40
CMCR (% of cost)***	0.29	0.67

**Equation (13), **Equation (11), ***Equation (11) and footnote 15*

4.1.5 The IPR

As discussed in section 2, the GUPPI and the CMCR tests predict only the direction of the price change after the merger, but not the magnitude of price increases. For that reason, we turn to the IPR, the calculation of which requires specific assumptions on the symmetry between the parties and a functional form for demand.

We summarize the results acquired from the numbers in Table 3. We assume the margins to be 40% and the revenue diversion ratios as in Table 1. The price was expected to rise by 6-11% for Office Depot and 15-20% for Svanströms when linear demand is assumed. The magnitude of price rise estimated from the assumption of constant elasticity of demand is however higher than what it seems to be realistic.

Table 3 The IPR results assuming a margin of 40 %

Assumption on demand function and symmetry	**Office Depot**	**Svanströms**
Linear demand , symmetry*	0.09	0.20
Linear demand, asymmetry**	0.11	0.15
Linear demand, symmetry with 5% efficiency gain for both products***	0.06	0.18
Iso-elstic demand, symmetry†	0.40	2.00

**Equation (19), **Equation (22), ***Equation (21), †Equation (26)*

4.1.6 The decision

In addition to the UPP-method,[36] Konkurrensverket considered qualitative aspects of the market, such as the low entry barriers as well as some other secondary evidence concerning the overall structure of the market before reaching the conclusion. Konkurrensverket concluded that there is little evidence suggesting the merger would substantially lessen efficient competition in the market. The merger between Office Depot and Svanströms was subsequently cleared after the phase I investigation.

4.2 Case 2: Arla/Milko (2011)

4.2.1 Background information

Konkurrensverket carried out a phase 1 and 2 investigation of Arla's intended merger of Milko in summer 2011. Arla is the largest producer of dairy products in Sweden and Scandinavia, while Milko, a cooperative of independent dairy farmers, was the third largest producer in Sweden. Arla and Milko together have a considerable share of total raw milk production in Sweden.

4.2.2 The customer surveys and the diversion ratios

During the investigation, Konkurrensverket carried out two surveys. The first was an online self-completion survey among grocery retailers whose stores were located in what came to be called "*Milkoland*[37]". The purpose of this survey was to investigate the grocery retailers' views on alternative suppliers of fresh milk and to obtain diversion ratios among different suppliers. Due to limited store space the grocery stores usually had no more than one or two main suppliers of fresh milk. Consumers choose milk from what is on offer at the grocery store they visit. Hence, the choice of milk brand is made primarily by the grocery retailers rather than consumers. Based on the answers to the second-best choice question[38], Konkurrensverket obtained the retailer-level diversion ratios of conventional, organic, and low-lactose fresh milk.

The second survey was a customer survey that carried out on a sample of approximately 5000 individuals who lived in *Milkoland*. The purpose of this survey

[36] Note again that the values of GUPPI, efficiency offsets, as well as IPR presented in this paper are based on the artificial margins and efficiency gains. The actual values that supported Konkurrensverket's decision are therefore different from those from the artificial figures.

[37] Milkoland consists of the five Swedish counties; Dalarna, Värmland, Gävleborg, Jämtland, and Västernorrland

[38] The second-choice question is *"What would be the most relevant alternative to your current supplier of conventional/organic/low-lactose milk, if you had to change the supplier?"*.

was to estimate the diversion ratios between Arla and Milko for seven dairy product categories[39] through second choice questions. 2246 individuals who bought dairy products in the latest two weeks from the time that the survey was performed were qualified to be relevant respondents.

Konkurrensverket calculated diversion ratios between Arla and Milko for the seven product categories. The consumer-level survey showed that the merging parties are the nearest competitors to each other for most of these products. In particular, for *natural filmjölk*[40] Arla and Milko are the nearest alternatives to each other with a diversion ratio from Arla to Milko of 66% and from Milko to Arla of 41%. For *natural yoghurt* the parties are the nearest alternatives to each other with a diversion ratio from Arla to Milko of 51% and from Milko to Arla of 28%. For *crème fraiche* and *cream* the parties are near alternative to each other, but the private label products are important alternatives to the parties.

Table 4 presents the shares of respondents whose stated preference was to change product categories when some choice limitation was imposed. For *cream*, and other dairy products used for cooking, over 80 % of the respondents chose other brands within the same product category as their second choice. For *filmjölk* and *yoghurt* the product loyalty is somewhat lower. For *natural filmjölk* and *natural yoghurt*, which are in the same relevant product market, the change between the product groups was 75-80%.

