

Price Segmentation in the Wine Industry: The Effects of Market Entry

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Abstract

This study suggests that microeconomic theory provides some insight as to the future price structure of the wine industry. Following examples from the pharmaceutical industry, theoretical evidence shows that due to market entry, the price point structure in the wine industry may break down and result in only two price points. The conditions for such a bifurcation of the wine market seem to be in place due to the entry of value wines, at prices under \$4 per 750ml container. We also provide brief empirical evidence the new structure has begun to form, but suggest that more research is needed. The wine industry, which has invested in millions per year in advertising and product differentiation to enter different price segments, may be reduced to low and high priced wine only.

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1. INTRODUCTION

The wine industry's pricing structure has traditionally been categorized into five segments or price points. These price points constitute market segments. Although these market segments have existed for some time, recent events may be acting to permanently change pricing structure. The success of the proprietary brand Charles Shaw, sold for around two dollars per bottle, perhaps best epitomizes this phenomena.¹ Standard economic theory tells us that competitive entry such as this results in an overall reduction in prices. However, it is possible that the recent entry of economy priced wines has different effects on each price segment resulting in a structural change in pricing.

As varietal-specific, low-priced wines enter the market, they will invariably garner a significant amount of market share from adjacent price points and exert price pressure on existing firms, resulting in lower prices. This is the expected effect and is consistent with traditional economic theory. However, if the low-priced (economy) wines extract only those consumers who are most price elastic from all price points, then consumers who continues to purchase higher priced wines are those who are relatively price inelastic. As a result, prices in the upper price points can rise as existing firms cater to the most price insensitive consumers. In essence, the wine market bifurcates into elastic and inelastic consumers with the average price between the two segments diverging. The implication for the wine industry is the elimination of the five tier price point structure and a paradigmatic shift in the way wines are marketed.

This paper is organized in six sections. Section II provides a model of market entry. Section III provides a model of market segmentation and the conditions under which price divergence will occur. Section IV provides an overview of the market segmentation-price divergence phenomena in the pharmaceutical industry. Section V provides some preliminary evidence indicating the beginning of the market segmentation-price divergence phenomena in the wine industry. Section VI concludes with some directions for future research.

2. A MODEL OF MARKET ENTRY

The wine industry is one of hundreds of small, differentiated firms, acting as monopolistic competitors. Advertising and branding are key ways in which firms find market niches and spend large sums in maintaining any established markets. Distributors and retailers also use the branding in such a way to offer choice to their respective customers. However, in the last two years, due mainly to a cyclic supply increase, variety-specific wines appeared at unprecedented low prices, and new brands entered the market. In many cases, these brands originated from large producers using the new brands as a supply pressure release. In a sense, these firms used surplus wine to provide generic choices of otherwise branded products.

To analyze the effect of low-cost wine entry, consider first the effect on a typical winery

¹ The name, "Two Buck Chuck" has been associated with Trader Joe's Charles Shaw brand initially as a derogatory descriptor. There have been copycat wine brands, also known as "value" or economy wine, based on their low price point in 750ml equivalent containers.

operating in a differentiated product market. Assume that firms in each price segment, are modeled as Nash-Cournot competitors, where profit is defined as,

$$\pi_i = P_i(Q)q_i - TC_i(q_i). \quad (1)$$

where π_i is profit of firm i , P_i is the price of firm i 's output, q_i is the output of firm i , Q is total output of market segment, and $TC_i(q_i)$ is the cost function of firm i . Note that the price of firm i 's output is a function of its own output and the output of all other competing firms.

$$\text{That is } P_i(Q) = P\left(\sum_{i=1}^n q_i\right).$$

The first-order conditions of a profit-maximizing firm yield the familiar equi-marginal optimization condition,

$$\frac{\partial \pi_i}{\partial q_i} = P_i(Q) + \frac{\partial P_i(Q)}{\partial Q} q_i - \frac{\partial TC_i}{\partial q_i}. \quad (2)$$

From Equation 2, recognize that marginal revenue can be expressed as,

$$MR_i = \frac{\partial TR_i}{\partial q_i} = P_i(Q) + \frac{\partial P_i(Q)}{\partial Q} q_i. \quad (3)$$

Rearranging the marginal revenue function in equation (3) gives us,

$$MR_i = P_i \left(1 + \frac{\partial P_i(Q)}{\partial Q} \frac{q_i}{P_i}\right), \quad (4)$$

