Ex-Post Merger Review and Divestitures*

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Abstract

We provide an ex-post analysis of the 2001 merger between the two largest brewers on the Swedish beer market. Difference-in-difference estimates suggest low price effects of the merger. This is well matched by a merger simulation, using a random coefficient logit model, which predicts price increases of only 0.4 percent. Knowledge of the retailers markup rules allows us to discard retailer behavior as an explanation for the pricing patterns. We further establish that without the divestitures required by the competition authorities, the price increase would have more than doubled to 1 percent (even though still low in absolute terms).

JEL Classification: K21, L11, L41, L66.

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1 Introduction

Competition authorities need to take a stand on which proposed mergers they should challenge and which mergers they should allow to proceed. Whether they are making the right choices is clearly an important issue, and many researchers have called for ex-post

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reviews of mergers[1]. Indeed, in recent years a number of ex-post evaluations of mergers have appeared; see for instance Focarelli and Panetta (2003), Hastings (2004), Taylor and Hosken (2007) and Ashenfelter and Hosken (2011)). A typical finding is that there are modest price increases of a few percent associated with the merger. In a related line of research, a handful of papers have compared the predicted price changes from merger simulations with the actual development of prices after the merger (see Peters (2006) or Weinberg (2011)). These papers point to substantial challenges of merger simulations, as they are commonly applied, in quantitatively matching price developments after the mergers.

In the present paper we aim to contribute to the literatures on merger simulations and ex-post merger reviews. We examine the takeover of Swedish brewery Pripps by the Danish brewer Carlsberg. Carlsberg's pre-merger market share on the Swedish beer market was 33 percent and Pripps' was 17 percent. Despite this substantial concentration there are no important price hikes following the merger. We follow Berry, Levinsohn and Pakes (1995, BLP) and Nevo (2000) and use a random coefficients logit model to estimate demand in this market. We use the model to do counterfactual simulations aimed at understanding the effect of the merger on prices. Our contributions are twofold: Firstly, the merger simulation does well in predicting the low price increases following the merger. If the merging parties were to control all the beers they controlled pre-merger, we predict a quantity weighted price increase for the average beer in the market of 1 percent. While the random coefficient logit model has become the method of choice in published work (see for instance BLP (1995), Nevo (2000) or Petrin (2002)) the evaluations by Peters (2006) and Weinberg (2009) use demand systems that imply more restrictive substitution

[1]See for instance Whinston (2006). In their critical view of Industrial Organization, Angrist and Pischke (2010, p. 20) highlight the lack of ex post merger reviews. "An important question at the center of the applied industrial organization agenda is the effect of corporate mergers on prices. One might think, therefore, that studies of the causal effects of mergers on prices would form the core of a vast micro-empirical literature, the way hundreds of studies in labor economics ... But it isn't so. In a recent review, Ashenfelter, Hosken, and Weinberg (2009) found only about 20 empirical studies evaluating the price effects of consummated mergers directly." In the same issue of Journal of Economic Perspectives Einav and Levin (2010) point to the idiosyncracies of mergers and the limits of what can be learnt from ex-post reviews, see also Carlton (2009). In a presentation at the Federal Trade Commision, Benkard (2010) also points to the limits of what can be learnt, based on an evaluation of 75 merger retrospective studies.

patterns. Merger simulation, as practiced by competition authorities, frequently uses these restrictive models. Our paper thus points to the potential value of using richer demand models when simulating mergers.[2] Our second contribution is to investigate in detail the role of divestitures in the merger. As a condition for clearing the merger the Swedish Competition Authority required the merging parties to divest a number of brands. Taking account of these divestitures more than halves the predicted price increase, to 0.4 percent. When competition authorities clear a merger they often do so under the condition that the merging parties agree to changes to the structure of the merger or to change their behavior in some way (see for instance Motta (2004)). The parties may for instance agree to change the duration of contracts with suppliers or to divest certain brands. These changes to the proposed mergers are known under various names, the perhaps most common being 'remedies' or 'undertakings'. The European Union also uses the term 'commitment' for changes to the structure of a merger. Such remedies are a central part of merger practice. As an example, the European Competition Authority subjected 165 proposed mergers to deeper analysis during 1990-2011 (the Phase II procedure, no merger was blocked at previous stages). Of these 165 proposed mergers, 56 percent were allowed to proceed after commitments. In comparison, only 13 percent were prohibited and 28 percent were permitted as proposed. Similarly, of 144 mergers challenged by US competition authorities between 2003 and 2007, 64 percent were allowed after remedies had been agreed upon (Tenn and Yun (2009))[3]. Thus, remedies are a crucial part of merger policy. Despite this, they are barely mentioned in most ex-post evaluations. The divesting of brands is one prominent form of merger remedy and in our ex-post evaluation we put the divestitures at center stage. We believe that the evidence in this paper stresses the role of merger simulations in guiding what divestitures competition authorities should pursue. The implicit focus on much discussion of the pros and cons of merger simulations is that they should be used to determine which mergers to block and which to allow (see for instance Angrist and Pischke (2010) and Einav and Levin (2010)). It has also been

[2]On a related note, even richer models examine mergers without assuming, as we do, static forms of competition (see for instance Benkard, Bodoh-Creed and Lazarev (2010)).

[3]51 percent were settled via consent orders and 13 percent were restructured after the Department of Justice communicated its concerns to the merging firms.

noted that even though merger simulations are accurate it is difficult to bring them into the court room. For divestitures they can form the basis for a discussion with the merging parties and explaining the intricacies of demand estimation to lawyers is less of an issue.

Several features of our data, and of the institutional setting, make the Pripps-Carlsberg merger an appealing case for examining the role of divestitures, also for those that do not have a strong interest in the Swedish beer market per se. We use package-level data on prices and quantities for the whole market, rather than an estimate based on a selection of stores, as is frequently the case with scanner data. This limits the amount of noise. The data source is the Swedish government-owned retailer, Systembolaget. It has a legal monopoly on retail sales of all alcoholic beverages, including beer (with an alcohol content above 3.5 percent by volume). An additional benefit of the institutional setting is that Systembolaget applies the same transparent markup to all products. We can thus back out the producer price that the profit maximizing producers and importers charge Systembolaget. Gaining access to prices at different stages of the vertical chain is notoriously difficult and many other prospective merger studies, such as Nevo (2000), have been forced to assume that retailer markups are unchanged. We were also attracted by the beer market having been a prominent testing ground for merger simulations right from the start of this literature; see Baker and Bresnahan (1985), Hausman et al (1994) for examinations of prospective mergers on the US beer market and Pinkse and Slade (2004) for mergers on the UK beer market[4].

In the next Section we describe the data and institutional setting before we turn to a description and introductory analysis of the Pripps-Carlsberg merger. Section 3 presents the model used to estimate the demand side, while section 4 presents the model of the supply side. In the following section, we detail our estimation procedure and the results. Section 6 simulates counterfactual prices for the merger with and without divestitures. Finally, section 7 concludes.

[4]See also Hellerstein (2008) or Rojas (2008) who examine the beer market with similar tools as the merger simulation literature, but focus on the pass-through of exchange rates and of excise taxes, respectively.