Table 4 Inter-product group diversion ratios

To / **From**	*Natural filmjölk*	*Flavored filmjölk*	*Natural yoghurt*	*Flavored yoghurt*	*Sour cream*	*Cream*	*Crème fraiche*	*Others*
Natural filmjölk	0.68	0.06	0.06	0.02				0.18
Flavored filmjölk	0.18	0.50	0.07	0.13				0.13
Natural yoghurt	0.16	0.02	0.63	0.05				0.14
Flavored yoghurt	0.03	0.05	0.05	0.74				0.14
Sour cream					0.81	0.08	0.09	0.09
Cream					0.00	0.88	0.02	0.09
Crème fraiche					0.04	0.02	0.87	0.07

Konkurrensverket calculated the margins for each product category separately. The margins for Arla were obtained through weighing product margins to a common margin for each product category using the weights based on AC Nielsen sales data.

[39] They are *crème fraiche*, *cream*, *sour cream*, *natural filmjölk*, *natural yoghurt*, *filmjölk with flavor*, and *flavored yoghurt*.

[40] Filmjölk (also known as fil) is a Nordic dairy product made from soured milk. It is similar to yogurt, but is produced using different bacteria which gives it a different taste and texture.

For Milko, the margins for each group were weighed to be a common margin for each product category based on Milko's aggregated sales volume. Since diversion between product categories was substantial, the margins were adjusted for the diversion between the product categories.

4.2.3 The GUPPI and the CMCR

Based on the diversion ratios measured by the consumer-level survey and the margins, Konkurrensverket calculated the GUPPI and the CMCR according to equation (11) and (9), respectively. Table 5 and Table 6 present these two measures that indicate whether the merger will lead price increase on Milko's and Arla's products. As in the previous case, we assume an artificial margin of 40%.

Table 5 GUPPI and the CMCR for Milko's products, given a margin of 40%

	Diversion Milko→Arla	**GUPPI***	**CMCR****
Natural filmjölk	0.41	0.16	0.28
Flavored filmjölk	0.25	0.10	0.13
Natural yoghurt	0.28	0.11	0.16
Flavored yoghurt	0.31	0.12	0.18
Sour cream	0.32	0.13	0.19
Cream	0.25	0.10	0.13
Crème fraiche	0.28	0.11	0.16
Natural/flavored filmjölk+natural yoghurt	0.35	0.14	0.22
Sour cream+ crème fraiche	0.34	0.14	0.21

**Equation (13), **Equation (11)*

Table 6 GUPPI and the efficiency offset for Arla's products, given a margin of 40%

	Diversion Arla→Milko	**GUPPI***	**CMCR****
Natural filmjölk	0.66	0.26	0.78
Flavored filmjölk	0.35	0.14	0.22
Natural yoghurt	0.51	0.20	0.42
Flavored yoghurt	0.32	0.13	0.19
Sour cream	0.34	0.14	0.21
Cream	0.37	0.15	0.23
Crème fraiche	0.29	0.12	0.16
Natural/flavored filmjölk+natural yoghurt	0.57	0.23	0.53
Sour cream+ crème fraiche	0.30	0.12	0.17

*Equation (13), **Equation (11)

In fact, the merger required substantially large efficiency gains to alleviate the upward pricing pressure on all of Milko's product categories except one, as the parties were the nearest alternatives to each other for most of the product categories. Hence, the merger was expected to result in price increases for most of Milko's products. For Arla's products, the actual GUPPI and CMCR tests also indicated that the merger would create incentives for Arla to increase the prices of all Arla's product categories. Konkurrensverket evaluated that efficiencies claimed by the parties would not be sufficient to countervail this upward pricing pressure and, consequently, concluded that the merger would have negative unilateral effects for consumers.

4.2.4 The decision

The UPP-analysis indicated that Milko was a major competitive constraint to Arla in a substantially large range of products, and vice versa, and the merger was therefore likely to lead to unilateral effects for consumers. Konkurrensverket also considered a credible *"failing firm defence"* that the parties brought up during the investigation. The parties argued that the merger had no anti-competitive effects, under the counter-factual that in the absence of the merger, Milko's financial problems would result in bankruptcy and Milko would exit the market. In the end Konkurrensverket cleared the merger subject to a commitment by Arla to divest Milko's largest dairy plant to a third party.[41]

4.3 Case 3: Eniro/Teleinfo (2011)

4.3.1 Background information

In December 2011, Konkurrensverket carried out a phase 1 and 2 investigations of the proposed merger between two *directory enquiry service operators*, Eniro (118 118) and Teleinfo (118 800), during which the UPP-method was once again applied. The UPP-method was particularly well suited for assessing the unilateral effects of this merger, since market boundaries were difficult to draw and the UPP-test did not require a strict definition of the relevant market.

Defining the relevant market was particularly challenging in this case and the result of this exercise could well determine the outcome of the investigation. If the relevant product market was defined as "*voice*" (directory services via telephone), the acquiring party, Eniro, would be the largest operator in that market with a large market share, whereas the acquired party, Teleinfo, would be the third largest

[41]Konkurrensverket approved *Kooperativa Förbundet* (KF, Coop) as a purchaser of Grådö dairy plant.

operator of directory services. In that case, the merger would result in a significant increase in market concentration. The parties argued that *voice* should be included in a larger market including also all *online search* via devices with internet access as well as the usage of printed telephone directories. They argued that demand for *voice* products had continuously decreased in the years up to the proposed merger due to the increase in *online search* using computers or smartphones. If sufficiently many users of *voice* were willing to substitute to online search following a price rise on *voice*, then the relevant market should be defined so as to include both *voice* and online search. The parties' market shares would then be substantially lower.

