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Analyzing Purchase Behavior for Domestic and Imported Dry Wines in the U.S. Market Using Panel Data

Nadica Koskarovska
University of Arkansas, Fayetteville

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Nadica Koskarovska
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_____
Michael R. Thomsen, Ph.D.
Thesis Director

_____
Bruce L. Ahrendsen, Ph.D.
Committee Member

_____
Lawton Lanier Nalley, Ph.D.
Committee Member

ABSTRACT

The objective of this study is to explore wine purchase behavior in the United States market, including different off-premise channels using AC Nielsen panel data and wine prices and rankings from the *Wine Enthusiast* database of wine reviews. The purpose of this thesis is to identify factors that impact customer loyalty to retail wine brands. In so doing my goal is to provide information that can be used to improve marketing efforts of small wineries that are seeking to grow into mainstream retail formats. The results suggest that efforts to build brand equity will be more successful if the brand can be placed within multiple retailers and channels. This suggests two things. First, efforts to expand the retail market should, to the extent possible, emphasize an expansion strategy with an aim towards broad exposure across retailers and formats in a specified geographic area. Second, in terms of building brand loyalty, a strong commitment to expansion would be more successful than an incremental "slow growth" type of an approach. Consequently, the volume needed to support expansion will require a significant augmentation to the production capacity of the winery. Regarding product mix wineries should emphasize growth through product lines that can make use of grapes that are suited for local production. The results of this thesis indicate that price, while being statistically related to each of the four measures of customer loyalty, is probably not the overriding concern when it comes to developing and maintaining customer loyalty. Efforts to optimize pricing might instead be aimed at product-push-type incentives to facilitate placement of the brand with retailers and thereby increase brand penetration within the market area. It would be a good strategy to use point-of-sale promotions to inform consumers about the winery, its story, values and to provide incentives to participate in winery visits or local wine tours.

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DEDICATION

Dedicated to mama Liljana, tato Kole and Trajce.

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Chapter 1: Introduction

Introduction

The US wine industry has experienced rapid growth over the past decade. The total number of bonded wineries in the US increased from 5,400 at the end of 2006 to over 6,850 by early 2010 according to US Alcohol and Tobacco Tax and Trade Bureau (Insel 2008, 68-73; TTB 2010, 1). While much of this growth is observed in California, wine tourism and on-site wine selling is an emerging trend in Middle America as well (WSJ 2007, W1-W12). McKenney reports that in 2009 there were 9 bonded wineries in Arkansas, 90 in Missouri, 17 in Kansas, 49 in Oklahoma, and 150 in Texas (McKenney February 15, 2009).

The development of small local wineries can have positive impacts for rural areas via wine tourism. Grapes used to supply wineries provide an important alternative crop for local farmers and winery visits can be a way to bring outside dollars into rural areas. In a study about Missouri wineries, Barham demonstrated that wineries have a significant effect on the local economy. She estimated that for each person employed in the wine sector, 0.66 other jobs were created elsewhere in the Missouri economy and that 79 cents were earned in other sectors for each dollar of revenue generated by the wine sector. Nationwide, the increase in the number of bonded wineries has gone hand in hand with increases in consumption. According to the Wine Institute, there was a 14.5 percent increase in per capita wine consumption from 2004 to 2008. Moreover, Insel confirms that wineries with annual capacity of up to 20,000 gallons sell primarily from their on-premises tasting rooms (Insel 2008, 71; Wine Institute Apr 13, 2010, 4). However, as these wineries grow, the on-site sales model is no longer sufficient and emerges a need to use other marketing channels. Dillon et al. examined the economics of establishing a small winery. They suggest that once a winery exceeds 10,000 gallons, it becomes necessary to

begin moving some volume through off-site retailers. Managing off-site marketing becomes more complicated as wineries expand. They argue that a full-time employee is needed to manage the marketing and delivery activities once a winery reaches 40,000 gallons in fermentation capacity (Dillon et al. 1994).

