Economics Bulletin

Volume 39, Issue 1

Negative market value and loss leading

Stephane Caprice
Toulouse School of Economics, INRA, University of Toulouse Capitole, Toulouse, France

Shiva Shekhar
Düsseldorf Intitute for Competition Economics (DICE), Heinrich-Heine-Universität

Abstract

Multi-product retailers competing with smaller retailers can exercise market power by pricing below cost products also offered by smaller rivals. Loss-leading is not a predatory strategy: rather pro-competitive justifications are invoked. Unlike standard textbook models, we show that positive market value, that is, consumer valuation larger than production cost, is not required in this line of research examining the phenomenon of loss-leading. Multi-product retailers can supply products offering negative market value. We use this insight to revisit some classic issues in vertical relations.

We are grateful to Patrick Rey, Yassine Lefoulli and Markus Reisinger for their discussions.
Citation: Stephane Caprice and Shiva Shekhar, (2019) "Negative market value and loss leading", *Economics Bulletin*, Volume 39, Issue 1, pages 94-103
Contact: Stephane Caprice - stephane.caprice@inra.fr, Shiva Shekhar - shekhar@dice.hhu.de.
Submitted: April 09, 2018. **Published:** January 10, 2019.

1. Introduction

Below-cost pricing is a practice commonly adopted by multi-product firms. As mentioned by Xu *et al.* (2017) in data mining literature which consists to discover interesting consumer patterns from transactional databases items with negative unit profit for multi-product firms arise in many real-life applications. For example, it is common that a retail store sells items at a loss to stimulate the sale of other related items or simply to attract customers to their retail location. While most of works in data mining literature do not consider itemsets with negative unit profit, recent works emerge to take into account both positive and negative unit profit.[1]

Policy debates on retail power are also interested in loss leading. For example, in its first groceries inquiry in the United Kingdom, the Competition Commission noted that "nearly all the main parties sold a small number of products at prices below the cost of purchase".[2] While it may be tempting to treat loss leading as predatory pricing, the persistence of below-cost sales over the time does not fit well with the scenario of predatory pricing. In its second inquiry, the Competition Commission reports for example that own-label products are generally sold below-cost for longer periods than branded products (U.K. Competition Commission 2008, p. 95). Below-cost selling are also common on budget lines (U.K. Competition Commission 2000, p. 131-132). Furthermore, loss leaders are mainly staple goods such as milk and dairy, bread and bakery products, and meat.[3]

One line of research in industrial organization examines the phenomenon of loss-leading when retailers are multi-product firms (i.e., Chen and Rey 2012, Chen and Rey 2016 and Johnson 2017). Loss-leading in these referenced papers is not a predatory strategy: rather pro-competitive justifications are invoked. For example, in Chen and Rey (2012), large retailers competing with smaller stores that carry a narrower range can exercise market power by pricing below cost for some products also offered by smaller rivals. Below-cost pricing arises as an exploitative device for large retailers (i.e., multi-product firms) to discriminate between multi-stop shoppers and one-stop shoppers. The result is shown in a standard model where the cost of the good, which is priced below cost, is lower than the consumer valuation, that is, the good offers a positive *market value* (MV) as in textbook models. This raises the issue of the value of the MV for these goods: the consumer valuation may be either higher or smaller than the cost for these goods which are priced below cost.

In this short article, we show that positive MV is not required for these goods. Large retailers can sell products offering negative MVs which is not a standard result.[4] Our conclusion emerges naturally in a stylized setting from Chen and Rey (2012) in allowing for a negative MV for the good which is priced below-cost. There is a dominant multi-product

[1] See for example Fournier-Viger (2014) and Singh *et al.* (2018a). Singh *et al.* (2018b) provide a survey of recent advancements and research opportunities. Many references are also available in Krishnamoorthy (2018).

[2] See the U.K. Competition Commission (2000), p. 131.

[3] Other product groups are also mentioned by the U.K. Competition Commission in its successive inquiries.