Another inherent difficulty was that *voice* and *online search* exhibited significant qualitative differences in terms of the breadth and types of services provided, making any qualified comparison of these two difficult. For that reason Konkurrensverket used the UPP-method as the main analytical tool to assess unilateral effects of the merger. Moreover, we used the UPP methodology as a way of applying a Hypothetical Monopolist Test as a means of defining the relevant market.

4.3.2 The customer survey and the diversion ratios

To obtain the diversion ratios necessary for calculating the various measures of the UPP-tests Konkurrensverket conducted a customer survey in the form of an online self-completion survey. In every customer survey, it is important to make sure the respondents are representative of the customer segment that the merging parties serve for. In this case, the screening questions aimed at identifying individuals who had used the services of either Eniro or Teleinfo during the last six months and also answered correctly the question of what the number of that operator was, as knowledge of the actual telephone numbers was deemed crucial.

Diversion ratios were obtained from the responses to a second-choice question, i.e. the share of customers who responded that they would choose another voice operator or another channel through which to look for information, if the voice operator they had previously used were to become unavailable. For a customer to divert from one voice operator to another, he or she needed to know the telephone number of another operator. It was deemed to be contradictory for a consumer who was familiar with no more than one voice operator to choose the alternative of

"other voice operators" in case the operator they previously had used became unavailable.[42]

Since the survey was performed on a web-panel, there was concern that the results might over-represent the preferences of frequent internet users and under-represent those of the individuals who were less exposed to online alternatives and therefore more likely to use voice service. In turn, this could cause a downward bias in estimating the diversion to *voice* and an upward bias in estimating the diversion to *online search*. To deal with these concerns, Konkurrensverket asked the survey respondents about the frequency of their internet usage and used that information to weigh the measured diversion ratios.[43]

The survey results showed a high diversion from *voice* to *online search* as well as significant diversions among the voice operators. Table 7 presents "illustrative" diversion ratios between the merging parties rather than the actual ones[44] used in the decision. It is worth to note that the diversion from Teleinfo to Eniro was larger than that from Eniro to Teleinfo. The substantial difference in these two diversion ratios was reasonable given the parties' market shares in the market for *voice*.

Table 7 Diversion ratios between Eniro and Teleinfo

	Diversion ratio
From Eniro to Teleinfo (d_{12}^{o})	0.15
From Teleinfo to Eniro (d_{21}^{o})	0.25

4.3.3 The margins and efficiency claims

Eniro's pre-merger margin was calculated based on the cost and sales data between January 2005 and December 2011 provided by the company.

[42] The survey showed that most of the qualified respondents knew the telephone numbers to only two voice operators, while Teleinfo's customers in particular knew at least three numbers. The respondents who knew the numbers to several voice service operators tended to have higher diversions to other voice operators.

[43] Compared to the statistic on internet usage of the Swedish population done by Statistics Sweden (SCB), the survey respondents were overrepresented by those who use internet on a daily basis. 5% of the Swedish population over 18 years old who do not use internet at all was not represented in our sample.

[44] When several possible methods of calculating diversion ratios exist it is good practice to consider all of them and use the subsequent results for testing the sensitivity of the final conclusions. In fact Konkurrensverket considered several alternative diversion ratios; e.g. diversion ratios weighted by frequency of internet usage, by the frequency of use of voice service in the last six months, as well as diversion ratios considering only those respondents that stated to have had an online search device such as laptop and smartphones available at the time they used the voice operator.

The parties claimed that the merger would give rise to efficiencies which would lower the marginal cost of Teleinfo's products. The efficiency gains consisted of the lower cost of purchasing a database (content gains), lower staff costs, as well as volume discounts in marketing activity. No efficiency gains were claimed for Eniro's products. Konkurrensverket accepted some but not all of the efficiencies claimed by the parties as relevant for inclusion in the UPP calculations.[45]

4.3.4 The SSNIP test

To get some indication of what the relevant product market was, Konkurrensverket evaluated whether a hypothetical monopolist could impose a SSNIP[46] on (a) at least one product (unilateral price increase) and (b) on all products (uniform price increases) in a candidate market. The diversion ratios used in the hypothetical monopolist tests are aggregate diversion ratios, the shares of Eniro's or Teleinfo's customers revealed to choose respective channels (instead of specific services within each channel) of searching information if the respective voice operator that he/she used were to become unavailable. Table 8 presents aggregate diversion ratios as substitutes of the actual values. More than half of the respondents who used a *voice* service answered that they would have done an online search using computers or smartphones, while roughly a quarter of the respondents answered that they would have used another voice operator, if the voice operator that he/she used were unavailable.