Off-site retailing has been a problem for smaller wineries with a regional identity. Cole et al. conducted exploratory research into the emerging Kansas wine industry. They noticed that retailers could play a big role in the promotion of small regional wineries. Their results showed that regional identity is an important reason why the customers would buy Kansas wines. Unfortunately, many retailers were not convinced of the quality of the wine, and were reluctant to promote Kansas wine, noting that Kansas is not a famous wine region. However, there were others that eagerly supplied their stores with local wines and voluntarily promoted them. Cole suggested that Kansas wineries could increase their acceptance among retailers by offering more point-of-purchase displays and promotional information and secondly by reducing the buying risk through return or exchange options programs (Cole et al. 2008).

Hanagriff, Lau and Rogers (2008) examined the Texas wine industry. According to them a major challenge for small regional wineries is increasing the awareness of the region on the broader retail market. In their study, they examined a variety of promotional efforts including the Texas wine website, printed advertisements, wine festivals and related activities, agro-tourism, marketing outreach, educational seminars, and billboards. Although these efforts are worthwhile, they noted the ability to place Texas wines in retail formats is necessary to improve visibility of the product, brand, and most importantly of the wine region visibility (Hanagriff, Lau, and Rogers 2008).

Barham (2003) reported that Missouri wineries produce several award-winning wines from new and not very common grape varietals. These wineries produce mostly unique wines that are unknown to the everyday wine drinker, rather than the more common grape varieties, such as Chardonnay, Merlot, Cabernet, etc. However, Missouri wineries seem to have been relatively more successful in raising awareness. According to a Wall Street Journal article (2007), the Missouri grape and wine industry had already established its own regional variety, Norton, calling it the "Cabernet of the Midwest." Also, local wines have been important to the growth in wine consumption within Missouri. In fact, 5.7 percent of the wine consumed within Missouri was locally produced (WSJ 2007, W1-W12; Barham 2003).

Wine distribution is an extremely important topic for small retailers. According to Centonze (2010), many small wineries do not have access to distribution channels, and they usually directly self-distribute to local retailers, restaurants, or directly to customers through various direct-to-consumer formats. One problem is that the number of distributors is limited (Centonze 2010). Insel (2008) reported that on average there are two distributors per state. Because of this, some small wineries have developed relationships directly with retail stores. Furthermore, Insel noted that this can be mutually advantageous as wine sales can be good profit generators for retailers and indirectly for the wine producers as well. Also, when people buy wine, they tend to complement it with certain foods which are usually more expensive, than if they did not buy wine. Barham (2003) emphasized that there can be complementarities between on-site sales through promoting winery visits and rural tourism and retail sales. The on-site and tourism-based efforts enable small wineries to get recognized by customers, which may pay off in repeat purchases through supermarkets and other retail channels. Insel (2008) summarized some of the key characteristics of the retail off-premise wine market. She observed that due to

the great number of brands and varieties, the market is highly fragmented. Consumers tend to look for variety and often choose between six to eleven brands per single purchase. However, turnover, in terms of customers, in wine is quite slow compared to beer and other alcoholic beverages. Another important aspect about purchase behavior is that 26 percent of American wine consumers consume two thirds of all the wine sales and purchase wines at least once a week (Insel 2008, 68-73; Barham 2003).

These retail characteristics pose opportunities and challenges for small wineries. Access to off-premise retail markets such as supermarkets, liquor stores, and wine shops is crucial if local wineries wish to increase their capacity. Very few customers will make on-site winery visits on a weekly basis; wineries lacking an off-site retail presence are missing out on serving the lucrative high-frequency segment of wine consumers. Retailers may be reluctant to take a chance by devoting shelf space to new local wines without proven sales records. Evidence from the Kansas wine industry cited above emphasized this challenge. Consequently, as small wineries develop relationships with retailers, they need to carefully plan and manage their marketing approach to assure that their wines are in demand, are perceived to be valuable to consumers, and contribute to the income stream of both the winery and the retailer.