[4] Similar insights may appear for a multi-product monopoly using bundling and selling to heterogeneous consumers, that is, some consumers would buy a product although their valuation for that product is below the marginal cost of production (See, for example, Belleflamme and Peitz 2010, p. 265). However, while this inefficiency result is clear in the case of a monopoly firm, the result is far to be obvious in the case of a firm which competes on this segment.

retailer competing with smaller retailers. The dominant firm supplies a product offering a negative MV in the competitive market.[5] Supplying products offering negative MV thus appears to be a robust feature in market environments where below-cost pricing does not arise for predatory reasons.

We use this insight to revisit some classic issues in vertical relations. In particular, we first discuss access to the retail market (using a multi-product retailer) for a supplier who offers a negative MV good, providing an instance where below-cost pricing is good for the supplier. Second, we demonstrate that a large retailer benefiting from an alternative source of supply which provides a negative MV for this good may have buyer power vis-à-vis a more efficient supplier of this good. The multi-product retailers may have a positive outside option for the good which is priced below cost, even if the MV for the good as an outside option is negative. This has immediate implications which sets our insights apart from extant literature on buyer power, where having a positive outside option for a retailer means a positive MV for that good (See e.g. Katz 1987 or Sheffman and Spiller 1992). For product categories which are priced below cost, multi-product retailers may have buyer power even if they threaten to offer products offering negative MV. This shows that the assortment strategy of a large retailer (i.e., its seller power) may interact with its buyer power when it competes with smaller retailers. Furthermore, this latter application may help us to better understand harsher negotiations between suppliers and retailers for some products like milk and dairy, meat and so on, which are often priced below-cost by large retailers, and under some aspects the growing imbalance of trade between suppliers and large retailers for these products.[6]

The rest of the paper is organized as follows. Section 2 presents a stylized setting in which we develop our insight. Section 3 provides applications of our result in vertical relations and we conclude in Section 4.

2. The model and analysis

Suppose two goods A and B, consumers value A at $u_A(>0)$ and B at $u_B(>0)$. There are two retail firms: L a multi-product firm which can supply goods A and B, and S a competitive fringe that supplies only good B. We denote by $v_A = u_A - c_A$, $v_L = u_B - c_L$ the MV of the good A and B, respectively, offered by L, where c_A and c_L are the related constant marginal costs, and $v_S = u_B - \widehat{p}$ the MV of the good B at S, where $\widehat{p}$ is the price of the competitive fringe ($v_A > v_S > v_L$). Chen and Rey (2012) assume that $v_L = u_B - c_L > 0$: good B has a positive MV at L. Instead, we extend their setting and focus on the case when B offers a negative MV at L, that is, the consumer value u_B is positive but lower than the marginal cost of production, and hence assume the following:

Assumption 1 $v_L = u_B - c_L \leq 0$.

Consumers face shopping costs s for visiting a store, reflecting the opportunity cost of the time spent in traffic, selecting products and so on. We suppose that a proportion $(1-\alpha)$ of the consumers face a high shopping cost $\overline{s}$ whereas the other α face a low shopping cost $\underline{s}$

[5] Extensions of our result to Chen and Rey (2016) and Johnson (2017) are provided as supplementary materials to this article.

[6] Vander Stichele and Young (2009) provides a survey of such evidence.

with $\overline{s} > \underline{s}$. We further assume that $v_A > \overline{s}$, $v_S > \underline{s}$ and $v_S \leq \overline{s}$. The latter inequality means that S cannot attract high-cost consumers.[7]

L's margin on goods A and B are denoted as $r_A = p_A - c_A$ and $r_L = p_B - c_L$ respectively. Moreover, let $r = r_A + r_L = p_A - c_A + p_B - c_L$ be the total margin of L on both A and B.[8] We first look at the case when L is a monopolist, i.e., S is absent from the market. Next, we look at the case when S is active in the market and creates competitive pressure on L.