Table 8 Aggregate diversion ratio from Eniro respective Teleinfo to online search and voice

To	A_{Eniro}	$A_{Teleinfo}$
Computer	0.38	0.37
Smartphone	0.19	0.15
Call other	0.14	0.16
SMS other	0.08	0.14
Voice (call+sms)	0.22	0.29
Online (computer+smartphone)	0.57	0.52

The results assuming unilateral and, alternatively, uniform price rises were then calculated and assessed as the lower respective upper bounds of the SSNIP test, as shown in Table 9. Once again a margin is applied for illustrative purposes only. If these bounds exceed the threshold, i.e. price increase by 5 -10 percent, it supports

[45] As discussed previously, efficiency claims that referred to a decrease in fixed rather than variable costs were not deemed relevant for estimating the firms' incentives to increase prices.
[46] Small but significant and non-transitory increase in price

that the candidate market that comprises voice itself can be defined as a relevant product market.

Table 9 The SSNIP test, given a margin of 40%

	Aggregate diversion	Unilateral SSNIP*	Uniform SSNIP*
Eniro to voice	0.22	0.09	0.11
Teleinfo to voice	0.29	0.12	0.16

**Equation (40), **Equation (34)*

4.3.5 The UPP, GUPPI and the CMCR: appraising the effect of the merger

Konkurrensverket calculated various UPP measures in order to evaluate the unilateral effects of the merger. Table 10 presents the calculated GUPPI and UPP indices and the CMCR based on the diversion ratios in Table 7, a margin of 40%, and efficiency gains for Teleinfo's product of 5% (as a percentage of revenue). Since no efficiency gains were claimed for Eniro's products, the measure of the UPP index for Eniro is the same as the corresponding GUPPI. This illustrative example indicates that the merger was likely to lead to an upward pricing pressure, particularly so for Eniro's product.

Table 10 Calculation of GUPPI and UPP, given a margin of 40%

	Teleinfo	Eniro
GUPPI*	0.06	0.10
UPP with efficiencies for Teleinfo (5%)**	0.01	0.10
CMCR (% of price)***	0.07	0.13
CMCR (% of cost)†	0.12	0.22

**Equation (13), **Equation (12), ***Equation (11), †Equation (11) and footnote 15*

4.3.6 The IPR: quantifying the unilateral effects

To obtain inferences about the likely price effect, Konkurrensverket calculated the IPR under various assumptions about the curvature of the demand function as well as the degree of symmetry between the parties.

Table 11 shows the IPR values for Eniro's and Teleinfo's products using the figures for margin (40%), efficiencies (5% of revenue for Teleinfo only), and diversion ratios between the parties as in Table 7. Depending on the assumptions, the price of Teleinfo's products are expected to rise between 3% and 13%, while the price rise on Eniro's products is expected to be more substantial.

Table 11 Calculation of the IPR

Assumption on demand function and symmetry	Teleinfo's product	Eniro's product

Linear demand , symmetry*	0.04	0.07
Linear demand, asymmetry**	0.04	0.06
Linear demand, symmetry with 5% efficiency gain for Teleinfo***	0.01	0.07
Iso-elstic demand, symmetry†	0.13	0.29

**Equation (19), **Equation (22), ***Equation (21), †Equation (26)*

As seen earlier, the results from the IPR depend heavily on assumptions concerning the elasticity of demand and the degree of symmetry between the merging parties. In general, linear demand implies smaller price rises than constant elasticity demand and the two are often taken as lower and upper bounds. Which assumptions about the demand function are realistic depends on the characteristics of the demand that each merging firm faces. In the case of Eniro's merger of Teleinfo, separately obtained price and quantity data indicates that the actual demand function is so convex that even constant elasticity of demand is unlikely to overestimate the price rise. If these tests were to be used as more than a screening device, a rigorous analysis on buyers' behavior as well as the firms' price setting behavior should be done to obtain more accurate inference from this method.

4.3.7 The decision

Based on several indices of the UPP-analysis as well as other evidence such as the prevalence of very high entry barriers in the form of the "*top of mind*" problem and limited price substitution between *voice* and *online search*, Konkurrensverket concluded that Eniro's merger of Teleinfo is substantially likely to lead to higher prices. When Konkurrensverket announced its intention to issue a statement of objection to the Stockholm City Court requesting that the transaction be prohibited, the parties decided to abandon the merger.

4.4 Case 4: Akademibokhandeln/Bokia (2012)

In August 2012 Konkurrensverket received a notification of a planned merger between Akademibokhandeln and Bokia, the two largest brick-and-mortar bookstore chains in Sweden. At first glance, the networks of the merging parties overlapped in a large number of local markets. However, brick-and-mortar bookstores faced a seemingly growing pressure from online bookstores. Potential unilateral effects of the merger were analyzed using the UPP-method during both

phases of the investigation. Several surveys were carried out both by Konkurrensverket and by the merging parties.[47]

4.4.1 Background: The Swedish book industry

The Swedish book industry was highly concentrated both horizontally and vertically. The Bonnier Group was a privately held Swedish media group of 175 companies operating in 20 countries. The Bonnier book publishing companies produced nearly half of the books published in Sweden, including magazines and newspapers. The group also owned the largest online bookstore in Sweden, *Adlibris*. Bonnier's main competitor was KF-Media, a member of the larger KF-group[48]. KF-Media was the owner of Akademibokhandeln, the largest brick-and-mortar bookstore chain in Sweden, as well as *Bokus*, the first online bookstore in Sweden. KF-Media owned also a group of large publishers, *Norstedts förlagsgrupp*. Both Bonniers and KF-Media owned several book clubs. Akademibokhandeln had developed a digital platform called *Dito*, a portal for audio- and e-book sales[49]. Similarly, Bonnier had developed an e-book reader, *Letto*.