If we assume that the firms in each segment are relatively similar, then $Q = nq_i$, where n is the number of competing firms in that market segment. Substituting this term into Equation (4) and multiplying and dividing by the number of producers results in,

$$MR_i = P_i \left(1 + \frac{\partial P_i(Q)}{\partial Q} \frac{Q}{P_i} \frac{1}{n}\right). \quad (5)$$

Note that the term $\left(\frac{\partial P_i(Q)}{\partial Q} \frac{Q}{P_i}\right)$, is the inverse of the price elasticity of demand ϵ_i , so that Equation 5

can be rewritten as a function of the market segment's price elasticity of demand and the number of firms in that segment, $MR_i = P_i (1 + 1/n\epsilon_i)$. Solving for price, it is easy to see that the price set by the profit maximizing firm will then be,

$$P_i = \frac{MC_i}{1 + 1/n\epsilon_i}, \text{ where } MR=MC \text{ for the profit maximizing firm.} \quad (6)$$

From equation 6, it is clear that entry will have a price reducing effect on profit maximizing firms in a market characterized by Nash-Cournot behavior, eventually driving price to marginal cost.² However, the entry firms into a market will have different effects depending on the behavioral assumptions of existing firms and new entrants.

Suppose, however, that instead of Nash-Cournot behavior, each market segment is characterized by a “dominant firm” and a number of competing firms. Assume also that the dominant firm in each price segment has a “first-mover advantage” over non-dominant or competitive firms and entering firms³, so that the profit function of dominant firms has the form,

$$\pi_i = P(q_i + \sum_{j \neq i}^n q_j)q_i - TC_i(q_i), \quad (7)$$

where the first term on the right hand side is the total revenue function. As before, the price of firm i 's output is a function of its own output, q_i , and the output of other firms in the market q_j .

Optimization by existing firms produces the following first order condition,

$$\frac{\partial \pi_i}{\partial q_i} = P - q_i \left(\frac{\partial P}{\partial q_i} + \frac{\partial P}{\partial q_j} \frac{\partial q_j}{\partial q_i} \right) - \frac{\partial TC_i}{\partial q_i} = 0 \quad (8)$$

Assume that entrants and existing non-dominant firms behave like price-taking competitors. These firms are often referred to as the “competitive fringe.” The competitive fringe firms, denoted j for $j \neq i$, thus face the following profit function,

$$\pi_j = Pq_j - TC_j(q_j). \quad (9)$$

Optimization by competitive fringe firms produces the following first order condition,

$$\frac{\partial \pi_j}{\partial q_j} = P - \frac{\partial TC_j}{\partial q_j} = 0 \text{ for } j \neq i. \quad (10)$$

From the first order condition, we can see that the competitive fringe firms price at marginal cost. The resulting equilibrium is shown graphically in Figure 1. The market price is set by the dominant firms which faces a residual demand and marginal revenue function denoted D^R and MR^R in Figure 1. The dominant firm's demand is a residual demand since the competitive fringe supplies the entire market at price P_2 and above. As price falls below P_2 , the competitive fringe supplies along their marginal cost functions, satisfying only part of the total market demand. The

² This assumes price elasticity remains constant. Allowing elasticity to increase will only accelerate the movement of price towards marginal cost.

³ The first mover advantage can be due to a cost advantage, brand loyalty or brand identification.