L is a monopolist: The multi-product firm L is a monopolist, implying S is not active. It is easy to see that the good B is not sold when $v_L < 0$. Then, two cases should be distinguished, L can supply A either to all or only to low-cost consumers. L's margin for A in the former case is $\underline{r}_A := v_A - \overline{s}$ and in the latter case, $\overline{r}_A := v_A - \underline{s}$. When supplying A to all consumers, it obtains $\underline{r}_A$, and supplying A only to low-cost consumers it obtains $\overline{r}_A \alpha$. Comparing the two profits, we get the profits of L as

$$\pi_A^M = \begin{cases} \underline{r}_A & \text{if } \alpha < \alpha^* \\ \overline{r}_A \alpha & \text{if } \alpha \geq \alpha^* \end{cases} \tag{1}$$

where $\alpha^* := \frac{v_A - \overline{s}}{v_A - \underline{s}}$. Hence, L supplies only A. This is the textbook result that any product with valuation smaller than production costs is not sold.

L competes with S on B: Suppose now that L is not a monopolist and the good B is also offered by S. We know that in the case L is a monopolist, it sells good A only.[9] We now show that L may be better off from selling A and B (in particular, the result is true for any proportion of high and low shopping cost consumers for $v_L = 0$).

Case $\alpha < \alpha^*$: If L were a monopolist, it would make $\underline{r}_A$ as profits. The presence of S allows L to screen consumers according to their shopping cost. Keeping the total margin on high-cost consumers unchanged such that $v_A + v_L - r - \overline{s} = 0$ (where $r = \underline{r}_A + v_L$), while lowering the margin on B to $r_L = -(\overline{r}_A - \underline{r}_A) + v_L$ along with increasing the margin on A to $r_A = \overline{r}_A$ does not affect the shopping behavior of high-cost consumers. This strategy increases the margin earned on low-cost consumers (who now become multi-stop shoppers). L earns a total profit of

$$\pi_{AL} = \overline{r}_A \alpha + (\underline{r}_A + v_L)(1 - \alpha)$$

which can be greater than π_A^M. Comparing the gains and losses of screening, this is true as long as the gains on low-cost consumers, that is, $(\overline{r}_A - \underline{r}_A)\alpha$, are larger than the losses on high-cost consumers, that is, $((\underline{r}_A + v_L) - \underline{r}_A)(1 - \alpha)$. Hence, we obtain the result that L earns a higher total profit if $\alpha(\overline{s} - \underline{s}) > -(1 - \alpha) v_L$, that is, $v_L > -\frac{\alpha(\overline{s} - \underline{s})}{(1 - \alpha)}$.

Case $\alpha \geq \alpha^*$: In this case, if L were a monopolist, it earn $\overline{r}_A \alpha$. As before, the presence of S allows L to screen consumers according to their shopping costs, by pricing the good B below cost. Keeping the margin on A constant and equal to $r_A = \overline{r}_A$, L attracts high-cost consumers by charging a margin $r_L = -(\overline{r}_A - \underline{r}_A) + v_L$ on B. With L's total margin equal

[7] The analysis may be extended to the case where $v_S > \overline{s}$, that is, L is constrained on its total margin as long as $v_A + v_L > v_S$. See below.

[8] Hence, consumer values of goods are denoted as the difference between the MV and the retail margin for each product. For instance, $v_A - r_A$ is the consumer valuation of the good A at L.

[9] Either to all consumers or to low-cost consumers only.

to $r = \underline{r}_A + v_L$, high-cost consumers buy A and B from L. Low-cost consumers still buy A only from L because they multi-stop shop, and high-cost consumers now buy because they are interested in buying the basket. L earns a total profit of

$$\pi_{AL} = \overline{r}_A \alpha + (\underline{r}_A + v_L)(1 - \alpha)$$

which can be greater than $\pi_L^M = \overline{r}_A \alpha$, the profits from selling A only to low-cost consumers. While profits on low-cost consumers are unchanged, L can now earn $(v_A - \overline{s} + v_L)(1 - \alpha)$ on high-cost consumers, which was not possible without the competitive fringe. At the end, this strategy is profitable for $v_L < 0$, as long as the profits on high-cost consumers are positive, that is, $v_L > -\underline{r}_A = -(v_A - \overline{s})$.