The acquired party, Bokia, was, at the time of the investigation, the second largest bricks-and-mortar bookstore chain in Sweden. *Natur&Kultur*, an independent publisher was a co-owner of Bokia which had otherwise no further vertical connections. An important distinction between these two merging parties was that while Akademibokhandeln was the owner of all its outlets Bokia owned approximately half of its outlets centrally while the other half was franchise outlets. It was not uncommon for previously independent bookstores to "buy their way" into the chain and switch to Bokia's logo, or in some occasions for a franchisee to decide to leave the chain and develop its own brand.

Akademibokhandeln and Bokia were the only "pure" bookstore chains in Sweden. There existed also two other co-operations between independent bookstores, JB-Gruppen and Ugglan. The purpose of these co-operations was mainly joined purchases from publishers and some limited common marketing. The bookstores that were members of JB-Gruppen or Ugglan maintained their own names and

[47] This case was unique in that for the first time in the history of Konkurrensverket a survey was carried out during both phases of the investigation, as well as in that the acquiring parties commissioned their own survey during the investigation.

[48] The KF-group (*Kooperativa Förbundet*) was present in several industries. Most notably it owned one of the largest grocery chains in Sweden, Coop.

[49] Dito was also a software platform that depended on operating systems -e.g. Android or iOs- and hardware –tablets or smartphones- developed by third parties, unlike Amazon's Kindle.

logos. Finally, there were hypermarkets and department stores selling a limited range of books, mainly bestsellers, at competitive prices.

4.4.2 The investigation

The merging parties' main argument was that both chains were having considerable profitability problems, mainly due to the strong competition from online book stores, and the efficiencies resulting from the merger were their only hope for surviving. They further argued that the two chains did not directly compete with each other. They motivated this claim by suggesting that the chains had limited geographic overlap, that Akademibokhandeln had a centralized national pricing strategy that did not consider location-specific competition, and that both Akademibokhandeln and Bokia set their prices in relation to those of online bookstores rather than each other's.

There was little doubt that the ascent of online bookstores had a considerable impact in the industry. However a series of concerns did not let Konkurrensverket simply dismiss the case. In terms of the quality of the service offered, Akademibokhandeln and Bokia appeared to be each other's closest competitor. Most strategic documents available suggested that the customer base of Akademibokhandeln and Bokia was demographically quite distinct from the customer base of online bookstores. There existed little tangible evidence of the price pressure from online bookstores that the parties claimed since brick-and-mortar bookstores were nonetheless capable of maintaining a premium compared to internet bookstores.

Konkurrensverket was hence interested in investigating whether third party competition, mainly from online and grocery stores, would be sufficient to discipline the merged entity. Given the geographic distribution of brick-and-mortar bookstores, the merged entity would face few, if any, constraints from other traditional bookstores so it remained to determine whether diversion ratios between Akademibokhandeln, Bokia, online bookstores and hypermarkets were such that would not lead to higher prices.

4.4.3 The three surveys

In phase 1 investigation, Konkurrensverket commissioned an exit-interview at three cities where the outlets of Akademibokhandeln and Bokia were located closest to each other. The idea was that if the survey at those "worst case" outlets did not result in critical UPP-figures, the merger ought to be non-problematic.

However, that was not the case, which led to a phase 2 investigation and the similar survey was expanded to four more cities.

The choice among the different modes of survey was subject to discussion. A face-to-face exit-interview was chosen as it allowed sampling from people who had just purchase a book at a store of interest. An important reality-check was whether the demographic characteristics of the sampled group matched those of the typical customers of Akademibokhandeln and Bokia (as described in recent market research studies conducted by the parties). The sample obtained by the survey in the phase 1 investigation did not match the target population as well as the much larger survey carried out during the phase 2 investigation.

The merging parties considered exit-interviews to be inappropriate since they claimed that such an approach introduced a potential bias towards brick-and-mortar bookstores. They argued that people exiting a physical bookstore would be more likely to suggest another physical bookstore as their second-choice alternative rather than the average book buyer would. According to them the crucial choice was whether to buy the book online or take a trip to the bookstore, a decision that took place in the comfort of one's home, rather than out on the street. Sampling outside a bookstore failed to consider those that had chosen to make their purchases online in the first place. This alternative approach is clearly flawed as it confuses the purchasing behavior of the "typical book-buyer" with that of the "typical buyer (customer) in brick-and-mortar bookstores". The crucial question is not whether there were more people using online bookstores than traditional bookstores, but rather how the merger would affect the individuals who still purchased at least some of their books in traditional bookstores. The fact that a lot of consumers had already moved all or a considerable amount of their book purchases from traditional to online bookstore certainly had an impact on the profitability of the former, but had little to do with the effects of the proposed merger.