Objectives

The objective of this study is to explore wine purchase behavior in the United States market, including different off-premise channels using AC Nielsen panel data and wine prices and rankings from the *Wine Enthusiast* database of wine reviews. The purpose of this thesis is to identify factors that impact customer loyalty to retail wine brands. In so doing my goal is to provide information that can be used to improve marketing efforts of small wineries that are seeking to grow into mainstream retail formats.

The specific research questions are:

- How important is price to brand loyalty in mainstream retail formats?
- What role, if any, do outside measures of quality play on loyalty to a brand of wine?
- What can be said about the relationship between the product offering and measures of brand loyalty? Specifically, how is brand loyalty impacted by the breadth and types of varietals marketed under the brand name?
- What role do demographic characteristics play on purchase behavior and loyalty to a wine brand?
- To what extent are different retail channels conducive to brand loyalty? Should small wineries emphasize particular channels as they move into retail distribution?

Description and outline of the study

My study includes data on over 150 wine brands sold in the U.S. market during the five-year period 2003 to 2007. The data are annual and are aggregated to the brand-level. The data set contains three key indicators of customer loyalty. These are: (1) the average frequency of purchase among customers buying the brand in question; (2) the percentage of customers that engaged in repeat purchases of the brand in question; and (3) among repeat purchasers, the number of days that elapse between purchase occasions for the brand in question. In addition to these loyalty measures, I also examine a fourth measure of retail performance. This is the average volume (750 ml equivalent) that is purchased on each occasion. These four measures are dependent variables in my empirical analysis. The independent variables are chosen to address the different components of the marketing mix: pricing, product attributes, promotion, and placement. Specifically, independent variables measure the price point of the brand; an indicator of the brand's quality; the diversity of wine varietals sold under the brand; the intensity of

merchandising activities; the brand's overall market penetration; the retail channels through which the brand is sold; and the demographic characteristics of the customers purchasing the brand.

The remaining portions of this thesis are organized as follows. In Chapter 2, I review literature that is relevant to the design of my study. While there has been little work specifically focusing on customer loyalty towards wines, there has been a large volume of work indirectly related to this question that is applicable to my study. Chapter 3 describes the data, objectives, hypotheses or *a priori* expectations regarding the empirical relationships between the dependent and independent variables, and the sources and methods used in developing the dataset. Chapter 4 presents the results of the study. Finally, Chapter 5 concludes the thesis and highlights the implications of these results for introducing local wines into off-premise retail channels.

Chapter 2: Literature Review

Introduction

The current literature addresses many facets and dimensions of the wine industry. The most interesting and applicable for this thesis are studies that address wine purchasing behavior, as well as purchasing behavior and customer loyalty in the general sense; wine demand studies; and hedonic pricing studies. I analyze and synthesize the research done in each of these categories for the US and the world wine industry, research in this field is relatively new and there are an insufficient number of studies based only on the US market to explain the entire phenomenon of wine purchasing behavior and brand importance.

Studies on Wine Purchasing Behavior and Brand Importance

Hussain, Cholette, and Castaldi (2007) conducted an econometric analysis of the determinants of wine consumption. Their data were collected from student-administered surveys that measured demographics, behavioral variables, and consumer knowledge about wine. Consumption was measured as the number of glasses per month consumed. Their findings indicate that knowledge of wine and consumption are positively correlated. There was a bimodal distribution of consumers, implying that light and heavy drinkers outnumbered moderate drinkers. Consequently, their proposed marketing strategy was to focus on the current "light" wine drinkers to influence them to consume more wine and substitute wine for other alcoholic beverages. Regarding price patterns, they found consumers purchase at different price points, with general concentration on wines under $15. Another important pattern is that consumers seek variety, so they go for cheaper, medium- or high-priced wines depending on their knowledge level and the type of occasion on which wine is consumed.