We summarize our results in Proposition 1.

Proposition 1 *Suppose L faces a competitive fringe of small retailers, L may supply A and B whatever the proportion of high and low shopping costs for $v_L \leq 0$; in particular, L supplies A and B to one-stop shoppers if $v_L > \max\{-(v_A - \overline{s}), -\frac{\alpha(\overline{s}-\underline{s})}{(1-\alpha)}\}$.*

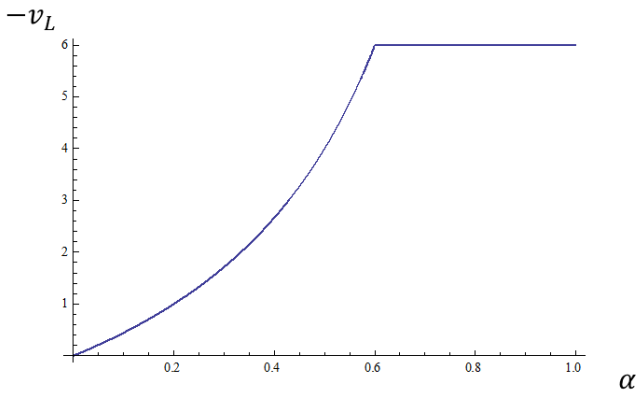

Figure 1: $v_A = 10,\ v_S = 4,\ \underline{s} = 0$ and $\overline{s} = 4$.

Figure 1 summarizes results in Proposition 1 according to the proportion of low shopping costs, that is, the negative values of v_L with respect to α under which L supplies good B profitably.[10]

This insight which may seem quite surprising is due to the presence of small retailers which allows the large retailer to screen consumers according to their shopping costs. While a multi-product monopolist has no incentive to profitably introduce a good with a negative MV, a multi-product firm which competes with small retailers on some segments has an incentive

[10] We develop our analysis in assuming that S cannot attract high-cost consumers, that is, $v_S \leq \overline{s}$. Similar insights can be provided for $v_S > \overline{s}$ as long as $v_A + v_L > v_S$, that is, L is constrained on its total margin, but high-cost consumers are one-stop shoppers at the equilibrium. When $v_S > \overline{s}$, we can show that L may supply A and B for $v_L \leq 0$ if $\alpha > \frac{v_S - \overline{s}}{v_S - \underline{s}}$; in particular, L supplies A and B to high-cost consumers if $v_L > v_S - \frac{\overline{s} - \alpha \underline{s}}{1 - \alpha}$ for $\frac{v_S - \overline{s}}{v_S - \underline{s}} < \alpha < \frac{v_A - \overline{s}}{v_A - \underline{s}}$ and if $v_L > -(v_A - v_S)$ for $\alpha \geq \frac{v_A - \overline{s}}{v_A - \underline{s}}$ (the proof is available upon request).

to profitably introduce products on these segments even if its products have negative MV. By selling these products below cost, the multi-product firm can discriminate between the low-cost consumers (who multi-stop shop and buy some products from the multi-product firm) and the high-cost consumers (who one-stop shop and buy all goods from the multi-product firm). Our insight provides a rationale for why multi-product firms are able to offer a larger product line at no benefit (i.e., $v_L = 0$) or at a loss (i.e., $v_L < 0$).[11]

While we demonstrate our results in a simple example, similar insights can be provided by using the general model of Chen and Rey (2012). Interestingly, similar insights also apply in Chen and Rey (2016) where multi-product firms with different comparative advantages compete for consumers with heterogeneous shopping patterns. Competition for one-stop shoppers drives total prices down to cost, but firms subsidize weak products with the profit made on their strong products. Negative MV for weak products thus arise because multi-product firms price these products below cost. Recently, Johnson (2017) considers a setting in which one-stop shoppers may underestimate their needs, and shows that below-cost pricing may emerge when consumers have different biases across products. In particular, loss-leader products tend to be products that consumers purchase regularly. Our insight that negative MV for these loss-leader products is feasible applies to these products as well.[12] We now provide some applications of our result on vertical relations in the following section.