2 Data and Institutional Setting

The data set includes the monthly retail sales of all beers sold in Sweden with January 1996 as the first month and December 2004 as the last month. In the demand estimation that we use for simulating the merger we use data up to November 2000 (the merger was cleared in December 2000, we return to a detailed description of the merger below). Sales volume per month and price are observed at the bar-code level and we use the term a *beer* to denote a product at this level. Samuel Adams Boston Lager in a 33 centiliter (cl) bottle is an example of a beer. In their catalogs Systembolaget classify beers into different categories and we use beers in the light lager, dark lager and ale segments[5]. We include all such beers that are sold in the standard sizes (33 cl and 50 cl bottles and 33 cl, 45 cl or 50 cl cans)[6]. Systembolaget also reports alcohol content by volume as well as measures of bitterness, richness and sweetness for each beer. These latter three measures are reported on a scale from 1-12. All of the above are used as measures of observable product characteristics in the ensuing estimation of demand.

The price for a given beer is the same across all of Sweden and prices can change only when there is a new catalog issued by Systembolaget. There are no temporary sales. The prices that consumers pay are determined by a deterministic markup on the price set by producers or importers. The ingredients in this markup on the producer price are the following: an excise tax on alcohol that is calculated per liter, a percentage markup added by Systembolaget that is common to all products, a markup per container that is also common to all products, value added tax (VAT) of 25 percent and, in the case of some beers, a deposit on the container. There have been a handful of changes to these variables as well as in how the markup is calculated over the period of study, in Section 4 we describe the calculation of the markup in detail. The percentage markup that Systembolaget adds is determined by Swedish parliament and is changed twice during the period covered by the data, in January 2000 and in April 2004. We use the information on these building

[5]The remaining segments (stout, weiss beer and 'specialty beers', for instance Belgian fruit beers) represent a miniscule share of volume and estimating demand for these marginal beers on the Swedish market would complicate estimations with little apparent benefit.

[6]Other sizes represent a diminutive share of volume.

blocks of the markup to back out the time series of producer prices.

By *brand* we define beer sold under the same name but in different package sizes, or with different alcoholic strengths. We also use monthly advertising expenditure which is observed at the brand level.[7] We sometimes also use the term umbrella brand to denote the case where a number of beers with different characteristics are sold under the same name; Budweiser, Guinness and Warsteiner are examples of *umbrella brands*.

2.1 The Supply of Beer and the Carlsberg-Pripps Merger

The light and dark lager segments are dominated by domestic beers, whereas imports have a high share in the ale segment. A useful way to describe the suppliers to Systembolaget are as follows; major brewers, microbreweries and pure importers. The major brewers are Åbro, Carlsberg, Krönleins, Pripps, Spendrups, and in later periods Kopparberg. While Carlsberg is based in Denmark, most of the beer they sold in Sweden at the time was produced locally. Carlsberg's local presence was partly based on having acquired Swedish brewer Falcon in 1995. Pripps was at the time of the merger owned by Norwegian food and drinks group Orkla. Krönleins and Spendrups are family controlled domestic brewers and Åbro and Kopparberg are independent Swedish brewers. Each of these brewers produces, and sells to Systembolaget, a number of 'their own' beers. They also produce some beers on license agreements with foreign brewers and act as importers and wholesalers for other beers. At the start of the period Carlsberg for instance was the wholesaler for imported beers under the umbrella brands of Budweiser, Caffrey's, Michelob and Staropramen. Micro breweries and independent importers make up a small share of overall volume but control a large number of beers.

In Table 1 we present some descriptive statistics on the market, as well as market shares and producer prices for some selected suppliers. Carlsberg, Pripps and Spendrups control roughly a quarter of the market each in the first years of the study. Until 2003

[7]Source: Research International/SIFO. Advertising expenditure is the estimate of the total cost of advertising for a given beer in magazines, newspapers, television and billboards based on the observed advertising. Before March 15, 2003 advertising of alcoholic beverages was not legal in Sweden. Beer with an alcohol content below 2.25 percent could be advertised also before this however. In cases where such a low alcohol beer with the same brand name was advertised we use this as a measure of advertising for strong beer.

Åbro is the fourth largest supplier - its market share is rather stable around 10 percent. Krönleins' market shares is rather stable around 5 percent. The four firm concentration ratio is close to 85 percent and the Herfindahl-Hirschman index of concentration hovers around 0.2, with a low of 0.195 in the year before the merger and a high of 0.235 in the year after the merger. The highly concentrated supply side is similar to that of brewing in for instance the U.S. (see Tremblay and Tremblay, 2005). The potential for strong effects of the merger on prices is evidenced by the combined pre-merger market share of Carlsberg and Pripps being around 50 percent. Aggregate volume almost doubled over the period. One reason was a sharp drop in the excise tax on January 1, 1997, as reflected in the drop in average consumer price.

The increase in volumes was also spurred by a number of very aggressively priced beers that were introduced during the period. In particular Kopparberg has been central to this development, it advanced from a market share of 3 percent to a market share of 19 percent in 2004.[8] The increasing importance of lower priced beers is seen in the average consumer price that is falling over the period (all prices are in Swedish krona, SEK. In November 2000, 8.62 SEK equalled one Euro and 10.08 SEK equalled one US dollar). The producer price falls as well, with the exception of 1997 when the tax decrease was not fully passed through into consumer prices. Other numbers from the table that we would like to highlight is the increase in market share (and fall in average price) for Galatea in 2001, which reflects that it took over many of the brands that were divested as a condition for the Carlsberg-Pripps merger. This brings us then to the merger itself.

[Table 1 about here]

The takeover of Pripps by Carlsberg had an international dimension and was investigated by competition authorities in Denmark, Finland, Norway and Sweden. Carlsberg merged with Norwegian brewery Ringnes, which owned Pripps and in turn was owned by Norwegian food and drinks group Orkla. A joint entity was created under the name

[8] At a fundamental level one may speculate that both developments are affected by European integration, Sweden joins the European Union in 1995 and agrees gradually to ease restrictions on cross-border shopping of alcohol; see Asplund et al. (2007) for an analysis of how crossprice elasticities of demand with respect to foreign price depend on distance to the border around this time.

Carlsberg breweries where Orkla received a 40 percent share. According to reports at the time of the merger, an important motivation was that Carlsberg wanted access to Baltic Beverages Holding Co., that had a strong position in the Russian beer market, and that was owned to 50 percent by Ringnes. Carlsberg and Pripps also sold beer with alcohol content below 3.5 percent that were retailed in supermarkets, bottled water and carbonated soft drinks. By focusing on the market for beer with alcohol content above 3.5 percent in Sweden we thus examine only part of the merger. The part that we examine was viewed as a separate relevant market in the product and the geographic space by the competition authorities.

The first public information about the proposed merger came on May 31, 2000 when Carlsberg announced that it had negotiated a merger with Pripps-Ringnes. During the fall of 2000, the merger is investigated by the Swedish competition authorities and, following a number of divestitures, the Swedish competition authority announces that it will not challenge the merger on December 14, 2000. The merger is finally consummated February 15, 2001. The terms of the merger stipulate that seven domestic and five imported umbrella brands should be divested.[9] Many of the divested brands were transferred to Galatea, an independent wholesaler with no production capacity of its own. As seen in Table 1, Galatea expanded from a market share of less than half a percent to one of more than 7 percent following the divestiture.

The first column of Table 2 reports market share by volume of the beers that were divested at the time of the merger. The market share of these beers show a decline over the period, that continues after the divestment. The average, quantity weighted, price of the divested beers is somewhat lower than the average price on the market, reflecting that the bulk of the volume for the divested beers stemmed from light lagers. Average price falls slightly after the merger but increases towards the end. This reflects a declining share as well as exit of some of these low priced lagers.[10] The most important umbrella brand

[9]The domestic brands that were divested were Arboga, Bayerbräu, Eagle, Fat, Sailor, Starkbock and TT. The imported brands that were divested were Bass, Caffrey's, Lapin Kulta, Staropramen and Warsteiner.