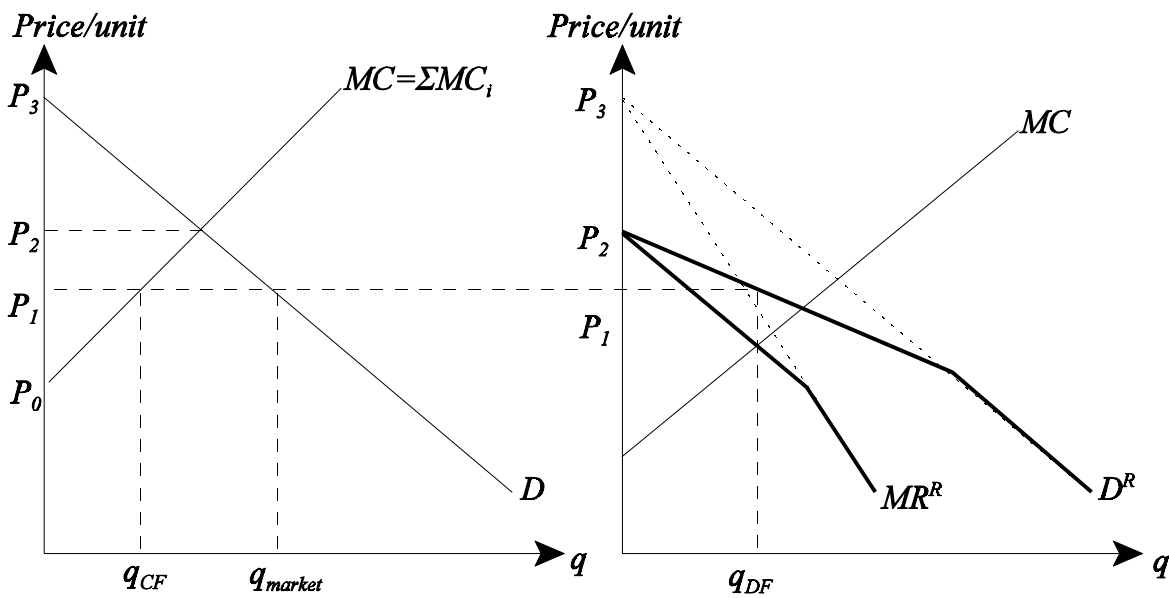


Figure 1
The Dominant Firm and the Competitive Fringe

dominant firm's demand curve is made up from the difference between the total market demand and the amount supplied by the competitive fringe. At price P_0 and below, the marginal cost of production is below the market price and the competitive fringe no longer profitably supplies output to the market. At this price, the dominant firm's demand curve becomes the market demand curve. This is shown as the kink in the dominant firm's demand curve in Figure 1. Clearly, the competitive fringe's existence reduces pricing power of the dominant firms. This is shown in Figure 1, by the fact that the residual demand facing the dominant firm is more elastic than the market demand.

To show the entry effect, recall that the dominant firms demand curve, q_i^D , is derived from the difference between the market demand q^D and the quantity supplied by the competitive fringe firms, q_{CF}^S , where $q_{CF}^S = \sum q_j^S$ for $j \neq i$ competitive fringe firms. Thus, the dominant firms demand is given by⁴,

$$q_i^D = q^D - q_{CF}^S \tag{11}$$

For a given change in output that results from a price change, we can rewrite the above as,

⁴ This analysis follows that of Browning and Zupan (1999).

$$\Delta q_i^D = \Delta q^D - \Delta q_{CF}^S. \quad (12)$$

Dividing both sides by the dominant firms demand q_i^D and multiplying the two terms on the right by q^D/q^D and q_{CF}^S/q_{CF}^S respectively produces,

$$\frac{\Delta q_i^D}{q_i^D} = \frac{\Delta q^D}{q^D} \left(\frac{q^D}{q_i^D} \right) - \frac{\Delta q_{CF}^S}{q_{CF}^S} \left(\frac{q_{CF}^S}{q_i^D} \right). \quad (13)$$

Multiplying the entire expression by $P/\Delta P$ yields,

$$\frac{\Delta q_i^D}{q_i^D} \frac{P}{\Delta P} = \frac{\Delta q^D}{q^D} \frac{P}{\Delta P} \left(\frac{q^D}{q_i^D} \right) - \frac{\Delta q_{CF}^S}{q_{CF}^S} \frac{P}{\Delta P} \left(\frac{q_{CF}^S}{q_i^D} \right). \quad (14)$$

The left hand term, is the price elasticity of demand for the dominant firm ϵ_i^D . The first term on the right hand side is the market price elasticity of demand ϵ^D , times the inverse of the market share of the dominant firm $1/S_i^D$, where $S_i^D = q_i^D/q^D$. The second term is the price elasticity of supply of the competitive fringe ϵ_{CF}^S times $1/S_i^D - 1$.⁵ Thus ,equation 13 can be rewritten as,⁶

$$\epsilon_i^D = \epsilon^D \left(\frac{1}{S_i^D} \right) + \epsilon_{CF}^S \left(\frac{1}{S_i^D} - 1 \right). \quad (15)$$