3. Applications in vertical relations

We provide two applications of our insights on vertical relationships. First, we demonstrate that a supplier facing a negative MV can access the retail market when it negotiates with a large retailer. Second, we show that a large retailer that benefits from an alternative source of supply for one product which provides a negative MV may have buyer power, that is, a positive outside option. This latter application helps us to show that the assortment strategy of a large retailer (i.e., seller power) interacts with its buyer power when it competes with smaller retailers.

3.1 Access to the retail market

L is a multi-product retailer which provides two goods, A and B. In this subsection, we consider a scenario where the good B at L is being supplied by a supplier U. U can produce B at a constant marginal cost $c \geq 0$ and offers a take-it-or-leave-it two-part tariff contract (w_L, F_L), where w_L and F_L, respectively, are the wholesale price and the fixed fee paid to the supplier by L. The timing of the game is as follows: first, the supplier offers contracts to L, which decides whether to accept or reject the contract, and then L sets retail prices.

For notational simplicity, we denote the MV of the good B as $v_L = u_B - c_L - c$, where c_L represents the retailing cost of the large retailer. Furthermore, we assume that the MV of good B is negative, that is, $v_L < 0$ (to focus on our point). Moreover, there exists a competitive fringe S of small retailers that sells B at a price $\widehat{p}$, providing consumers a utility

[11] For example, assuming that L faces a fixed cost to introduce the product L, that is K; our analysis shows that there exists a positive K such that L has incentive to introduce B whatever the proportion of low-cost and high-cost consumers are. Using calculations above, threshold values in K are given by $(\overline{s} - \underline{s})\,\alpha$ for $\alpha < \frac{v_A - \overline{s}}{v_A - \underline{s}}$ and by $(v_A - \overline{s})\,(1-\alpha)$ for $\alpha \geq \frac{v_A - \overline{s}}{v_A - \underline{s}}$ (with $v_L = 0$).

[12] A detailed analysis for both settings is available as supplemental material to this article.

of $v_S = u_B - \widehat{p} > 0$. As before, we assume that consumers face shopping costs $\underline{s}$ and $\overline{s}$, and that $v_A > v_S$ and $v_S \leq \overline{s}$.

Using previous results, we can write the retail margins of the large retailer and its gross profits. We denote by $\hat{v}_L = u_B - c_L - w_L$, the MV of the good B at L at wholesale price w_L. Retail margins are thus given by $r_A = \overline{r}_A$ and $r_L = -(\overline{s} - \underline{s}) + \hat{v}_L$ which leads to:

$$\pi_{AL} = \begin{cases} \pi_A^M + [(\overline{s} - \underline{s})\,\alpha + \hat{v}_L\,(1-\alpha)] & \text{if } \alpha < \alpha^* \\ \pi_A^M + (v_A + \hat{v}_L - \overline{s})\,(1-\alpha) & \text{if } \alpha \geq \alpha^* \end{cases} \tag{2}$$

where π_A^M is as in equation (1).