[10]For instance TT light lager dropped from 1.3 percent market share in 1999 to 0.7 in 2002, and Eagle beer, with a market share of 1 percent in 1999, was discontinued in 2003.

that Carlsberg-Pripps was required to divest was Lapin Kulta, imported from Finland. The transfer of control over Lapin Kulta to Åbro did not take place until November 2002 however. The last column presents the volumes of the divested brands including Lapin Kulta.

[Table 2 about here]

2.2 The impact of the merger on prices: a first look

The descriptive statistics presented above indicate that, despite the merger of two firms that control roughly a quarter of the market there was little effect on prices. This could be a result of a low price increase of the merger per se, or it could be reflecting cost or demand shocks which counteracted the incentives to raise price. Ex-post evaluations of mergers, such as those by Focarelli and Pannetta (2003) or Hastings (2004) have typically pursued a difference-in-difference methodology. One strives to compare development of prices for the "treated" products, with those of a control group that would be affected by the same demand and cost shocks, but unaffected by the merger. As argued by Angrist and Pischke (2010), the methodology has proved very fruitful in many areas of economics. Applying such a methodology to a merger between two major players on a national market is challenging however. One challenge regards the timing and the difficulty of defining a clear distinction between before and after "treatment". The merger was cleared in February 2001, but the firms had agreed to merge already in May 2000, possibly after long negotiations. The largest umbrella brand to be divested as a result of the merger, Lapin Kulta, was not divested until November 2002, a year and a half after the merger was consummated. Strategic behavior to try to influence the terms of the deal may have affected prices also before May 2000. The earlier one defines the pre-merger period, the more other shocks due to for instance entry and exit of beers are likely to obscure the comparison. The concerns regarding timing are therefore difficult to solve in a perfectly satisfying manner. The other challenge regards defining a control group. Examination of price developments in neighboring countries pointed to that they were affected by other demand shocks and Sweden's floating exchange rate creates substantial noise in cross-

country price comparisons. As a rough comparison for the price developments of the merger we use all beers sold by the other main domestic brewers. We thus exclude beers produced by micro breweries, beers that are imported by a purely trading firm rather than by a brewer, and beers sold by Kopparbergs, the producer that is increasing market share rapidly following a very aggressive strategy, as discussed in connection with Table 1. The comparison group is likely to be faced by very similar cost and demand shocks as the merging parties. However, these are also producers that are likely to be in close competition with the merging parties. The treatment may thus have an effect also on the "control" group. A standard prediction would be that prices of merging party products increase and that those of substitutes increase, but by lower amounts. A "difference-in-difference" estimation that did not pay attention to this would yield downwardly biased estimates of the price effect of the merger. Below we use regression analysis to describe price developments surrounding the merger, but we would like to stress that, for the reasons just mentioned, a causal interpretation of the results are not warranted.

In Figure 1 below we plot the quantity weighted (constant weights given by sales volume for the pre-merger period) average producer price for the merging parties (excluding beers that were divested as a result of the merger review), for the divested beers, and for the other traditional main brewers (Spendrups, Åbro and Krönleins). There is little evidence of dramatic price increases following the merger. Average price of beer sold by the merging firms increased some over the pre-merger period but remained largely constant around the merger. The prices of the other main brewers increased somewhat after the merger. The divested beers fell in price compared to the other two groups of beers. If divestitures are to play a disciplining role in mergers, this is a pattern that we would like to see. The fall in producer prices at the beginning of 2000 is associated with a change in the retailer markup, as described in Section 4.

[Figure 1 about here]

In the main specifications we define the pre-merger period as the year from November 1999 up to, and including, November 2000. The post-merger period uses April 2001 as

its first month and April 2002 as its last month. We estimate the price of beer i in month t using the following specification.

$$ln(p_{it}) = a_i + \beta_1 * postmerger_t + \beta_2 * postmerger_t * merge_i + \beta_3 * postmerger_t * divest_i + e_{it} \quad (1)$$

In this specification, *merge* is a dummy for beers sold by the merging parties after the merger (excluding Lapin Kulta) and *divest* is a dummy for the beers divested at the time of the merger as a condition for the merger. The variable *postmerger* is a dummy for the post-merger period, as defined above, and a_i a fixed effect per beer. We use fixed effects to capture the price of each beer.

[Table 3 about here]

In column (1) we use beers from all segments and find that prices of the merging parties fell relative to the comparison group around the time of the merger. Many interpretations are possible: it could for instance be due to cost savings having a rapid effect or that demand shocks affect the merging parties stronger than others. It nevertheless points to that having the merger allowed and consummated was not associated with a price increase of the merging firms relative to a comparison group of similar brewers. In columns (2) to (4) we estimate the same specification as in (1) but do so separately for the light lager, dark lager and ale segments. A comparison of columns (1) to (4) shows that the fall in prices of the merged firms is due to developments of prices of light lager beers; for dark lagers and ales the point estimate of price increases due to the merger are instead 1.3 and 2.6 percent (where only the latter is significant). We note that Åbro's introduction of a highly succesful low priced light lager in March 2001, Kung, may have contributed to these pricing patterns. Keeping all the caveats from above in mind, caveats that we believe are a concern for many merger retrospectives, we do think the regressions are useful in establishing that, despite the merger of two parties that each had a pre-merger market share close to 25 percent, there we no dramatic price increases. The regressions are also useful in establishing that the relative prices of the divested beers fell.

3 Modeling Demand

If we want to deduce the likely effects of the merger on prices, firm profits and consumer welfare before the merger actually takes place, and thereby establish a link between the magnitude of price changes and divestitures, we have to adopt a structural approach. We follow standard practice in merger simulations and estimate a discrete choice model and in particular, following BLP (1995) we allow for random coefficients in the logit estimation. Many have noted that allowing for random coefficients allows for more realistic substitution patterns than those implied by the simple to implement, but restrictive, logit form of demand (see for instance Berry (1994)).

3.1 The Random Coefficients Logit Model

We briefly present the assumptions of the model. Readers interested in a more detailed exposition are referred to Nevo (2000). We observe $t = 1, ..., T$ periods with a total number of J_t beers in each. The indirect utility of consumer i from purchasing beer j at date t is then given by

$$u_{ijt} = x_{jt}\beta_i - \alpha_i p_{jt} + \xi_{jt} + \epsilon_{ijt},\ i = 1, ..., I,\ j = 1, ...J_t,\ t = 1, ...T \tag{2}$$

x_{jt} is a K-dimensional row vector of observable product characteristics. Here we include the following observables: the taste characteristics richness, sweetness and bitterness, which are all measured on a scale from 1 - 12, percent alcohol by volume, the beer category (dummy variables for ale and dark lager, light lager is the omittted category), packaging dummies with the 33 cl bottle as the base category and brand-level advertising expenditure. p_{jt} is the retail price of product j, ξ_{jt} is the product characteristic that is unobserved by the econometrician and ϵ_{ijt} is a random shock to the consumer's taste for product j. The parameters of interest are the taste coefficients, β_i, and the price sensitivity, α_i. The individual also has the option of not purchasing beer, which is referred to as the outside good and its mean utility is normalized to zero.

