

Splitting the Price Effect of Private Labels

The Case of a Swedish Metropolitan Area



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Both theoretical and empirical literature provides mixed results on the impact on retail prices from the introduction of private labels, also known as store brands. In this paper we further explore the price effect on leading national brands by using a unique data set covering prices of a variety of food products in a major Swedish metropolitan area. Using information on if a retail chain markets a private label in a specified product category and whether an individual store chooses to provide the private label we are able to estimate the total price effect on national brands from private labels and to what extent it is due to any in-store price effect. We find scarce evidence that the price on market leaders depends on whether a store chooses to market a private label. However, the results suggest that private labels lower consumer prices although the magnitude significantly depends on which category studied.

Introduction

Private labels (henceforth PLs), also known as store brands, are brands exclusively sold and owned by the retailer. The brand may be the retailer's own name or a name created exclusively by the retailer and may be produced by own facilities or by sub-contracted firms. PLs were launched on the food market as early as the beginning of the 20th century in western economies but the large expansion of PLs since the 1990s profoundly altered market power and innovation within the food chain and so gained scholars' attention. The penetration and market shares of PLs are now particular high in western countries and foremost in Western Europe where the PL market share in many countries reach more than 30 percent while other western countries as Australia, Canada and the United States have more modest market shares of roughly 20 percent (The Nielsen Company, 2014). The scope of PLs have also widened as the PL portfolio nowadays consists of products along the quality ladder.

The impact of PLs on competition, assortment and innovation has parallel attended substantial research interest illuminating PLs various impact on the market. First, PLs make retailers not only a customer but also a horizontal competitor with food industry and so gain buying power at the whole sale level (Steiner, 2004). Engaging in horizontal competition with manufacturers enforce retailers' market power upstream and may therefore squeeze mark-ups in the food industry. The food industry has therefore to employ a strategy due to the challenges and opportunities that the penetration of PLs entails and for some manufacturers PLs may come as a blessing. For instance, producing PLs may create an opportunity to expand production for manufacturers not carrying a leading national brand (Tarzijan, 2004). PLs may spur product innovation as they force manufacturers to differentiate their brands in order to side-step the competition from PLs. However, this opportunity has partly been curtailed later years by the expansion of premium PLs with a large degree of "own innovation". The progress in information technology has made retailers key players in innovation of products and made them more competitive in producing novel and high quality PL and not just generic products. Second, PLs also differentiate chains as they are exclusive to the retailer. If consumers do not consider PLs across retailers as perfect substitutes PLs may lower horizontal competition at the retail level. Successful PLs may by so enhance consumer loyalty

towards the retailer and so increase profit margins which has shown validity both in theory (Corstjens and Lal, 2000) and empirics (Ailawadi et al., 2008).

In this paper we study how PLs affect the consumer prices of national branded products (henceforth NBs) by investigating how the presence of PLs effect food prices for a sample of market leaders and food categories in a Swedish metropolitan area. Statements from food industry and authorities regarding PLs impact on the Swedish market resonance the literature. The Swedish food industry considers the demand for PLs as one of the most important consumer trend later years (The Swedish Food Federation, 2013a and 2014). The Swedish competition Authority states that retailers are strengthening their bargaining position with the help of PLs in a number of ways. They do so by controlling shelf space and in store exposure and so the positioning of PLs vis-à-vis NBs to consumers at the same time as PLs enable retailers to acquire knowledge about processing costs gives them an upper edge in price negotiation with the industry (Konkurrensverket, 2009). Most Swedish food processors lately stated that their profitability for PLs are lower than their own major NBs and that the expansion of PLs will lower their profitability as well as vulnerability due to retailers may easily replace as PL manufacturers (The Swedish Food Federation, 2013b). This is in contrast with an earlier statement that by the majority of food processors that they had comparable high profitability in making PLs (The Swedish Food Federation, 2011). The change in profitability may be a result of the expansion of PLs upward in the quality ladder which can increase retailers' bargaining power versus food industry. Our objective is to disentangle the effect PLs have on consumer prices from in-store-pricing and consolidating market power upstream. We focus solely on standard PLs, also known as "me-too products", and their price effect on leading national brands. It is by far the largest PL category on the Swedish market and marketed as close substitutes of market leaders. They are hence likely close in product space, quality space, to market leaders, and arguably so fierce competitors to leading NBs. Studies covering other markets also suggest that standard PLs have the largest price effect on NBs. Standard PLs can therefore be hypothesized to have the most profound price effect and so have the biggest impact among PL categories on both consumer welfare and the food industry.