The supplier sets its contract to maximize the following:

$$\max_{w_L, F_L} \pi^U = (w_L - c)\,(1-\alpha) + F_L$$
$$s.t.\ \pi_{AL} - F_L \geq \pi_A^M,$$

and the fixed fee is set to bind the participation constraint of L. Since the retailer is the residual claimant of the total profits, U sets its wholesale price to maximize the multi-product retailer's profit and hence $w_L = c$. The supplier's profits are thus given as:

$$\pi^U = \begin{cases} [(\overline{s} - \underline{s})\,\alpha + v_L\,(1-\alpha)] & \text{if } \alpha < \alpha^* \\ (v_A + v_L - \overline{s})\,(1-\alpha) & \text{if } \alpha \geq \alpha^* \end{cases} \tag{3}$$

The above implies that U can sell B even for $v_L < 0$. In particular, when $\alpha < \alpha^*$ and $v_L > -\frac{\alpha(\overline{s}-\underline{s})}{(1-\alpha)}$ (< 0) or when $\alpha \geq \alpha^*$ and $v_L > -(v_A - \overline{s})$ (< 0) (see our previous analysis).[13] The supplier is thus able to profitably supply the good B at L even if its good has a negative MV. Our application provides a clear example whereby below cost pricing is good for the supplier, echoing the findings of von Schlippenbach (2015). However, we go further here and say that the supplier has the incentive to introduce a good for which the MV is negative as long as the good is priced below-cost.

3.2 Buyer power and alternative source of supply

There are a number of reasons to explain why large buyers obtain price discounts from sellers (e.g., Dobson and Waterson 1999, Inderst and Mazzarotto 2008). One of these is to assume that large buyers can turn to other sources of supply and can thus demand better terms from suppliers.[14] In these kinds of models, large retailers have access to other sources of supply and can turn to these other sources if they dislike the efficient supplier's terms. Price discounts thus emerge when large retailers have *positive* outside options, that is, a good with a positive MV as an outside option, which corresponds to the "textbook" view.[15]

In our present setting, the large retailer is a multi-product firm. While the previous view arises when the large retailer is a monopolist, i.e., the large buyer has buyer power if it can

[13] While we provide an analysis assuming that the supplier offers two-part tariff contracts to the large retailer, our analysis still holds in linear-contracting for values of v_L defined in the main text; however, equilibrium contracts would be different.

[14] Integrating backward and producing the good themselves is an alternative solution, which is also mentioned.

[15] See Katz (1987), and more recently Caprice (2006) and Caprice and Rey (2015) for applications with this modeling of buyer power.

threaten to carry a good with a positive MV, we show that buyer power may also arise if the large retailer can threaten to carry a good with a negative MV, when competing with small retailers. It is the combination of both "access to an alternative supplier" and "seller power" (i.e., its ability to price these goods below cost) which allows the large retailer to have discounts even with a negative MV as an outside option.

In this application, we assume that an efficient supplier U supplies good B to L. However, L can also access an inefficient alternative supplier which is modeled as a competitive fringe $\tilde{U}$. As previously, we assume that U makes take-it-or-leave-it offers to L in two-part tariffs. Let $v_L = u_B - c_L - c$ denote the MV offered by the U at L and $\widetilde{v}_L = u_B - c_L - \widetilde{c}$ the MV offered by the alternative supplier at L with $v_L > \widetilde{v}_L$ (c and $\widetilde{c}$ are the respective constant marginal cost of U and $\tilde{U}$). We assume that $\widetilde{v}_L < 0$ in order to focus on a negative MV as an outside option. The retail market and consumer behavior are unchanged.

L is a multi-product monopolist: There is no scope for L to exert buyer power vis-à-vis U on the good B because L has access to a negative outside option for this good (i.e., $\widetilde{v}_L < 0$). The supplier sets contracts so as to offer L its participation profit, which in our case are as in equation (1) and extracts all the remaining surplus. In this case, only a positive MV as an outside option for this good, i.e., $\widetilde{v}_L > 0$, would allow L to obtain better terms from the efficient supplier.