The variation of the parameters of interest between the I agents stems from the distri-

bution of observable demographics. Thereby, the individual coefficients are decomposed into two parts: the means across individuals and the deviations from the means for each agent.

$$\begin{pmatrix} \alpha_i \\ \beta_i \end{pmatrix} = \begin{pmatrix} \alpha \\ \beta \end{pmatrix} + \pi D_i + \Sigma v_i, \; v_i \sim P_v(v), \; D_i \sim P_D(D) \tag{3}$$

D_i is a $(d \times 1)$ vector of consumer i's observable demographics. π is a $(K+1) \times d$ matrix of coefficients to be estimated, allowing the individuals' preferences over product characteristics to vary with observed demographics. v_i is a $(K+1)$-dimensional vector capturing individual taste shocks and Σ is a symmetric matrix of coefficients conformable with v_i. Σ allows for arbitrarily correlated shocks to consumer i's valuation of a product's observable characteristics. It is assumed that D_i and v_i are distributed independently.

We can now collect terms depending on whether they vary with individual demographics and rewrite (2) as the sum of the mean utility of consuming product j and individual i's deviation from this mean utility.

$$u_{ijt} = \delta_{jt} + \mu_{ijt} + \epsilon_{ijt}, \tag{4}$$

where $\mu_{ijt} = [-p_{jt}, \, x_{jt}]^T [\pi D_i + \Sigma v_i]$ and $\delta_{jt} = x_{jt}\beta - \alpha p_{jt} + \xi_{jt}$. The sum $\mu_{ijt} + \epsilon_{ijt}$ is the individual-specific deviation from the mean and δ_{jt} is the mean utility. It is assumed that ϵ_{ijt} is *i.i.d.* with a Type I extreme value distribution. The probability that consumer i purchases beer j at date t is then given by

$$s_{ijt} = \frac{exp(\delta_{jt} + \mu_{ijt})}{1 + \sum_{k=1}^{J_t} exp(\delta_{kt} + \mu_{ikt})}. \tag{5}$$

We obtain the aggregate market share for product j by integrating over all individuals. The resulting substitution patterns between products are summarized by the elasticities.

$$\eta_{jkt} = \begin{cases} \frac{-p_{jt}}{s_{jt}} \int \alpha_i s_{ijt}(1 - s_{ijt}) dP_D(D) dP_v(v) & , \; j = k \\ \frac{p_{kt}}{s_{jt}} \int \alpha_i s_{ijt} s_{ikt} dP_D(D) dP_v(v) & , \; j \neq k \end{cases} \tag{6}$$

For comparison, we also estimate demand with the logit model. In this approach, all

individual-specific variations are set to zero. In other words, observable demographics do not play a role. The market share equation in the logit model is thereby a specialized version of (5) with $\mu_{ijt} = 0$.

4 Modeling Supply

To model the supply side of the Swedish beer market, we impose Nash-Bertrand competition between firms. The relevant firms here are the producers/wholesalers that act as suppliers to Systembolaget. There are $f = 1, ..., F_t$ firms present at date t and each firm maximizes profits for its portfolio of products, $\mathcal{F}_f$.

$$\max_{p^w_{jt}} \ \Pi_f = \sum_{j \in \mathcal{F}_f} M_t s_{jt}(p^r_{jt})(p^w_{jt} - mc_{jt}) - C_f \tag{7}$$

p^r_{jt} and p^w_{jt} are the retail and wholesale prices. M_t is the market size at date t, mc_{jt} is the marginal cost of production for beer j and C_f is the fixed cost faced by firm f. We distinguish between retail and wholesale prices, because the market shares of all products and the elasticities are functions of the prices charged to consumers, while firm margins directly depend on the prices charged to the retail monopoly. As mentioned in section 2, an attractive feature of the Swedish beer market is the deterministic relationship between the retail and wholesale prices of all beers. The retail monopoly, Systembolaget, applies a fixed[11] formula when determining retail prices.

$$p^r_{jt} = (p^w_{jt} + x^a_{jt}\tau^a_t)(1 + \tau^c_t)(1 + mk^s_t) + d_{jt} \tag{8}$$

x^a_{jt} is the per liter alcohol content of beer j, τ^a and τ^c are the alcohol excise tax and value added tax, while mk^s and d_j are the markup of the retail monopoly and the deposit for the packaging of product j, respectively. As emphasized by the indexing, the tax rates

[11] The formula changes in December 1999. Before this it is given by $p^r_{jt} = (p^w_{jt} + x^a_{jt}\tau^a_t)(1 + mk^s_t)(1 + \tau^c_t) + d_{jt}$. From January 2000 onwards, the retail price is $p^r_{jt} = (p^w_{jt}(1 + mk^s_t) + c_t + x^a_{jt}\tau^a_t)(1 + \tau^c_t) + d_{jt}$, where c_t is a constant, per container, charge applied to all beers. From January 2000 to April 2004, is c_t 1.5 SEK, and from then on it falls to 0.85 SEK. For backing out the marginal costs implied by our demand estimates, we are interested in $\partial p^r_{jt}/\partial p^w_{jt}$. It is straightforward to verify that this equals $(1+\tau^c_t)(1+mk^s_t)$ for all the pricing functions.

and the retail markup are equal for all products. When setting wholesale prices, firms therefore have certainty about the price charged to consumers.

Knowledge of (8) allows us to precisely back out firm margins, $p_{jt}^w - mc_{jt}$. We define $\kappa_t \equiv \partial p_{jt}^r / \partial p_{jt}^w = (1 + \tau_t^c)(1 + mk_t^s)$. The first-order profit maximization condition for product $j \in \mathcal{F}_f$ is given by

$$\sum_{k \in \mathcal{F}_f} \frac{\partial s_{jt}}{\partial p_{kt}^r}(p_{kt}^w - mc_{kt}) = -\frac{s_{jt}}{\kappa_t}.$$

Switching to matrix notation, we collect the profit maximization conditions for all firms in the market and define the matrix of market share derivatives, Ω.

$$\Omega(j,k) \equiv \begin{cases} \frac{\partial s_{kt}}{\partial p_{jt}^r} & , \ \exists\{j,k\} \subset \mathcal{F}_f \\ 0 & , \ otherwise \end{cases}$$

$$\Omega_t(p_t^w - mc_t) = -s(p_t^r)\kappa_t^{-1}, \ \forall t$$

Ω_t takes into account the actual ownership pattern of beers at date t. We thereby impose a Nash-Bertrand equilibrium, where firms are the players. To illustrate, setting all off-diagonal elements of Ω_t to zero, would define the products as the relevant players and model firms as ignoring the crossprice elasticities between the individual beers in their holdings. By inverting Ω_t, we can now solve explicitly for firms' price-cost margins, given the assumption of Nash-Bertrand competition between firms.

$$p_t^w - mc_t = -\Omega_t^{-1} s(p_t^r)\kappa_t^{-1} \tag{9}$$

Wholesale prices, market shares and κ_t are observed directly, while the elements of Ω_t are functions of the estimated demand parameters. Marginal costs can be backed out by rearranging and using the demand estimates.

$$\widehat{mc}_t = p_t^w + \widehat{\Omega}_t^{-1} s(p_t^r)\kappa_t^{-1} \tag{10}$$

We can allow for different types of strategic conduct by adapting Ω_t. By treating each product as a stand-alone firm, we can back out product margins that are solely due to differentiation, while Nash-Bertrand conduct between firms captures both the product differentiation effect and the additional market power stemming from firms having control over several brands.

5 Estimation

The retail monopoly keeps the prices of all beers and the number of beers on offer fixed in between issues of product catalogs. Ackerberg and Rysman (2004) caution that if we included such periods we would attempt to identify price elasticities without actually observing price changes or the entry and exit of products. We therefore estimate demand using observations only from the periods when prices are permitted to change.