The paper continues with a representation of the Swedish food retail market and the prevalence of PLs. Thereafter follows a presentation of previous studies of the effect PLs has on consumer prices. Data and descriptives are then presented followed by regression analyses. The paper ends with conclusions and summary.

The growth and presence of PLs on the Swedish food market

The Swedish food retail market is dominated by a few retailers that all sell PLs. ICA has about half of the retail market and the three largest retail chains have together a market share of approximately 85 percent (Dagligvarukartan, 2015). The degree of vertical integration does however differ. ICA is not a

fully integrated retail chain as it consists of independent stores with a common wholesale organization and partly a joint marketing operation. Coop and Axfood are also major players with market shares of approximately 20 percent and a little more than 15 percent, respectively. Coop is a fully integrated consumer cooperative while Axfood's hard discount stores (Willys) are fully owned by Axfood and constitutes the majority of the retailer's sales. The majority of their more service oriented stores (Hemköp) are owned by Axfood while Tempo and Handlarn are franchised convenience stores within the Axfood sphere. At the fringe operates three fully integrated retail chains. Bergendahls have a market share of about six percent while the hard discounters Netto and Lidl have market shares of approximately four percent and three percent, respectively. Gasoline stations, convenience stores owned by the chain 7-eleven and small independent convenience stores make up the rest of the food retail market.

PLs have a long history on the Swedish retail market but have had a remarkable growth the last twenty years just as in many other western economies. PLs contributed to a quarter of all sales in Swedish retail in 2014 measured in terms of value (Statistics Sweden). The Swedish figure is close to the median in Europe but far from PL market shares in countries such as Switzerland, Spain and the UK with shares of more than 40 percent (The Nielsen Company, 2014). PLs are now present in almost all food categories and found among more food products within categories. Retailers now carry PLs in major generic food products as vegetables and fresh meat at the same time as PLs expand in highly processed food categories as ready-to-eat products. According to Sayman and Raju (2004) there is an "umbrella effect", i.e. a spill-over effect, that partly explains the expansion, as PL sales in one food product category increase by the number of PLs in other categories.

The growth of PLs in the major retailers took off as low priced and low quality PLs, so-called discount brands, partly to face the competition from Netto and Lidl who entered the Swedish retail market in the early 2000s. The PL market share in terms of value in Swedish food retailing doubled in the short time span 2003 until 2010. All retailers since 2010 sell PLs but the scope differs significantly across retailers. The sales at Lidl consist mostly of PLs while PLs only entails a small fraction of Netto's sales while Bergendahls introduced PLs first in April 2010. PLs have not only continuously broadened across product categories but also along the quality ladder. The sales of standard PLs with a higher quality than hard discount PLs have primarily expanded during the 2000s. Standard PLs are as mentioned marketed as close substitutes to NB market leaders in order to persuade consumers to switch their purchases of leading NBs to PLs. Standard PLs economic value is important as it is the main PL category in Sweden in terms of value and constitutes more than half of all PL sales (Konkurrensverket, 2016). Premium PLs have parallel been introduced and gained larger market shares and so contributed to the overall growth of PLs. Premium PLs include products demanding considerable product innovation above many NBs in the quality ladder as well as products where the quality mainly emanates at primary production stage such as the credence quality "organically produced". PLs constituted about 20 percent of the sales in the major retailers ICA and Coop while PLs corresponded to as much as 25 percent at Axfood (Artman et

al., 2012). In 2015 standard PLs constituted as much as 80 percent of PL sales among the major retailers ICA and Axfood and 70 percent in the second largest retailer Coop.¹ As the three retailers together have a market share of a little more than 85 percent, roughly 20 percent of all sales of food on the Swedish retail market are standard PLs.