From Equation 15, we can analyze the effect that entry into the market will have on the price elasticity of demand of the dominant firm and subsequently the price set by the dominant firm. Consider first a situation in which there are no other firms in the market so that $S_i^D = 1$ so that the price elasticity of demand for the dominant firm is equal to the market demand. In this case, price will be equal to the monopolistic price. As firms enter the market, S_i^D decreases resulting in increasing the dominant firm's price elasticity of demand and a reduction in its pricing power. This is illustrated in Figure 1 by the fact that the residual demand curve is flatter than the market demand curve. The change in price elasticity begins a process by which a market with multiple price points based on branding sees its traditional price structure collapse and reform in a dichotomous price structure. The consumer no longer looks at specific brands, but at all brands versus all generics. An analogy to the pharmaceutical industry is below, where the wine industry currently shows the conditions for the same outcome.

⁵ To solve for this term recognize that $S_i^D + S_{CF} = 1$ or equivalently if we divide both sides by S_i^D we get $1 + S_{CF}/S_i^D = 1/S_i^D$ or $S_{CF}/S_i^D = 1/S_i^D - 1$.

⁶ Note that the sign of the second term was changed to positive since the elasticity of demand term is treated as a positive.

3. A MODEL OF MARKET SEGMENTATION-PRICE DIVERGENCE

Entry need not, however, have a price-reducing effect. For example, in the wine market, if the entry of varietal-specific, value wines attract only those consumers who are relatively price elastic, then those who continue to purchase higher priced wines, due to brand or price point loyalty, will be those who are relatively price inelastic. In this case, the market bifurcates with the price elastic segment characterized by the competitive fringe firms pricing near marginal cost. In the price inelastic segment, however, since the demand facing these firms consists of those consumers who are price insensitive, price need not necessarily fall, and may even rise.

Market segmentation resulting from low cost entry can be modeled by assuming the demand function for existing firms is composed of two parts, a cross-price elastic (price sensitive) segment and a cross-price inelastic (price insensitive) segment.⁷ The demand function for the existing firms, denoted i , can be shown as,

$$q_i^D = q_I(P_i) + q_E(P_i, P_j). \quad (16)$$

where the first term in Equation 16, $q_I(P_i)$, is the inelastic segment of the existing firms demand, which is a function of the price of the existing firms output. The second term, $q_E(P_i, P_j)$, is the elastic segment of the existing firm's demand, a function of the existing firm's price of output and the competitive fringe output.

The demand function for each of the $j \neq i$ competitive fringe firms is a function of their own price and the output price of existing firms,

$$q_j^D = q_j(P_j, P_i). \quad (17)$$

If we define the equilibrium price of the competitive fringe firms output as $P_j^* = P_j^*(n, P_i)$ where n is the number of competitive fringe firms, then the profit maximization problem facing the existing firm becomes,

$$\pi_i = P_i[q_I(P_i) + q_E(P_i, P_j^*(n, P_i))] - TC[q_I(P_i) + q_E(P_i, P_j^*(n, P_i))]. \quad (18)$$

Profit maximization with respect to own price produces the following first order conditions,

$$\begin{aligned} \frac{\partial \pi_i}{\partial P_i} = & P_i \left[\frac{\partial q_I}{\partial P_i} + \frac{\partial q_E}{\partial P_i} + \frac{\partial q_E}{\partial P_j} \frac{P_j}{P_i} \right] + q_I(P_i) + q_E(P_i, P_j^*(n, P_i)) \\ & - \frac{\partial TC}{\partial q_i} \frac{\partial q_I}{\partial P_i} + \frac{\partial TC}{\partial q_E} \frac{\partial q_E}{\partial P_i} + \frac{\partial TC}{\partial q_E} \frac{\partial q_E}{\partial P_j} \frac{\partial P_j}{\partial P_i} = 0. \end{aligned} \quad (19)$$

If the marginal cost of production is the same regardless of which market the output is sold, then

$$\frac{\partial TC}{\partial q_i} = \frac{\partial TC}{\partial q_I} = \frac{\partial TC}{\partial q_E}, \text{ so that the second part of Equation 19 can be rewritten as}$$

⁷ This analysis follows that of Frank and Salkever (1992).