Konkurrensverket's two exit-interviews had two screening questions. The first question was *"did you buy at least one book at the store you just visited?"* with the follow-up (assuming a positive response to the first one) *"did you pay for your purchase with a gift voucher?"* A negative response to the second question was deemed necessary to continue the interview. People redeeming gift vouchers had no choice than visiting the store and could not be considered as typical customer of the outlet.

The telephone-interview survey commissioned by the merging parties had two different screening questions. The first was "*how many books in total have you bought during the last 12 months?*", followed by the second screening question *"have you bought at least one book from Akademibokhandeln, Bokia or some other physical bookstore during the last 12 months?"*. Having bought a single book from a physical bookstore in the last 12 months qualified an individual for inclusion into the survey sample even if the same person had made the rest of his/her purchase from other channels.

4.4.4 The UPP

The fact that two different surveys were conducted in a total of six different cities resulted to several diversion ratio estimates. Aggregate diversion ratios referred to movements between the three main channels; brick-and-mortar bookstores, online bookstores and hypermarkets/department stores, presented in Table 12 below. The aggregate diversion ratios were calculated by aggregating the answers from both chains to the question: "*If the store you just visited and purchased (a book/books) did not exist, what would you have done?*".[50, 51] One problem with this formulation was that several respondents answered that they would go to another store or bookstore, but were unable to further specify which one. Since there was no guarantee that customers differentiated between traditional physical bookstores and hypermarkets/department stores, we couldn't easily handle those answers without making some assumptions about how those answers should be distributed among the respective channels. Table 12 shows that 17% of all of Akademibokhandeln customers answered that they would have chosen an online bookstore if the particular Akademibokhandeln outlet did not exist. For Bokia the equivalent figure was somewhat lower. The row "Total" sums up the aggregate diversion ratios that were measured in the six cities for Akademibokhandeln and Bokia respectively.

[50] In the phase 1 investigation the survey took place in Göteborg, Jönköping and Umeå. In the phase 2 the survey was conducted in Helsingborg, Växjö, Linköping and Malmö. However the responses in Jönköping were not taken into consideration. The weather condition (sudden snowstorm) led to extremely low traffic in the shopping district in that city, which resulted in too few respondents.

[51] When selecting the locations for the exit-interviews two main conditions were taken into consideration. First of all we needed cities with frequent sales so that would help achieve better response rates. Second, we intended to cover both duopoly regions, i.e. cities where Akademibokhandeln and Bokia were the only traditional physical bookstores, and oligopoly regions, i.e. cities where Akademibokhandeln and Bokia were located with other traditional physical bookstores in s local market. Our hypothesis is that aggregate diversion ratios towards other physical bookstores are higher in oligopoly regions than in duopoly regions. This means that the aggregate diversion ratios from the physical bookstore to online bookstores in Helsingborg and Växjö (duopoly regions) would be higher aggregate diversion ratios towards online bookstores than Linköping and Malmö (oligopoly regions). However, no such pattern appeared in the cities investigated.

Table 12 Aggregate diversion ratios to online bookstores

City/region	Akademibokhandeln	Bokia	Total
Göteborg	0.10	0.09	0.10
Umeå	0.09	0.19	0.14
Helsingborg	0.09	0.12	0.11
Växjö	0.25	0.10	0.20
Linköping	0.30	0.16	0.25
Malmö	0.19	0.11	0.15
Total	0.17	0.13	0.15

The columns Akademibokhandeln and Bokia in Table 13 summarize the aggregate diversion ratios to other physical bookstores in each of the six cities. We observe some variation existed among the different city/regions. The aggregate diversion ratios to other physical bookstores varied from approximately 38% in Linköping to approximately 75% in Göteborg. Nearly 60% of all respondents gave the answer to the second-choice question that they would go to another physical bookstore. The last row gives an estimated "national" aggregate diversion ratio of each chain towards other physical bookstores. This estimate assumed the aggregate diversion ratio of "Total" 62% applied to all geographical markets where Akademibokhandeln faced competition from one or more physical bookstore (s), while this diversion ratio took the value 0 in the local markets where Akademibokhandeln outlets faced no local competition from other physical bookstores. The same goes for Bokia.

Table 13 Aggregate diversion ratios to physical bookstores

City/region	Akademibokhandeln	Bokia	Total
Göteborg	0.75	0.77	0.76
Umeå	0.63	0.55	0.59
Helsingborg	0.66	0.58	0.62
Växjö	0.56	0.63	0.58
Linköping	0.38	0.59	0.46
Malmö	0.64	0.55	0.59
Total	0.62	0.61	0.61
National	0.55	0.53	

Finally, Table 14 presents aggregate diversion ratios from the respective physical bookstore to hypermarket/department stores. The diversion to this channel of purchasing books was roughly 6%, and much lower than the ones to other physical bookstores or online bookstores.