Private labels and their price effect on national brands

The price effect of private labels on NBs is ambiguous both regarding theoretical and empirical evidence although the empirical evidence somewhat favor a price increasing effect. Theoretical contributions support that introducing products on a market, as PLs, increase competition and lower prices depending on product differentiation and cross-price elasticities between PLs and NBs as shown by Choi and Coughlan (2006). The price effect has also theoretically shown to crucially depend on price leadership between retailers and manufacturers (Choi and Fredj, 2013). Perloff et al. (2012) theoretical contribution supports that the in-store price effect on NBs and whether a store hold a PL is indeed sensitive to parameters as in store-costs and local demand. Ward et al. (2002) offers both economic theory and empirical evidence inconsistent with conventional industry wisdom that PLs lowers NB prices and promote product differentiation and innovation.

There tends to be a discrepancy between older and later empirical studies. Older empirical studies (as Putsis [1997], Cotterill and Putsis [2000], Chintagunta et al. [2002]) have tended to find a price decreasing effect on NBs from PLs. However, evidence found in later studies mainly support that PLs have a price increasing effect on NBs. Bontemps et al. (2008) for instance find that a larger PL share increase NB prices and so does Ward et al. (2002). Others, as Bonfrer and Chintagunta (2004) find indeed mixed results across product categories where a price increasing effect is found in just as many product categories as where categories where a price decreasing effect is found. Cohen and Cotterill (2011) likewise present ambiguous results on retail prices, in their case milk prices. Empirical literature shows that results not only widely differ across product categories, but also that the effect differs across PL categories. Bontemps et al. (2008) found for instance that standard PLs have a larger price effect on NBs compared to both premium and low-price PLs.

The evidence regarding PLs effect on consumer prices is hence mixed and point out that the effect may significantly depend on the quality of PLs as well as which product group the study concerns. More, the price effect seems to be time dependent and may explain why results tend to differ between later and earlier studies. When PLs are introduced, manufacturers initially lower the prices on NBs but increase them later on as the competition effect is reduced by the exit of second-tier NBs. More, in order to persuade consumers to try PLs, price competition may be more aggressive at the introduction. A while after PL entry, leading NBs change pricing strategy and drop “switchers”, i.e. consumers more or less

¹ Figures revealed at a seminar about private labels at the Swedish Government in January 2016.

indifferent regarding NBs and PLs, and focus on less price sensitive “loyal” NB consumers. The change in pricing strategy will therefore increase prices to retain profits. The fraction of “switchers” and “loyals” within product categories explains both differences in penetration of PLs and price effects across product categories according to the theoretical set-up in Gabrielsen and Sørsgard (2007). For instance, it crucially depends on the elasticity of substitution between PLs and NBs. For some categories, there will be no price effects, in others prices on NBs rise. Another plausible explanation for the inconclusive empirical evidence is that data used in studies significantly differ in terms of quality making the possibility of inference to differ across studies. Some studies for instance use retail scanner data, others use household data at the same time as the aggregation level differs.

The above mentioned studies concern the US market but there are a few studies that have dealt with price effects on the Swedish market in the period 2001-2004. It was a period when PLs had not gained significant market shares and discount PLs had almost just as large market shares as standard PLs. Anselmsson et al. (2008) used aggregated household panel data and found that the average price within a product category decrease with an increased PL share when they studied how the average price across 35 product categories evolved. The price effect on NBs is though unclear as they consider an average price effect not distinguishing between PLs and NBs. A price lowering effect can for instance be attributed to discount PLs gaining market shares. Swedish Competition Authority (2005) used scanner data for 146 retail categories in order to among other things study the price effects on NBs from the presence of discount and standard PLs, respectively. They found that the price of NBs increases with an increased PL penetration and that the price effect from standard PLs are significantly larger than the effect from discount PLs which is in line with the notion that standard PLs are closest in product space to NBs. They do not yet have information on any price effects on individual NBs which blur any conclusions regarding the price effect as the quality and sample of NBs may differ across time. The price of NBs may increase due to differentiation and innovation among NBs in the response of PLs or that premium NBs gain or have unaltered market shares while lower priced second-tier NBs are hurt by PLs. Anselmsson et al. (2008) find for example that second-tier NBs suffered significant market share losses the short period of time 2001-2004.

Data and descriptives

Our data consist of store-prices manually registered by two research assistants in the period of two weeks in August 2010. Our data therefore departs from most other price studies that mainly use panel data as scanner data or consumer panels (Hyman et al., 2010). Although the data restrict us from direct analyzing any causal effect, the in-store observations have the virtue on carrying price information at individual stores. The data also enables us to study a market that is more mature concerning PLs and particular so for standard PLs compared to the previous studies of the Swedish market.