$\frac{\partial TC}{\partial q_i} \left[\frac{\partial q_I}{\partial P_i} + \frac{\partial q_E}{\partial P_i} + \frac{\partial q_E}{\partial P_j} \frac{\partial P_j}{\partial P_i} \right]$. Equation 19 can then be expressed as,

$$\frac{\partial \pi_i}{\partial P_i} = \left[P_i - \frac{\partial TC}{\partial q_i} \right] \left[\frac{\partial q_I}{\partial P_i} + \frac{\partial q_E}{\partial P_i} + \frac{\partial q_E}{\partial P_j} \frac{P_j}{P_i} \right] + q_i(P_i) + q_E(P_i, P_j^*(n, P_i)) = 0. \quad (20)$$

The first term in brackets, on the right hand side, is the mark-up of price over marginal cost, which is positive for profits greater than zero. The second bracketed term is the effect on demand of a change in own price, $\partial q_i / \partial P_i$ and is negative for downward sloping demand curves. The final term is the firms output, q_i , shown in Equation 16.

Total differentiation of the first order conditions show that the entry effect on the price of the existing firm's output will be positive, $\partial P_i / \partial n > 0$, if as competitive firms enter the market with an output priced below the output of existing firms, the price elastic consumers purchase exclusively from the competitive fringe firms leaving the price inelastic consumers to be served by existing firms. This result is shown in Figure 2, where the demand curve for the price elastic segment becomes flatter resulting in lower prices, while the demand curve facing the price inelastic segment gets steeper resulting in higher prices.