When defining the total market, we keep in mind that Swedish beer sales vary substantially over the seasons with peaks in summer and winter. Defining the market as a fixed number of liters per capita would therefore yield substitution to the outside good that is driven by seasons, and not by prices. Since wine sales follow a similar seasonal cycle, and is the other good available in the Systembolaget stores, we define the total market as the total number of liters sold of both beer and wine in the outlets of Systembolaget.

To estimate the parameters in (3), we follow the algorithm of BLP. Before describing the specifics of our estimation, however, we have to address the endogeneity of prices.

5.1 Instruments

ξ_{jt} is unobserved by the econometrician and is typically positively correlated with the price of product j. As the unobserved product attribute increases, consumers' valuation of the beer rises and so does their willingness to pay. The producer of beer j observes ξ_{jt} and incorporates this into the pricing of the product. The resulting positive correlation between prices and the error term biases the estimate of α downwards.

Since we lack comprehensive firm-specific information on cost shifters, and because

Systembolaget's price setting does not allow for any regional variation in observed prices, our set of potential instruments is limited to those assuming the location of beers in characteristics space to be exogenous. More specifically, we use the instruments proposed in BLP (1995) for each type of beer. The excluded instruments for each beer's price are obtained by summing the characteristics of all beers of the same type, i.e. ales, dark and light lagers, belonging to the same firm and by summing the characteristics of all beers of the same type belonging to all other firms. We also include the number of beers of the same category held by each firm and the number for beers owned by all other firms. For a motivation of this approach, see for instance BLP (1995) or Nevo (2000).

5.2 Estimation Algorithm

With the level of aggregation of our market data, we do not observe the purchasing decisions of individuals directly. Therefore, we estimate the parameters in (3) by drawing 120 observations[12] from the empirical distribution of Swedish total household income (age twenty and above). As we do not have information about the distribution of consumer tastes, we set $\Sigma = 0$[13]. We estimate the vector of parameters $\theta = [\alpha,\ \beta,\ \pi]'$ by efficient GMM and split the problem into a linear and nonlinear part, as in Nevo (2000). Let θ_1 denote the parameters entering linearly and let θ_2 denote the remaining nonlinear parameters.

At each iteration k of the algorithm, we use the Berry (1994) inversion to obtain the vector of mean utilities, δ^k that matches the aggregated simulated market shares, s_{jt}, with their observed counterparts, S_{jt}. BLP show that δ^k can be solved for with a contraction mapping that is guaranteed to converge.

$$s(\delta^k; \theta) = S$$

As Nevo (2000) shows, given δ^k, we can obtain the sample estimate of the unobserved

[12] We have simulated up to 700 households, but the estimates did not change substantially.

[13] We initially assumed a multivariate normal distribution for v_i and a diagonal Σ, but found that the estimated coefficients were negligible. Since we use the Simplex method, which is "derivative-free", we chose to drop Σ, even though the inclusion might aid in smoothing the objective function. The payoff in terms of preserved degrees of freedom seemed more relevant to us.

product characteristic, ω, by using a linear instrumental variables estimator.

$$\omega(\theta) = \delta^k - X_1\theta_1$$

X_1 contains the observable characteristics entering linearly. We then form the GMM objective function, $\omega(\theta)'ZWZ'\omega(\theta)$, where W is the weighting matrix and Z is the matrix of instrumental variables. We use the simplex method to determine the parameter values minimizing the GMM objective.

$$\widehat{\theta} = \arg\min_{\theta} \omega(\theta)'ZWZ'\omega(\theta) \tag{11}$$

In the first step of the GMM estimation, we assume that the errors are homoscedastic and therefore set $W = (Z'Z)^{-1}$. In the second step[14], we use the estimated errors to form the optimal weighting matrix, W^*, allowing for arbitrary correlation on the product level. Thus, $W^* = (Z'\widehat{\Omega}_c Z)^{-1}$, where we define $\widehat{\Sigma}_j = \omega_{j\cdot}\omega_{j\cdot}'$ and

$$\widehat{\Omega}_c = \begin{pmatrix} \widehat{\Sigma}_1 & & \dots & & 0 \\ \vdots & \ddots & & & \vdots \\ 0 & \dots & \Sigma_j & \dots & 0 \\ \vdots & & & \ddots & \vdots \\ 0 & & \dots & & \Sigma_{J_T} \end{pmatrix}.$$

5.3 Results

We first discuss the logit and instrumented logit results that we report in Table 4. In both specifications, the price coefficient is negative and statistically significant. The instrumented price coefficient is almost four times as large as its uninstrumented counterpart, which tells us that endogeneity of prices in our data is a substantial issue. This is mirrored in the mean ownprice elasticities at the bottom of the table. According to the logit estimation, demand is very inelastic and around sixty percent of all observations are

[14]We found that updating the weighting matrix repeatedly does not change the estimated parameters significantly after the first update.

estimated to have elasticities of magnitudes lower than one. In the instrumented specification, however, this fraction of outliers drops to zero and the average ownprice elasticity is close to four, which seems more reasonable.

Most of the other coefficients have the same signs and are of comparable magnitudes. The ale coefficient is positive in the instrumented specification and negative in the logit estimation. As these beers tend to be imported and have prices above the average market price, we view a positive coefficient as more reasonable. Finally, the Sargan test of overidentifying restrictions does not reject the orthogonality of our instruments. Taken together with the finding that the instrumented price coefficient is substantially greater than its logit counterpart, we take this as indication that the instruments are both valid and relevant.

The random coefficient logit estimates indicate that consumers become less price sensitive as their income rises. This is apparent from the positive price-income coefficient. As income increases, however, consumers also attach lower value to beer, because the coefficient on the interaction of income and a constant is large and negative. Given that the outside good is wine, this seems a reasonable outcome.

To allow demographics to matter for product characteristics, we estimate random coefficients for bitterness and alcohol, which we found to be the two taste characteristics with the biggest impact. Wealthier consumers prefer beers that are relatively bitter and dislike beers with a high alcohol content. Given the linear coefficients, exactly the opposite holds for consumers that are located at the lower end of the income distribution.

In comparison to the instrumented logit estimates, the average ownprice elasticity more than doubles. At first brush, this may seem like a high number. Note though that the institutional setting of the Swedish beer market pushes up prices along the demand curve considerably by adding sizable charges to the wholesale price. The average difference between a beer's retail and wholesale price amounts to 23 SEK per liter or roughly 65 percent of the retail price. In light of this, we believe that higher elasticities are a more convincing result for this particular market.

[Table 4 about here]

To further gauge if demand estimates are reasonable we can also consider the producer markups, $(p^w - mc)/p^w$. The implied markups correspond closely to the magnitudes of the estimated ownprice elasticities. As seen in Table 5, the logit specification yields unreasonably large markups given the market setup and many estimated markups that are greater than one. For the instrumented specifications, these outliers are negligible and markups move into more reasonable ranges.

We distinguish between the markups stemming from pure differentiation and from multi-product firm pricing, which also takes into account the additional market power that firms derive from selling a portfolio of products. A comparison between the "differentiation" and "multi-product" columns in Table 5 points to beers with relatively high markups being more likely to be controlled by firms with wider product portfolios. Beers with below average markups hold on average 19 brands, while above the average markup the mean portfolio size increases to 30.

For the random coefficients specification, the average markup is close to 14 percent, while beers located in the right tails of the distribution boast markups between 23 percent and 29 percent.