Prices have been collected from all stores selling food that are located in the municipalities of Malmö and Lund as well as the commuting villages (Arlöv, Åkarp and Hjärup) along the travelling route Malmö-Lund.² The part of Malmö metropolitan area included in our study had 430.000 inhabitants in 2010 and a food sales value of approximately 7.7 billion SEK.³ The area mirrors the Swedish food retail market with the exception that small retail chains have relatively large markets shares. Prices have been registered for 59 food items, specifying brand and size, a total of 226 stores. As the sample of stores includes all stores that sell food, it also includes stores that mainly sell other items than food products, as gasoline stations. Prices have been collected both for generic products as fresh meat and fresh fruit and vegetables, but the majority of the products, 51 items, are branded products which we utilize in our study. The branded items are collected in the categories candy, dairy products, breakfast cereals, pasta, breads, biscuits and table sauces as well as orange juice and a functional food drink (ProViva).⁴ Prices for standard PLs were also registered for eight food items; orange juice, ketchup, corn flakes, three pasta varieties (tagliatelle, spaghetti and fusilli) and two varieties of soured cream (gräddfil and crème fraiche). The choice of standard PLs was based upon that they should be marketed across all major retailers, i.e. Ica, Coop and Axfood with a market share of approximately 85 percent on the Swedish retail market. The pairing of NBs and PLs allows us to examine any price effect that me-too products have on NBs.

Including identical NBs in the study of course enables direct price comparisons between stores. Quality differences due to brand reputation or physical attributes between NBs and standard PLs do exist and are more or less prominent across product categories, i.e. the degree to which the PLs actually are “me-too products” may hence vary across products. It is fair to argue that some pasta products and above all the non-flavored soured creams in our study are indeed close to being perfect substitutes to the NBs according to qualities as nutrition and taste. The manufacturing of both the pasta PLs and NBs involve a standardized production process and include a few and identical ingredients - the exception being of tagliatelle where only the NB includes eggs as an ingredient. Brand loyalty may although be strong for dairy products even if physical characteristics objectively are absent between brands. Skånemejerier is a well recognized local brand and a market leader in Malmö and its surroundings which creates heterogeneity among otherwise homogenous goods. For instance, when Coop replaced dairy products from Skånemejerier with counterparts from Arla Foods they had to re-introduce the products from Skånemejerier in their assortment due to consumer protests. Barilla may also enjoy brand loyalty as

² The motivation of a narrowly defined geographical area and including all stores relies on the object to estimate local price competition which will be presented in another study.

³ In 2010, approximately 4.6 percent of Sweden’s population lived in the area and food was sold for about 169 billion SEK in Sweden.

⁴ See appendix for a full list of included items.

Barilla markets their products as somewhat premium and has been established on the Swedish market since the 1970s.

Table 1: Market leaders and private label in-store frequency

Corresponding NB	Frequency of PL	Price ratio NB/PL
Fusilli 500 gr (Barilla)	100 %	1.13
Tagliatelle 500 gr (Barilla)	98.3 %	1.10
Spaghetti 1000 gr (Barilla)	90.9 %	1.14
Cornflakes 500 gr (Kellogg's)	90.2 %	1.12
Orange juice 1 liter (Bravo)	94.8 %	1.07
Soured cream ("Gräddfil") 2 dl (Skånemejerier)	83.1 %	1.09*
Soured cream ("Crème fraiche") 3 dl (Skånemejerier)	90.0 %	1.16*
Ketchup 1250 gr (Felix)	85.3 %	1.28
Ketchup 1000 gr (Heinz)	82.5 %	1.28

Note: Only including specified sizes. Only including ICA as it is the only retail chain with corresponding PL size.

The standard PLs are as expected priced below their NB counterpart as revealed in *Table 1*, the NBs are 7-16 percent more expensive than their PL counterpart. The Barilla pasta varieties are 10-14 percent more expensive than the PLs suggesting them to be close substitutes. The PLs are also frequently marketed parallel to the Barilla pasta products as about nine out of ten stores choose to do so. The sour cream products do still reveal a mixed pattern where Skånemejerier's "gräddfil" is only about nine percent more expensive while "crème fraiche" (Skånemejerier) is 16 percent more expensive than the corresponding PL. The motivation for the price difference is unclear as both items are indeed generic products where both NBs and PLs originate from the same producer. The products also differ regarding frequency in stores as many as 90 percent provides the PL crème fraiche but only about 83 percent market a PL "gräddfil" if they sell the brand Skånemejerier.