Table 14 Aggregate diversion ratios to hypermarkets/department stores

City/region	Akademibokhandeln	Bokia	Total
Göteborg	0.00	0.02	0.01
Umeå	0.03	0.06	0.04
Helsingborg	0.10	0.07	0.08
Växjö	0.10	0.08	0.10
Linköping	0.03	0.05	0.04
Malmö	0.09	0.10	0.10
Total	0.06	0.07	0.06

4.4.5 Diversion ratios between the merging parties

The diversion ratio needed for calculating the UPP-index of interest is the one between Akademibokhandeln and Bokia. Table 15 presents estimated diversion ratios between these two chains, from Akademibokhandeln to Bokia and vice versa. These have been calculated as the ratio of respondents outside respective store that named the other chain as their second-choice alternative in case the outlet they just purchased their book(s) at did not exist.[52] Approximately 22% of all Akademibokhandeln customers chose Bokia as their second-choice, while 29% of Bokia customers chose Akademibokhandeln as their second-choice.

Table 15 Diversion ratios between the merging parties

City/region	Akademibokhandeln	Bokia
Göteborg	0.09	0.52
Umeå	0.52	0.45
Helsingborg	0.28	0.14
Växjö	0.33	0.46
Linköping	0.31	0.32
Malmö	0.07	0.12
Total	0.22	0.29

[52] These diversion ratios are however conservative, as we assumed that none of the respondents who were unable to give specific store names would choose either Akademibokhandeln or Bokia. A generally acceptable method would be to assign such ambiguous answers based on the market shares of the parties.

4.4.6 Margins and Efficiency Claims

Since the focus of our analysis was to assess the effects of the merger in the local markets separately, the margins specific for each outlet were collected. The relevant margins for the calculation of the UPP were the total turnover minus the cost of goods sold (including logistic costs), i.e. the costs involved in selling an extra copy of a book. As in the previous sections, we use herein a margin of 40% for all outlets, both for Akademibokhandeln and Bokia. By no means do these artificial margins reflect the actual margins of the outlets.

The parties argued that the planned merger would give rise to cost savings in the form of diminishing variable costs as well as diminishing capital depreciation. Konkurrensverket did not deem the suggested efficiency claims to be sufficiently supported or proven to be merger specific.

4.4.7 UPP and GUPPI calculations

Table 16 presents the calculations of the UPP-indices based on the diversion ratios between the merging parties in Table 15 and the spurious margin of 40% for all outlets. Since the merger seems to yield no efficiencies related to lowering variable costs, the values of the UPP-measure here is the same as the GUPPI.

Table 16 UPP and GUPPI calculations with a margin of 40 %

City/region	Akademibokhandeln*	Bokia*
Göteborg	0.04	0.21
Umeå	0.21	0.18
Helsingborg	0.11	0.06
Växjö	0.13	0.18
Linköping	0.12	0.13
Malmö	0.03	0.05
Total	0.09	0.12

**Equation (12)*

4.4.8 The decision

The unilateral effects analysis, in the form of a UPP analysis, was one of the several key elements that Konkurrensverket took into consideration before reaching the final decision to permit the merger. The analysis showed that the merging parties would indeed have the incentive to increase prices in a handful of overlapping regions. The parties argued nevertheless that since those regions represented only a small part of their total turnover, it would be unprofitable to follow such a strategy as it would lead to losses in the non-overlapping areas. Their premise for this argument was that they would maintain national pricing.

Konkurrensverket further examined whether the parties would have an incentive to switch from national to local pricing after the merger so as to extract higher local profits. This exercise included the challenge of transforming national margins to local, i.e. optimal pre-merger margins, using national and local diversion ratios. The analysis indicated that store closures were more likely than a switch from national pricing to local pricing. The facts that several stores in the overlapping areas were proven to be in a process of closing down, and that the size of the region determined to a great extent how many bookstores can exist in that region indicate that closures would not in fact be a direct result of the merger. Given all aspects mentioned above Konkurrensverket decided to allow the merger between Akademibokhandeln and Bokia, to take place without any remedies.

4.5 Case 5: Cloetta/Leaf (2012)

In the merger between two candy manufacturer, Cloetta and Leaf, a simplified UPP-analysis was applied during the first phase of the investigation. Commonly referred to "UPP-light" within Konkurrensverket, the analysis was entirely based on market research data available beforehand, which alleviated the authority from the burden of carrying out a comprehensive customer survey. This constitutes an almost ideal situation, as market research conducted by the merging parties was detailed enough to carry out a UPP-analysis. In addition, the fact that the research was not carried out after the parties announced their plan for merger minimized the risk of survey results being biased.