[Table 5 about here]

As we already argued for the ownprice elasticities, given the market setting, these numbers seem reasonable to us. It would be surprising to see larger markups for the majority of brands with retail prices being raised considerably by the retailer and the government's taxation scheme. Furthermore, several features of the retail environment at Systembolaget point in the direction of making demand more price sensititive. Beers are given the same shelf space in a store (rather than dominant brands paying to have larger space or end-of-aisle displays) and are organized according to price in stores and in catalogs. These factors should limit producers' ability to earn higher margins on their beers. At the time of the merger, Spendrups is the only major player that is listed on the Swedish stock market. It's operating margin for 2000 was 9.3 percent. This reflects profits from its other fields of sales as well (low alcohol beer and carbonated soft-drinks), but is indicative of that the relatively low producer markups are in the right ball-park.

Table 6 shows an excerpt from the estimated elasticity matrix for the last period before the merger is consummated. We have included the largest brands in terms of sales from the merging parties, Pripps and Carlsberg, Galatea (the acquirer of the divestitures) and some beers with big market shares brewed by firms not directly involved in the merger. The rows of the table are indexed by j and the columns by k. Thus, the entry in the second row and third column, for instance, shows a predicted increase in the market share of Norrlands Guld of 0.174 percent in response to a 1 percent price hike by Falcon. Examining the table in more detail shows that the strengths of our estimates lies with

[Table 6 about here]

the deviation of the crossprice elasticities from their IV-logit counterparts. The pattern of crossprice elasticities is intuitively appealing. Products that are close in characteristics space are closer substitutes than those which are further apart. As an example, consider Millenium and Norrlands Guld. The observable product characteristics of these two beers are identical, except that Millenium has a sweetness rating of 2, while Norrlands Guld has a rating of 1. The market share of the latter is predicted to rise by almost 0.9 percent in response to a 1 percent price increase by Millenium. The other beers with crossprice elasticities of comparable magnitude are close to Norrlands Guld in product space, as well. These beers are Pripps Blå, Three Towns Fat and Lapin Kulta.

Analogously, Starorbno is also a light lager, but it has a bitterness rating of 9, while the other light lagers in Table 6 have a rating of 5. On a scale from 1 - 12, this sets these beers quite far apart. As a consequence, Starobrno is not a very close substitute for the other light lagers. Overall, we find that the estimated substitution patterns are plausible and form a reasonable base for simulating the outcome of the Pripps and Carlsberg merger.

6 Merger Simulation

Having backed out marginal cost estimates under multi-product Nash-Bertrand firm conduct, we can finally perform the merger simulation. To answer this question, we compare two scenarios: a counterfactual merger between the two firms, without any compulsory

changes to the joint portfolio of beers, and the actual merger with the divestitures imposed by the Swedish competition authority. We use the set of brands and pre-merger ownership pattern for November 2000 as the basis for this exercise.

We take the estimates of marginal costs and unobserved product characteristics as given in our simulations. The post-merger equilibrium prices solve

$$\widetilde{p}^w = \widehat{mc} - \widetilde{\Omega}^{-1}(\widetilde{p}^r)\widetilde{s}(\widetilde{p}^r)\kappa^{-1}, \tag{12}$$

where the entries of $\widetilde{\Omega}$ reflect the post-merger ownership outcomes in the two scenarios. We arrive at the equilibrium prices by taking pre-merger prices as the initial guess for the solution to (12) and then iterate until convergence. This can be thought of as iterating over firms' best responses to price changes by all other firms, until no firm has an incentive to deviate.

Table 7 shows the market-share weighted relative price changes resulting from the merger in the two scenarios. A ratio above 1 implies that prices increase and below 1 that they fall. Forcing the merging parties to divest the selected beers generally lowers the overall price increases resulting from the merger of Pripps and Carlsberg. Using the RC-logit specification, prices are predicted to increase by 1 percent without divestitures, whereas they are predicted to increase by only 0.4 percent when divestitures are considered. Thus, the divestitures cut the predicted price increase by more than half. The fact that both equilibria are associated with modest price increases is due to the relatively high ownprice elasticities, which, as we have argued previously, are largely driven by the institutional setup of the Swedish beer market. Focusing on beers produced by Carlsberg after the merger, so this includes beers produced by Pripps before the merger, in row 2 we see that the predicted price increase is 2 percent without divestitures and 1.3 percent with the divesting of beers. The divested beers themselves are predicted to raise prices by 1.5 percent if they were to be kept by Carlsberg-Pripps but lower prices by about 2.4 percent if divested to Galatea.

Turning to the row showing the predicted relative price changes for Galatea products, we can deduce that Galatea was well chosen as a recipient. Recall that we are referring

to the post-merger ownership structure here. Thus, the scenario with divestitures moves all the divested beers to Galatea, while the scenario without divestitures leaves Galatea's product portfolio unchanged. Comparing the relative price changes in rows three and four for the scenario with divestitures shows that Galatea derives almost no additional market power from absorbing the divested beers. If the divestitures complemented its existing portfolio of products well, the relative price change of Galatea's grown portfolio would be substantially higher than the predicted relative price change of the spinoffs alone. This is not the case, however, which strongly suggests that the choice of Galatea as a recipient for the divested beers aided in limiting price increases resulting from the Carlsberg-Pripps merger.

In the last row, we note that prices of beers not directly involved in the merger are little affected. As seen in Table 6, the cross-price elasticities between brands are non-trivial. The small price increases for beers not directly affected by the merger are thus largely due to the small predicted price increases of beers sold by the the merging parties.

Let us now compare our simulated effects to the time series evidence that we considered in Section 2. While there are concerns about our ability to capture the causal effect of the merger on prices using the methods of Section 2, we note that all specifications pointed to small price effects of the Carlsberg-Pripps merger. If the merger was associated with large price increases we would have needed large drops in marginal cost or large negative demand shocks to counteract an incentive to raise price. We have not found any plausible candidate to such large shocks. Thus, we are confident that the time series points to very moderate price effects of the merger, even if we do not want to put to much faith into any one of the specifications.

The RC-logit estimates clearly match the low price effects of the merger. In comparison, the logit results, reported in the first columns of Table 7, point to much greater price effects. Time and computational constraints have implied that logit and nested logit have been seen as the main alternatives for merger simulations (see for instance Peters (2006) or Weinberg (2011)). However, falling computing costs are likely to make RC logit easier to implement and we take the ability of the RC logit to match the limited price increases

observed in this market as encouraging. We also note that in this particular case the predicted price increases from the IV-logit are rather close to those of the RC logit. This result stresses the role of finding valid instruments in the case where one opts for using a logit estimation.

For reasons explained above we do not put much trust in the logit estimates reported in the first two columns. Even so, one might view them as a robustness check on what the price effects would be if demand were less elastic. We then note that the divestitures have an important effect on the estimated price increases also in this case - divestitures lower predicted price increases from 4.3 to 2.1 percent.