Orange juice is a homogenous product in the sense that it only contains one ingredient, fruit juice from oranges. However, substantial price differences exist between orange juices suggesting significant quality differences. Orange juice may for instance be made from fruit concentrate or be "freshly squeezed" and so differ substantially according to taste. We include Bravo juice which is a market leader and a moderated priced "standard juice" made of concentrates that was introduced on the Swedish market as early as 1973. Bravo is marketed by the dairy Skånemejerier just as the soured creams. Bravo is only seven percent more expensive than the PLs, which also are made from concentrate, suggesting them to be indeed close substitutes. About 95 percent of the stores that provide Bravo also keep the PL. Cornflakes may as well be regarded as a fairly homogenous good with few ingredients and a simple production process. The included NB, Kellogg's, can yet be regarded as "the original brand" and may therefore have a large share of loyal consumers in the category. Kellogg's corn flakes sells at a twelve percent higher price hence comparable with the price difference Barilla on average enjoys towards its

PL counter parts. About 90 percent of the stores that sell Kellogg's also provide the PL. Ketchup can *a priori* be suggested as the most differentiated product among the items as it varies most regarding taste and has significantly more ingredients than pasta, juice, soured cream and cornflakes. We include the two dominating brands among NBs on the Swedish market, Felix and Heinz, where Felix is the market leader and Heinz may be considered as the most premium brand as it has a much higher price/quantity ratio, about 25 percent higher, than Felix in our sample. Both brands have a long history on the Swedish market with an introduction in the 1950s, and are both considered to have a considerable brand loyalty. It is also the category where we find the biggest price premium for NBs versus PLs, about 28 percent. PL ketchups are therefore arguably the least "me-too" category in the sample at least concerning Heinz ketchup as Felix ketchup price/package size ratio is close to the PLs.

Testing any price effect

We make two tests. First, we try to estimate if the store price on NBs depends on whether the store holds a corresponding PL. We label this as the "in-store price effect". As showed, not all stores within a retailer market an individual PL although it has the opportunity to do so. The choice to carry a PL may depend on local demand both for the PL and corresponding NBs as well as marginal costs as shelf space as suggested by Perloff et al. (2012). Second, we estimate the overall price effect from marketing PLs. A store may gain an advantage from a PL that their chain holds regardless if the store sells it or not as the NB may come at a lower cost due to increased buyer power at the wholesale level. It may also be that the price on NBs increases as manufacturers raise the price in order to reap consumer surplus from loyal consumers. This study is hence an attempt to disentangle the price effect that emanates from market power vertically, i.e. bargaining power, and price positioning horizontally. The former effect is more straightforward as an increased bargaining power at the wholesale level will result in lower good prices to the stores. It will so decrease marginal costs at the store level. To what degree any price reduction at the wholesale level is passed on to consumers is beyond this study, but we will gain inference whether an increased buyer power will lead to lower consumer prices.

We start to estimate the "the in-store price effect", i.e. if the price of a product differs if the store carries a PL or not. The theory of price discrimination supports that we should expect a positive effect on NB prices from the presence of a PL as NBs are priced according to brand loyal consumers' inelastic demand. We test the price effect separately for each product as previous empirical and theoretical contributions support that the price effect differs among products. More, "the in-store price effect" may be more detectable in some retail chains. When abstracting from store dummies and only including good dummies and store size as explanatory variables, we find that 99 percent of the within chain price variation is explained within the formats Willys, corresponding figure is 97 percent and 92 percent for Coop and ICA, respectively (not reported). As points of reference, corresponding R-squared statistic equals in limit 100 for the hard discount chains Lidl and Netto as well as stores belonging to Citygross

and Hemköp. The results thus suggest that prices in stores belonging to same-sized Willys (just as stores belonging to Netto, Citygross, Hemköp and Lidl) practice a common mark-up and face a common wholesale price. The stores in these formats hence do not seem to respond to competition, demand and costs at the local level. The comparative large price variation in ICA stores is plausible as they are regarded as independent stores operating within a commonly shared and owned wholesale operation. We therefore exclude Willys in one specification in order to test any PL effect among stores that to a larger degree appear to practice in-store price setting. The regression equation is specified as

$$p_{is} = \mu_i + \delta_s + \beta_j * \mu_i * pl + \varepsilon_{is} \quad (1)$$