4.5.1 The Swedish candy market

Cloetta is the oldest confectionery manufacturer in the Nordic countries, mainly producing confectionery with chocolate as one of the main ingredients (but no plain chocolate bars). Leaf, founded in the Netherlands in the mid 1980's, mainly produces fresheners such as mint pastilles, chewing gums, and cough drops, but no significant amounts of chocolate-based products. Both companies had an extensive portfolio of products with several strong brands in each.

Since the parties were active in different product segments to varying extent, the project group focused its analysis on three distinct product markets in which the merging parties would enjoy relatively high market shares after the merger. These are the markets for sugar-based confectionary, fresheners, and *godisriket*.[53] In the

[53] *Godisriket*, candy-kingdom in English, refers to a product segment identified and described in the market research studies of the parties including both chocolate- and sugar-based confectioneries in pre-packed sealed bags of similar size and shape, usually containing between 125 gr and 200 gr of candy. The products in this segment are priced similarly and usually hang next to each other near the counters in a store.

market for sugar-based confectionary, Leaf had significant market power with a market share of [30-50]% while Cloetta's market share was [5-10]%. In the market for fresheners it was Leaf that had significant market power with a market share of [40-60]%, to which Cloetta's market share of [5-10]% would be added, resulting in a position with [45-70]% share of the market. Finally, in the so called "candy-kingdom" market, Cloetta and Leaf has market shares of [10-30]% respective [10-30]%. All market shares were calculated from AC Nielsen retailer-level sales data that were available for finely detailed sub-segments of the confectioneries market.

4.5.2 Applying "UPP-light"

In this case Konkurrensverket applied the UPP-methodology in reverse. First, the relevant margins were identified after discussions with the merging parties. Then, the UPP calculus was applied to obtain the critical level of diversion ratios between the two parties necessary for the merged entity to have an incentive to increase prices by 10% in the product segments identified as potentially problematic. Finally, Konkurrensverket evaluated whether the actual diversion ratios would exceed those critical levels. Consumer research material provided by the parties that examined the consumers' purchasing behavior, their preferences, as well as their substitution patterns among different products along scanner data from AC Nielsen helped Konkurrensverket evaluate market shares and the approximate values of the diversion ratios between the merging parties.

As an example, we assume a relevant margin of 30% equal for both merging parties. We further assume efficiencies that would result in cost savings of 5%. This gives

$$UPP = (diversion) * 0.3 - 0.05 \geq 0.05.$$

The minimum diversion ratio from one of the merging party to the other whose production costs are expected to decrease would be 33%. If the actual level of diversion ratio is evaluated to be higher than 33%, then we can conclude that there is an indication of unilateral effects on that product. The threshold diversion ratio to the product where no efficiency gains are expected is 16%.

$$UPP = (diversion) * 0.3 \geq 0.05$$

4.5.3 The decision

The "UPP-light" analysis led to the conclusion that, post-merger, the merging parties would not have significant incentives to increase prices on their products. A series of other considerations, however, led Konkurrensverket to decide on allowing the merger to take place without any remedies. First of all, the candy

producers, due to the nature of their products, did not have a strong bargaining position against the concentrated grocery stores market, on which they depended for reaching the end consumers. Second, several close substitutes existed to the segment of *Godisriket*, notably chocolate and pick-and-mix candy[54]. Third, barriers to entry seemed to be relatively low. Although brand names were very important, established competitors could with relative ease develop candy similar to the one whose price had increased.

5 Closing remarks

In this paper we sought out to present a concise discussion of the theory behind the UPP methodology and provide the interested reader with a list of the equations that, through our experience with applying this methodology, we consider to be the most relevant for any practitioner's toolbox. We supplemented this discussion with a relatively detailed exposition of how the methodology has been applied in five recent cases.

We would like to close this paper with some cautionary words. While we consider the introduction in competition policy of effects-based instruments, such as the UPP methodology, a move in the right direction one should be wary of the illusory convenience of such tools.. As detailed in Section 3, a considerable body of theoretical work and scholarly debates lie behind the handful of equations that have come collectively to be named the UPP method. As with most economic modeling, a result is only as good as the appropriateness of the assumptions made. However, an investigating team needs to face the fact that some questions (e.g. concerning the curvature of the demand function) often cannot realistically be answered convincingly in the brief time available during a merger review process. The approach that we often have adopted in such cases is to calculate permutations of the relevant indices and evaluate them collectively (with a critical eye) while considering every aspect of the market that is known at the time of the investigation. It is often possible to determine the direction of the bias introduced by the uncertainty concerning some aspects of the industry at hand and the UPP results can be treated accordingly as upper or lower bounds.

The quality of the UPP predictions also rest on the quality of the estimates that go into the calculations, namely the diversion ratios and the profit margins of the companies involved. While a UPP analysis always serves to increase the attention

[54] That is loose candy assortments the consumer can freely combine.

given in the investigation to these important competitive factors, the results themselves are mainly useful when the investigating team is confident in the quality of the underlying estimates. That said, we believe that UPP indices should not stand on their own, but rather need to always be supplemented with as much complementary evidence, both qualitative and quantitative as possible.

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