[Table 7 about here]

7 Conclusion

There are important limits to how much can be learnt from one single case study of a consummated merger. Let us nevertheless highlight a few findings from our study which we believe are of more general interest. Firstly, divestitures and other remedies are a crucial part of merger control. If ex-post merger reviews are used to analyze whether merger policy is effective or not, they need to be careful in how they deal with remedies. For mergers that are seen as problematic, remedies are the rule, rather than the exception. Despite this, remedies have been conspicuously absent from ex-post merger reviews. We put them center stage and show that they had an important impact on the predicted price changes of the Carlsberg-Pripps merger. Secondly, while RC-logit is seen as superior to logit and nested logit by economists, previous ex-post evaluations have typically used these more restrictive demand specifications. In our case RC-logit provides a much better match with actual price changes than logit. With falling complexity of implementing demand systems, that allow for richer substitution patterns, we should not discard merger simulations based on the criticism that too restrictive methods are being used.[15] Finally,

[15]For instance access to consumer level data on purchases of differentiated consumer products is now common. The tools to estimate a random coefficient logit demand system on such data are now available as a canned routine in STATA.

the case study also points to that a reliance on simple measures of concentration to decide what mergers to block, can lead astray. Despite the merger of two parties, where each had close to a quarter of the market, the price effects were small. In this case, high demand elasticities served to keep the price effect of the merger muted. The high elasticities were plausibly generated by taxes pushing prices far up along the demand curve and a retail setting with an explicit aim to provide a level playing field. These institutional features are specific to our data. The benefit of merger simulations, and its simplified cousin in the form of upward pricing pressure (UPP, see for instance Farrell and Shapiro (2010)), is that it forces us to be explicit about these institutional features.

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Table 1: Market statistics, Swedish market for beer with alcohol content above 3.5 percent (ABV)

		Market Share by Volume (selected groups)								Prices (quantity weighted)				
Year	HHI	Carls-berg	Pripps	Spen-drups	Koppar-bergs	Galatea	liters sold (millions)	average con-sumer price	average prod-ucer price	Carls-berg	Pripps	Spen-drups	Koppar-bergs	Galatea
1996	0.210	0.288	0.251	0.230	0.033	0.008	85.47	37.08	9.979	10.13	9.27	9.73	7.15	15.26
1997	0.204	0.260	0.250	0.249	0.037	0.004	95.73	29.52	10.257	10.63	10.20	9.54	8.34	15.62
1998	0.201	0.259	0.256	0.233	0.047	0.003	98.62	28.68	9.667	10.35	9.30	9.44	7.90	15.24
1999	0.210	0.302	0.257	0.193	0.054	0.003	117.47	27.58	9.064	9.13	8.93	9.43	7.31	14.19
2000	0.195	0.329	0.168	0.183	0.099	0.004	130.29	26.58	7.935	8.04	8.69	8.43	5.68	12.15
2001	0.235	0.406	-	0.187	0.064	0.077	143.40	25.92	7.842	8.15	-	8.45	6.66	7.86
2002	0.235	0.396	-	0.214	0.055	0.103	153.51	25.81	7.885	8.03	-	8.38	6.71	7.29
2003	0.194	0.311	-	0.193	0.176	0.118	164.77	24.53	7.131	7.57	-	8.25	4.14	6.59
2004	0.212	0.349	-	0.164	0.191	0.124	163.84	22.24	6.466	6.14	-	8.16	4.30	6.09
mean	0.214	0.325	0.2364	0.208	0.086	0.070	129.13	27.41	8.41	8.63	9.29	8.95	6.45	9.43

Note: Prices in real Swedish krona (base year 1996).

Table 2: Market shares and prices of beers that were divested as a result of the Carlsberg-Pripps merger

Year	Market share by volume	Average price (quantity weighted)	Market share by volume (including Lapin Kulta that was divested in Nov. 2002)
1996	0.093	8.756	0.149
1997	0.078	9.173	0.136
1998	0.091	8.703	0.143
1999	0.073	8.777	0.110
2000	0.061	8.607	0.092
2001	0.056	8.485	0.090
2002	0.047	8.849	0.080
2003	0.035	9.187	0.061
2004	0.031	9.492	0.053
Mean	0.064	8.836	0.103

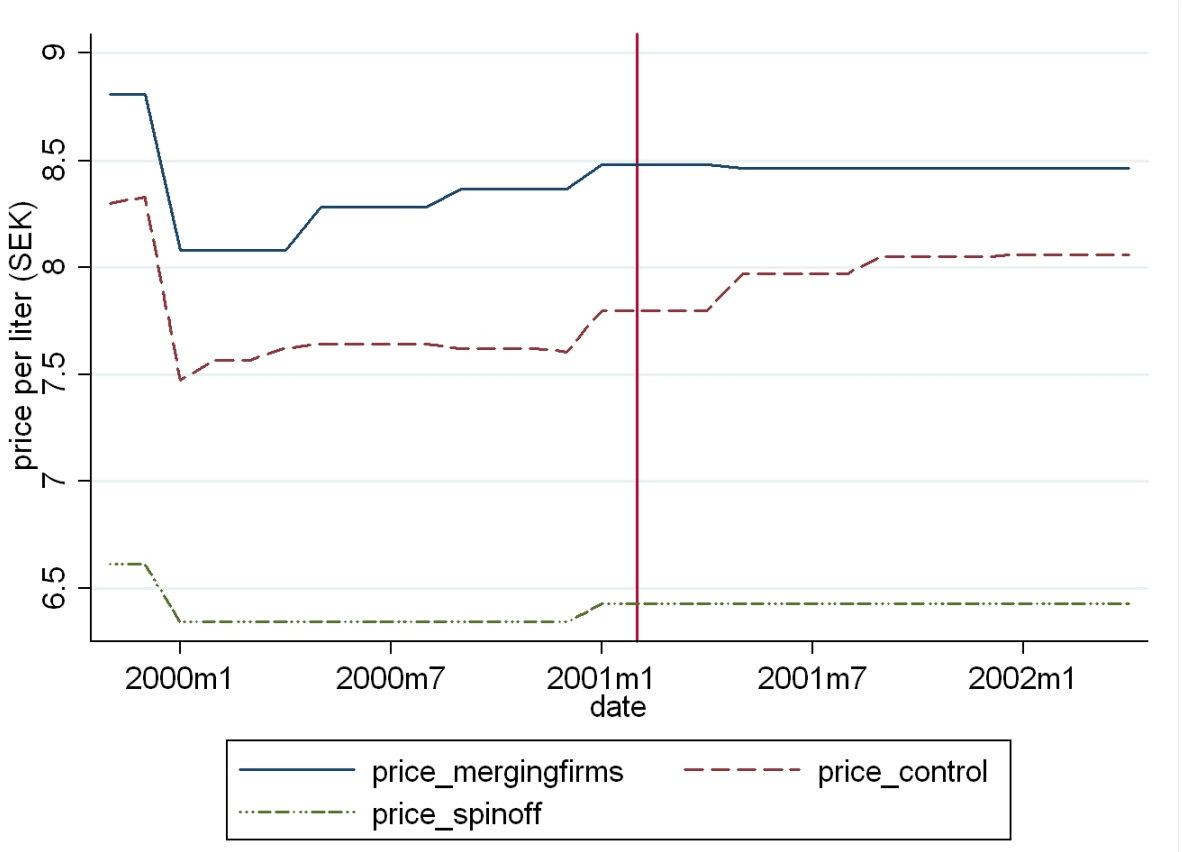

Figure 1: Quantity weighted price of beer sold by the merging firms, divested beers and a control group before and after the Carlsberg-Pripps merger in February 2001.