, where p_{is} is the logged price of good i in store s , μ_i represents good dummies, δ_s denotes store dummies which control for the overall price level at the store. The variables of interest are $\beta_j * \mu_i * pl$ which is a set of dummy variables that takes the value of one if a store chooses to market the private label for each of the nine j NBs where we have information regarding if they parallel sell a PL twin. We drop observations if the good size differs from the specified size as the NB and PL then are less so substitutes.

Table 2: Measuring the in-store PL effect

	<i>I</i>	<i>II</i>
<i>pl*gräddfil (soured cream)</i>	-0.022 (-1.21)	-0.025 (-1.32)
<i>pl*crème fraiche (soured cream)</i>	0.016 (0.51)	0.012 (0.40)
<i>pl*spaghetti</i>	0.026 (0.97)	0.028 (1.05)
<i>pl*tagliatelle</i>	0.025** (2.04)	0.032** (2.16)
<i>pl*Heinz (ketchup)</i>	0.030 (1.42)	0.042** (2.36)
<i>pl*Felix (ketchup)</i>	0.030 (0.68)	0.031 (0.68)
<i>pl*orange juice</i>	0.001 (0.04)	0.002 (0.05)
<i>pl*cornflakes</i>	-0.022 (-1.22)	-0.018 (-0.91)
<i>Excluding Willys stores</i>	No	Yes
No. observations	2,209	2,075
Adj R-squared	0.96	0.96

Notes: ***, ** and * indicate a significance at 1, 5 and 10 percentage levels (t-value in brackets).

Overall, we find that the coefficients of interest are small and with a low significance. The overall low t-values may be explained by the low variation in the dependent and explanatory variables as almost all stores sell the PL and/or because prices in retail stores partly are set at the wholesale level. Including all stores belonging to ICA, coop and Willys, we find that the inclusion of a PL tagliatelle in a store assortment has a positive price effect (significant at the five-percent significance) on the price of the Barilla tagliatelle. Including the PL tagliatelle in the assortment increase the price with three percent. Excluding Willys we additionally find a positive price effect about four percent on Heinz ketchup from including a PL. The results hence support that stores price discriminate among consumers in order to

capture consumer surplus for ketchup (Heinz), the product category that likely is the most differentiated item in the sample, and Barilla tagliatelle which includes eggs as an ingredient as opposed to the PLs.

We next turn to trace any overall effect that PLs may have on NB prices which may include any effect of buyer power and consumer discrimination upstream. The expected effect is unknown as PLs are expected to lower NB prices by amplifying retailers' market power upstream but also facilitate consumer segmentation and so "pricing to consumer" which we found some evidence for in previous regressions. Lower marginal costs at the retail level will render in lower consumer prices although the magnitude of the price transmission crucially depends on demand and marginal costs regarding *both* PLs and NBs. Any price change on NBs from carrying PLs should also infer price changes on corresponding NBs in all retail chains. The introduction of PLs could therefore indirectly have an impact on the price level in stores not belonging to the major retailers and especially stores that are fierce competitors to stores belonging to ICA, Coop, and Axfood. Hard discounters are price oriented and they just as Bergendahls, which citygross stores in our sample belongs to, may have introduced standard PLs for corresponding goods. There may hence be an overlapping effect regarding the assortment of PLs which we unfortunately lack information about.