L is in competition with S on the good B: The view changes drastically: While L as a monopolist obtained π_A^M as profits, it now has an outside option profit denoted by

$$\widetilde{\pi}_{AL} = \begin{cases} \pi_A^M + \left[(\overline{s} - \underline{s})\,\alpha + \widetilde{v}_L\left((1-\alpha)\right)\right] & \text{if } \alpha < \alpha^* \\ \pi_A^M + (v_A + \widetilde{v}_L - \overline{s})\,(1-\alpha) & \text{if } \alpha \geq \alpha^* \end{cases} \tag{4}$$

which can be greater than π_A^M even if $\widetilde{v}_L < 0$. This insight comes from our previous analysis: a multi-product firm competing with small retailers on a specific segment has an incentive to profitably supply a product for which the MV is negative on this segment. By selling this product below cost, the multi-product firm can discriminate between consumers according to their shopping costs, which allows products with a negative MV to be profitable. While L would have no buyer power when it were a monopolist, it now has buyer power as it can extract $\widetilde{\pi}_{AL}$ instead of π_A^M. Figure 2 illustrates our insight for $\widetilde{v}_L = 0$. Note that this buyer power arises for any proportion of high and low shopping cost consumers. In particular, starting from a situation where all consumers have the same shopping costs, introducing an arbitrarily small number of consumers with different shopping costs suffices to give some

buyer power to the large retailer, which is not the case for $\alpha = 0$ or $\alpha = 1$.

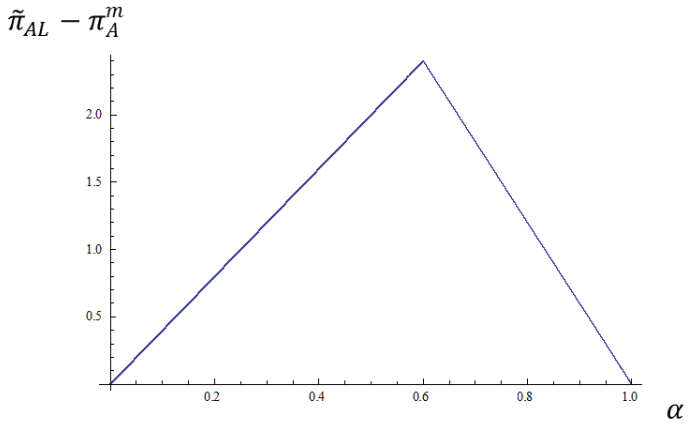

Figure 2: $v_A = 10,\ v_S = 4,\ \underline{s} = 0$ and $\overline{s} = 4$.

Our result contrasts with the standard textbook view about buyer power, in which the MV, that is, $\widetilde{v}_L$ should be positive. While in the analysis of market power of large retailers buyer power and seller power are generally studied separately, our insight suggests that both can interact.[16] In particular, the assortment strategy of big-box retailers can help them to benefit from buyer power in product categories for which products are sold at below-cost prices.

4. Conclusion

Chen and Rey (2012) captures one of the key characteristics of the modern retail market: consumers face shopping costs and large retailers offering large product line benefit from seller power. Using a stylized setting from Chen and Rey (2012), we provide new insights. Contrary to the conventional wisdom which requires a positive MV for accessing market, we show that goods with a negative MV can be provided by multi-product retailers as long as below-cost pricing on these goods is optimal.

Our insights extend to alternative models as in Chen and Rey (2016) and Johnson (2017).[17] Supplying products offering negative MV thus appears to be a robust feature.

We provide two applications of our result on vertical relationships. First, we demonstrate that a supplier facing a negative MV can access the retail market when negotiating with a large retailer. This supplier benefits from the large product line of the large retailer. The latter prices this product below cost and the supplier has access to the market, and thus the

[16] Note as an exception, Caprice and Shekhar (2017) which defines buyer power in the same way, but focuses on the impact of the countervailing power on consumers and total welfare. In particular, they show that countervailing power is detrimental to consumers and total welfare when the market power of the large retailer is defined by both seller power and buyer power; however, they do not deal, as here, with the introduction of negative MV products.