Table 3: Difference-in-Difference Estimation

	(1)	(2)	(3)	(4)
	All in treatment and control	Light lager	Dark lager	Ale
Postmerger	0.036	0.037	-0.020	0.028
	(0.010)***	(0.011)***	(0.029)	(0.013)**
Postmerger*merge	-0.053	-0.057	0.013	0.026
	(0.016)***	(0.018)***	(0.034)	(0.013)*
Postmerger*divest	-0.063	-0.068	-0.209	-0.014
	(0.017)***	(0.018)***	(0.077)***	(0.028)
Constant	2.257	2.180	2.374	2.972
	(0.004)***	(0.004)***	(0.009)***	(0.006)***
Observations	4685	4111	149	425
Number of products	288	244	12	32
Adjusted R^2	0.05	0.06	-0.04	0.07

Note: Regressions include fixed effects at the beer (bar-code) level. Standard errors are clustered by brand. The pre-merger period is November 1999 up to, and including, November 2000. The post-merger period stretches from April 2001 to April 2002. *significant at 10%, ** significant at 5%, *** significant at 1%

Table 4: Estimation Results

Regressor	Logit	IV-Logit	RC-Logit	
			linear coefficients	interaction with income
Price per Liter	-0.0540	-0.2188	-0.8513	3.1660
	(0.0098)	(0.0319)	(0.4158)	(2.4842)
Richness	0.2231	0.2379	0.3034	-
	(0.0542)	(0.0616)	(0.1087)	
Sweetness	-0.0485	-0.0568	-0.1258	-
	(0.0689)	(0.0726)	(0.1063)	
Bitterness	-0.1796	-0.2699	-1.8586	12.7820
	(0.0460)	0.0551	(1.1231)	(8.2925)
Alcohol as % of Vol.	0.1603	1.0214	1.7299	-1.9440
	(0.0934)	(0.2027)	(3.9334)	(26.402)
Ale	-0.8566	1.3680	2.7836	-
	(0.2821)	(0.4971)	(0.8879)	
Dark Lager	-1.3474	-0.7178	-0.2575	-
	(0.4156)	(0.4251)	(0.5447)	
Can (33 cl)	0.2663	1.5284	2.8412	-
	(0.2854)	(0.4044)	(0.6958)	
Can (50 cl)	1.4161	0.2162	-0.8331	-
	(0.2402)	(0.3528)	(0.6615)	
Bottle (50 cl)	-0.2309	-0.8958	-1.4976	-
	(0.1991)	(0.2674)	(0.4574)	
Advertising	0.4848	0.3774	0.3432	-
	(0.0558)	(0.0634)	(0.0969)	-
Constant	-7.0176	-5.2530	77.4550	-497.2400
	(0.4411)	(0.7558)	(24.9)	(156.51)
$\bar{\eta}_{jj}$	-1.059	-3.8324	-8.3214	
% of Obs. $\eta_{jj} > -1$	60.18 %	0 %	0.25 %	
Sargan $\sim \chi^2(11)$	-	4.2188	-	
J-Statistic $\sim \chi^2(10)$	-	-	10.3650	

Note: The estimation period covers the pre-merger period from January 1996 to November 2000. Standard errors are given in parentheses and are clustered at the product level.

Table 5: Estimated Producer Markups

	Logit	IV-Logit		RC-Logit	
		differentiation	Nash-Bertrand	differentiation	Nash-Bertrand
min	0.1489	0.0367	0.0367	-0.0186	-0.0186
1st percentile	0.3438	0.0847	0.0848	0.0500	0.0502
5th percentile	0.5302	0.1289	0.1308	0.0657	0.0678
25th percentile	0.8452	0.2018	0.2085	0.0941	0.1023
median	1.1584	0.2712	0.2858	0.1193	0.1344
mean	1.1867	0.2757	0.2928	0.1237	0.1395
75th percentile	1.4613	0.3344	0.3605	0.1474	0.1691
95th percentile	1.9303	0.4442	0.4762	0.1939	0.2309
99th percentile	2.5788	0.6152	0.6362	0.24551	0.2828
max	9.757	2.3929	2.4069	0.7899	0.8015

Note: The table presents producer markups, $(p_t^w - mc_t^w)/p_t^w$, implied by the estimates in Table 4. We have used perfect knowledge of the retail monopoly's pricing rule, (8), to back out marginal costs at the producer level.

Table 6: Own- and Crossprice Elasticities for Selected Beers

	Carl.^{c}	Norr.	Falc.^{c}	Pripps^{p}	TT^{d}	Hein.	Bass^{d}	San M.	Lap.^{d}	Arbo.^{d}	Star.^{g}	Blå^{p}	Mill.^{c}
Carlsberg^{c}	**-7.338**	0.192	0.161	0.018	0.040	0.080	0.004	0.039	0.119	0.006	0.008	0.103	0.361
Norrlands Guld	0.089	**-6.220**	0.174	0.021	0.061	0.040	0.002	0.039	0.230	0.003	0.003	0.100	0.886
Falcon^{c}	0.104	0.243	**-5.871**	0.019	0.047	0.068	0.003	0.040	0.151	0.005	0.006	0.106	0.494
Pripps Blå^{p}	0.103	0.262	0.173	**-6.534**	0.050	0.064	0.003	0.041	0.162	0.005	0.006	0.106	0.547
Three Towns Fat^{d}	0.097	0.317	0.176	0.020	**-5.149**	0.051	0.002	0.040	0.197	0.004	0.004	0.104	0.713
Heineken	0.100	0.108	0.132	0.014	0.027	**-8.083**	0.006	0.033	0.068	0.008	0.011	0.090	0.171
Bass Pale Ale^{d}	0.092	0.078	0.114	0.011	0.021	0.103	**-9.407**	0.029	0.049	0.009	0.012	0.079	0.112
San Miguel	0.105	0.226	0.168	0.019	0.045	0.072	0.004	**-9.610**	0.141	0.006	0.007	0.105	0.450
Lapin Kulta^{d}	0.089	0.370	0.174	0.021	0.061	0.040	0.002	0.039	**-8.835**	0.003	0.003	0.100	0.884
Arboga 7.7^{d}	0.097	0.093	0.124	0.013	0.024	0.101	0.007	0.032	0.058	**-4.434**	0.012	0.085	0.141
Starobrno^{g}	0.091	0.075	0.111	0.011	0.020	0.104	0.007	0.029	0.047	0.009	**-6.007**	0.078	0.106
Blå Gul^{p}	0.105	0.221	0.167	0.018	0.045	0.073	0.004	0.040	0.137	0.006	0.007	**-4.305**	0.435
Millenium^{c}	0.079	0.421	0.168	0.021	0.066	0.030	0.001	0.037	0.261	0.002	0.002	0.094	**-4.729**
IV-Logit η_{jj}	-3.577	-2.379	-2.6527	-2.8282	-2.0603	-4.617	-5.7225	-6.3885	-3.3142	-2.6024	-2.4735	-2.0101	-1.8839
IV-Logit η_{jk}	0.0242	0.0521	0.0374	0.0041	0.0101	0.0193	0.0012	0.0003	0.0324	0.0016	0.0252	0.0236	0.1097

The estimated elasticities are based on market shares in November 2000, the last period before the consummation of the merger. ^{c,p} indicates beers that are owned by Carlsberg and Pripps, respectively, before and after the merger, beers that are divested to obtain merger approval are indexed by ^{d} and ^{g} indicates beers that are owned by Galatea.

Table 7: Predicted Market-Share Weighted Relative Price Changes

Post-Merger Ownership	Logit		IV-Logit		RC-Logit	
	no divest.	with divest.	no divest.	with divest.	no divest.	with divest.
all beers	1.043	1.021	1.013	1.008	1.010	1.004
Carlsberg	1.086	1.062	1.029	1.026	1.020	1.013
Divestitures (Carlsberg & Pripps)	1.070	0.907	1.024	0.974	1.015	0.977
Galatea	1.000	0.920	1.000	0.977	1.000	0.980
all others	1.002	1.001	0.997	0.997	1.001	1.000