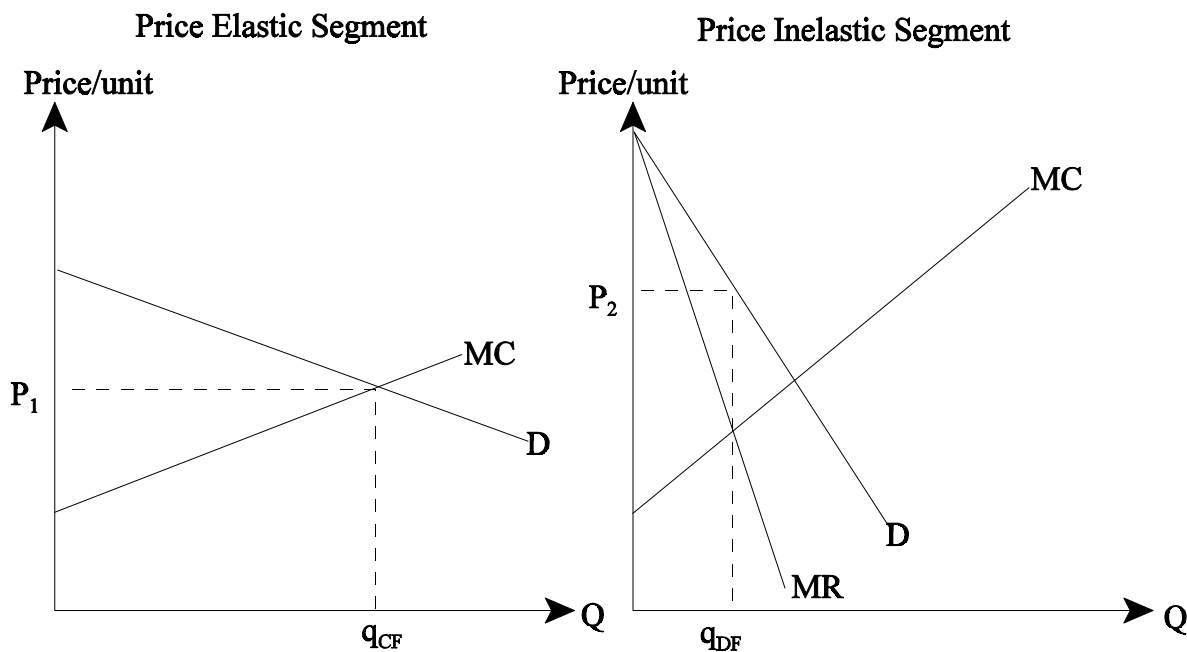


Figure 2
Market Segmentation

4. PRICE DIVERGENCE IN THE PHARMACEUTICAL MARKET

Much of the literature on the market segmentation-price divergence phenomena comes from the pharmaceutical industry. The pharmaceutical industry is unique in that patents and subsequent expiration create a natural experimental setting from which changes in the market structure can be observed. For example, Caves, Whinston and Hurwitz (1991), Grabowski and Vernon (1992), Frank and Salkever (1997), Suh et al. (1998) and Regan (2002) have all observed, to varying degrees, the market segmentation-price divergence phenomena in the market for pharmaceuticals after patent expiration. In particular, as generic manufacturers enter the market for a drug after patent expiration, the low-priced, generic drugs inevitably take market share away from the higher-priced, branded drug. However, while competition among generic manufacturers forces the price of competing generic drugs down, the branded drugs' prices often rise. This result is attributed to a market bifurcation, where one segment, consisting of generic manufacturers vigorously competing for consumers, results in low prices and expanding market share. In the market for branded drugs, as price sensitive consumers move to generic producers, prices of branded drugs rise for price insensitive, brand loyal consumers. Regan (2002) showed that "within two years of patent expiration, the average branded drug lost nearly 80 percent of its

market.”⁸ In the wine market, low-priced varietals have similarly grabbed a significant share of the market. The effect on price, however, has yet to be discerned. In the drug market, Regan showed that, consistent with the model’s predictions, the average price of branded and generic drugs increased with the number of generic entrants.⁹

5. PRELIMINARY EVIDENCE OF PRICE DIVERGENCE IN THE WINE MARKET

The model predicts that entry of low cost, varietal-specific wines resulting in market segmentation. If this occurs, we should observe a growing low price segment where recent entry of generic wines forces prices down and extracts consumers from adjacent price segments. Table 1 shows the average number of store keeping units (SKUs) for all California wines by price segment. Although the data is for California wines only, it does provide the first glimpse of market segmentation. Table 1, indicates that the lowest price segment experienced a positive growth rate of 33% in the number of SKUs (proxied here as market share). This increase came at the expense of the three adjacent price segments, which experienced a decrease in market share of 10%, 4% and 2% respectively. This is what is expected. Table 1 also shows an increase in the market share of “ultra premium” and “deluxe” price segments, consistent with a bifurcation of the traditional price point market into two markets, “value” and “premium.” The brand or price point loyal consumers are price inelastic, while value wine consumers are price elastic. As more data on price becomes available, a clearer picture of structural changes in the wine market will become more evident.

Table 2: Market Share by Price Point

	Suggested Retail Price								
	\$0-6	\$6-8	\$8-11	\$11-15	\$15-20	\$20-31	\$31-59	\$59+	Total
2002	287	282	422	730	1100	1373	1039	271	5504
2003	381	253	407	714	1203	1450	1102	297	5807
%Δ	33%	-10%	-4%	-2%	9%	6%	6%	10%	6%

Source: AC Nielsen WineScan Data

6. CONCLUSIONS

It is generally believed that price competition in the wine industry occurs within each price point. Wines are marketed to compete within specific price points with competition between price points not as common. The recent introduction of varietal-specific, value wines may change this model of behavior. These market entrants are not just competing in traditional price points, but also in other market segments. As consumers who normally purchase wines in higher prices

⁸ Ibid, pg 25.

⁹ Each additional entrant increased the average real branded price by about \$1.66. Ibid Pg. 25.

switch to lower priced wines, wineries are left in a precarious situation: either the firms lower price to compete with these new wines directly, which can result in lower revenue, or lose market share. The effects of this increased competition on the wine industry can be dramatic.

Conventional wisdom predicts that the recent entry of certain wines, such as value wines, would induce price reductions in the entire market. Upon first glance, this may appear to occur. Because of the popularity and proliferation of these new brands, the average price of wine may fall. However, this reduction in the average price of wine could be due to the rising market share and falling price of wine in lower price (price elastic) segments, even though the price of premium wines are rising in the shrinking, price inelastic market. A closer examination of the wine industry by price segment may reveal a significant change in the traditional price point structure, and show that this industry may have a new long-term structure. The entry of value wines may have the same effect as generic entry in the pharmaceutical market and result in a collapse of the current wine industry price segments. The implications of this change are great. Mid-priced wines, facing competition from lower priced wines, will see a declining market while wines in the low priced segment face a growing market characterized by fierce price competition. The upper price segment experience a shrinking market of highly price-inelastic consumers. The good news is that the low prices may be effective in penetrating the obstinate US market where the U.S. ranked thirty-fourth in per capita wine consumption worldwide, behind Slovakia but ahead of Latvia.¹⁰ Clearly, more research needs to be done. As more data becomes available, we can more clearly analyze market share and price behavior and identify any structural changes in the US wine market.

¹⁰ The California Wine Institute (2000).

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