We extend our sample to include all stores in the regression and all branded products (except the PLs as they are heterogeneous across retailers). As in previous regressions, we single out the so called PL goods in the previous analysis. The regression equation is specified as,

$$p_{is} = \mu_i + \delta_s + \beta_j PLgood * major_{is} + \gamma PLgood * harddiscount_{is} + \varphi PLgood * citygross_{is} + \delta PLgood * Axfoodfringe_{is} + \rho X_{ks} + \varepsilon_{is}$$

, where the variables of interest are the interaction terms between the retail chain constellations and the goods with a PL twin that is labeled *PLgood*. Again, we include store and good dummies to account for good specific effects and the overall store price level. What we test is if prices are comparable high or low in the major chains for the *j* products that we for certain know carries a PL twin. If the estimated β and φ are positive (negative) the interpretation is that the presence of PL twins has a price increasing (decreasing) effect on market leaders. Stores belonging to either ICA, Coop, Willys or Hemköp are labeled *major*, stores belonging to hard discounters is labeled *harddiscount* (Lidl and Netto), citygross stores are labeled *citygross* while stores acting as a franchiser to Axfood (Tempo and Handlarn) is labelled *Axfood_fringe*. Price competition versus the other chain stores may as mentioned spill over foremost to a price effect PL at Citygross, Netto and Lidl. Tempo and Handlarn have access to PLs but may not fully gain any cost reduction from any buying power PLs enforce and we therefore expect the price effect to be relative high compared to Willys and Hemköp for these formats due to double marginalization. Again, the effect may vary across products which motivates us to study the price effect for each of the *j* goods that has a PL twin. We also include the set X_{ks} variables that include the *k* food

categories interacted with the retail chains to control for differences in prices across food categories that otherwise may bias our results as the results may be driven by our choice of PLs. Dairy products and breads are for example in our data comparable expensive in retail chain stores while colonials, which include most of our sample of PLs, are relatively cheap. The set X_{kS} variables therefore serve as control variables as chains may have introduced PLs in food categories where they more or less have an economic incentive or opportunity to do so, for instance to curb market power in categories with strong manufacturers. Again, we drop any observations where the size of the product does not match the specified.

Table 3: The overall PL effect

	<i>III</i>	<i>IV</i>
<i>PLgood_major</i>	-0.058*** (-5.23)	
<i>PLgood_citygross</i>	-0.061*** (-3.11)	-0.058*** (-2.72)
<i>PLgood_harddiscount</i>	-0.059*** (-3.67)	-0.064*** (-3.54)
<i>Plgood_Axfoodfringe</i>	0.010 (0.57)	0.011 (0.61)
<i>Crème_major</i>		-0.036** (-1.97)
<i>Gräddfil_major</i>		-0.038** (-2.06)
<i>Felix_major</i>		-0.112*** (-4.24)
<i>Heinz_major</i>		-0.046 (-1.47)
<i>Spaghetti_major</i>		-0.098*** (-4.02)
<i>Fusilli_major</i>		0.068 (1.42)
<i>Tagliatelle_major</i>		-0.071*** (-2.70)
<i>Cornflakes_major</i>		-0.080*** (-4.04)
<i>Orangejuice_major</i>		-0.105*** (-5.27)
<i>No. observations</i>	4,991	4,991
<i>Adj. R²</i>	0.94	0.94

Notes: ***, ** and * indicate a significance at 1, 5 and 10 percentage levels (t-value in brackets).

The results in regression *III* support that prices of NBs with corresponding PLs on average (unweighted) are about six percent lower at retail stores but only compared to independent stores and Axfood franchisers. The results hence support that private labels contribute to lower prices on leading national labels but not so vis-à-vis stores owned by other retail chains. The lower cost for market leaders may not be fully passed on to Axfood franchisers at the same time as Axfood franchisers, just as retail stores, may exploit the division of loyal consumers and switchers when setting prices. A plausible rationale for the absent effect vis-à-vis hard discounters and Citygross is that they are strong competitors to the major retailers and so engage in price competition as opposed to convenience stores that foremost compete in service and not prices. Other retail chains may for instance as mentioned carry corresponding PLs and the price effect may so hold across retail chains.

On a product category level the estimated effect varies significantly as shown in regression *IV*. The price effect from having a PL twin is negative for seven out of the nine products, stretching from a price

lowering effect from almost four percent (the sour creams) to eleven percent (Felix ketchup). For two products the effect is hence insignificant, Barilla fusilli and Heinz ketchup, the brand that earned a positive “in-store effect”. There is hence not a common PL price effect in our sample although the results unambiguously suggest that the price effect is non-positive. It should also be noticed that the effect was comparable modest for the two generic brands that does not meet competition from low-budget PLs (the soured creams). The results therefore weakly suggest that the combination of multiple PLs lower prices on market leaders.