[17] See supplemental material to this article.

supplier benefits from the large retailer's below-cost pricing strategy. Second, we demonstrate that a positive MV as demand-side substitution is not required for a large retailer to benefit from buyer power. Its seller power (i.e., its ability to price below cost) aids it to benefit from buyer power, even if it has a negative MV as a demand-side substitution. In these markets, having a positive MV as an outside option is not required for having buyer power.

We focus here on vertical relations, interesting insights of our results in relation to product line competition could also be provided. However, we leave this task for further investigation.

5. References

Belleflamme, P. and M. Peitz (2010) "Industrial Organization, Markets and Strategies" Cambridge University Press.

Caprice, S. (2006) "Multilateral Vertical Contracting with an Alternative Supplier: The Welfare Effects of a Ban on Price Discrimination" *Review of Industrial Organization*, **28**(1), 63-80.

Caprice, S. and P. Rey (2015) "Buyer power from joint listing decision" *Economic Journal*, **125**, 1677-1704.

Caprice, S. and S. Shekhar (2017) "On the countervailing power of large retailers when shopping costs matter" TSE Working Paper 17-771.

Chen, Z. and P. Rey (2016) "Competitive Cross-Subsidization" TSE Working Paper 13-450, revised version.

Chen, Z. and P. Rey (2012) "Loss leading as an exploitative practice" *American Economic Review*, **102**(7), 3462-3482.

Dobson, P. and M. Waterson (1999) "Retailer power: recent developments and policy implications" *Economic Policy*, **14**(28), 133-156.

Fournier-Viger, P. (2014) "FHN: efficient mining of high-utility itemsets with negative unit profits" *Advanced Data Mining Applications*, 16-29.

Inderst, R. and N. Mazzarotto (2008) "Buyer Power in Distribution" in W.D. Collins (Ed.), ABA Antitrust Section Handbook, Issues in Competition Law, 1611-1637; ABA Book Publishing, Chicago.

Johnson, J. P. (2017) "Unplanned Purchases and Retail Competition" *American Economic Review*, **107**(3), 931-65.

Katz, M. L. (1987) "The welfare effects of third-degree price discrimination in intermediate good markets" *American Economic Review*, **77**(1), 154-167.

Krishnamoorthy, S. (2018) "Efficiently mining high utility itemsets with negative unit profits" *Knowledge-Based Systems*, **145**, 1-14.

Scheffman, D. T. and P. T. Spiller (1992) "Buyers' strategies, entry barriers, and competition" *Economic Inquiry*, **30**(3), 418-436.

Singh, K., Shakya, H. K., Singh, A. and B. Bhaskar (2018a) "Mining of high-utility itemsets with negative utility" *Expert System*, to appear.

Singh, K., Singh, S., Sheshar, K. A. and B. Bhaskar (2018b), "High utility itemsets mining with negative utility value: a survey" *Journal of Intelligent & Fuzzy Systems*, **36**, Pre-press, to appear.

UK Competition Commission (2000) "Supermarkets: A report on the supply of groceries from multiples stores in the United Kingdom" available at: http://webarchive.nationalarchives.gov.uk/+/http://www.competition-commission.org.uk//rep_pub/reports/2000/446super.htm.

UK Competition Commission (2008) "Groceries market investigation" available at: https://www.gov.uk/cma-cases/groceries-market-investigation-cc.

Vander Stichele, M. and B. Young (2009) "The abuse of supermarket buyer power in the EU food retail sector" available at: https://www.somo.nl/the-abuse-of-supermarket-buyers-power-in-the-eu-food-sector/.

von Schlippenbach, V. (2015) "Sales at a loss: who benefits" *European Review of Agricultural Economics*, **42**(2), 269-286.

Xu, T., Dong, X., Xu, J. and D. Xue (2017) "Mining High Utility Sequential Patterns with Negative Item Values" *International Journal of Pattern Recognition & Artificial Intelligence*, **31**(10), 1-17.