Conclusions and summary

We use a novel data set covering all stores on a narrowly defined Swedish geographical market to illuminate any price effect on market leaders from private labels in the food categories dairy, pasta, juice, cornflakes and ketchup in the major retail chains in Sweden. The data set is unique in the sense that it provides information if an individual store chooses to market a PL or not. We find that the price on a market leader only weakly depends on whether a store chooses to carry a corresponding standard PL. The only significant price effects we estimate, and the effects are as expected positive, concerns one ketchup (Heinz) and one pasta variety (Barilla tagliatelle). The overall low significance may partly be explained by low variation in the data as almost nine out of ten stores choose to carry a PL if it can do so. The indeed narrow price spread among stores that belongs to a common retailer may also explain the low significance.

Any price effect due to consumer segmentation may therefore principally be found at the wholesale level and not the store level. Our results nevertheless suggest that PLs in total have an average price lowering effect of about eight percent on corresponding NBs. The results confirm previous studies of the Swedish food retail market although many studies covering the US market have found a price increasing effect. The results do however suggest that franchisers do not enjoy the full discount on national labels that retailers get from holding a PL. Further, the results suggest that all chains have PLs in corresponding categories and/or engage in fiercer price competition than small convenient stores as all retailers on average have relatively low prices on the NBs where the major retailers sell a similar PL. However, the price effect varies across product categories as we do not find any price effect for dairy products, the Heinz ketchup and one pasta variety (Barilla fusilli). The mixed price effect may depend on differences in demand elasticity of substitution between NBs and PLs and a variance in the degree of buyer power PLs yield across product categories as other theoretical and empirical studies suggest. The estimated price effect may also differ across products depending on the point in time for the launch of individual PLs and the existence of a wider range of PL categories. For instance, dairy products are the only product category in our sample that is exempted from the competition of low budget PLs.

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Appendix

Table A1: National branded items included in the analysis

National labels	Information if a store has corresponding standard PL
Consumption milk 3 % (fat), Skånemejerier, 1 l	
Consumption milk 1.5 % (fat), Skånemejerier, 1 l	
A-fil 3 % (fat), Skånemejerier, 1 l	
Yoggi, Arla, 1 l	
Proviva, Skånemejerier	
Soured cream (crème fraîche), Skånemejerier, 2 dl	X
Soured cream (gräddfil), Skånemejerier, 3 dl	X
Margarine, Lätta, 600 gr	
Margarine, Bregott, 600 gr	
Butter, Skånemejerier, , 500 gr	
Cheese (Grevé), Skånemejerier, 1000 gr	
Orange juice (Bravo), 1 l	X
Full grain macaroni, Kungsörnen, 800 gr	
Macaroni (Idealmakaroner gammaldags), Kungsörnen, 1000 gr	
Spaghetti, Barilla, 1000 gr	X
Tagliatelle, Barilla, 500 gr	X
Fusilli, Barilla, 500 gr	X
Oat cereal (Havrefras), Quaker, 500 gr	
Corn flakes (Kellogg's), 500 gr	X
Muti grain cereal (Multi cheerios), Nestlé, 375 gr	
Bread (Varsågod!), Skogaholm	
Bread (Skogaholmslimpan), Skogaholm	
Bread (Lingongrova), Pågen	
Bread (Roast'n Toast), Pågen	
Bread (Längtan), Pågen	

Bread (Äntligen Subs!, Pågen	
Crackers (Ballerina), Göteborgs Kex	
Crackers (Singoalla), Göteborgs Kex	
Crackers (Brago), Göteborgs Kex	
Candy (Kexchoklad original, 55 gr, Cloetta	
Candy (Kexchoklad original, 100 gr, Cloetta	
Candy (Gott och blandat), Malaco	
Candy (Bridge), Cloetta	
Candy (Polly Blå), Cloetta	
Candy (Ahlgrens bilar), Cloetta	
Candy (Dumle kolor), Fazer	
Tomato ketchup (Heinz), 1000 gr	X
Tomato ketchup (Felix), 1250 gr	X
Mustard (Slotts original)	

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AgriFood Economics Centre provides economic expertise in the fields of food, agriculture, fishing and rural development. The Centre is a cooperation for applied research between the Swedish University of Agricultural Sciences (SLU) and Lund University. The aim is to supply government bodies with a solid scientific foundation supporting strategic and long-term policy choices.

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