Hussain, Cholette, and Castaldi (2007) find that knowledge of wine is positively related with involvement in wine purchase and consumption. Moreover, many customers are confused when buying wine and are overwhelmed with the wine jargon used on the label. As wine knowledge increases among customers, it should not be expected that they will purchase more expensive wine, and US producers should have a price offering targeting most of the customers which is $15 or below. Findings indicate that demographic factors have an important influence on wine consumption and that whites and non-whites should not be considered to have the same preferences. Demographics appear to matter in wine consumption trends as well. Jung (2005) reports 31 percent increase in consumption among Hispanic adults compared to 11 percent increase among whites (Hussain, Cholette, and Castaldi 2007, 49-62; Jung 2005).

The millennial generation was born between 1977 and 1999. According to Nowak et al. (2006) this generation is an important market to consider for research on wine purchase behavior. Nowak et al. (2006) inquired into the buying attitudes toward wine and explored what could be done to enhance brand equity, including brand loyalty. Nowak et al. postulated that a positive customer experience should contribute to positive attitudes towards the brand and increased brand equity for the winery. Their results, based on tasting room surveys, suggested that product quality is the strongest predictor of brand equity and consumers would assess this quality using different product attributes such as price, brand name, awards, ratings, growing region, the winery's reputation, recommendations from friends, and the consumer's own senses. Aside from product quality, service quality made a great impression on the tasting room customers and thereby provides a means of improving the emotional bond between customer and brand. In conclusion, this research suggests that efforts to build an emotional connection with the customer can increase loyalty (Nowak, Thach, and Olsen 2006, 316-323).

Hall and Lockshin (2003) discuss outlook for consumer purchasing behavior. They stressed that brands are important but elaborated on other factors such as intrinsic and extrinsic cues, taste, brand, price, origin, packaging, quality, situation, perceived risk, and involvement. Because of the complex purchasing behavior and the weak correlation between attitudes and behaviors, they suggested that new proposed research should attempt to address all the important attributes in one "Brand Constellation" approach. Namely, this approach would include brand name, color of the wine, country, region, subregion, vineyard, price, discounts, and varietals within a panel data set to give more insight into the consumer purchasing behavior (Hall and Lockshin 2003, 1-21).

A new method to measure how consumers choose wine was examined by Lockshin et al. (2009). Their focus was on those aspects of a product and its promotion that consumers use to make the purchase decision. They incorporated a new marketing research technique of simulated retail shelves surveys, with actual wine bottles and labels. In this setting they were able to change several components of the label, closure, and bottle and elicit consumer preferences for specific use occasions. First, they tested the validity of this method and discovered that the survey answers were very similar to AC Nielsen market share data, with a correlation of 0.75. Five intrinsic wine attributes (brand, country of origin, price, price discount, and alcohol level) and four extrinsic attributes (label style, label color, closure, and medals) were included in the experiment. The results showed that the strongest influence was the brand of the wine. Second in importance was the price point. The most frequently chosen price was $12.99. Medals were third in importance followed by price discounts. Alcohol level also had a positive effect. Based on these results, Lockshin et al. (2009) identified three different segments of consumers: a brand driven segment (mostly influenced by brand and medal); a value for money segment (most influenced by rating and discount) and a price sensitive segment (low price and price discount

were most important). Wine producers and marketers can use results like these to target different market segments when making decisions with respect to designing labels and other marketing tasks (Lockshin et al. 2009).

Corsi, Casini and Rungie (2010) looked at the relationships between brands and attributes from a loyalty perspective and realized that this subject had not been sufficiently addressed in past studies. Their analysis used data covering a three-year period (2003-2005) and a sample from Italian consumers to focus on three product attributes: formats of packaging, prices, and quality designations. Their analysis showed that price was the strongest attribute, then format of packaging (.75-l bottles, 1-l carton or 3-l bag-in-box). Quality designation (awards, medals and other rating attributes of wine) was least associated with loyalty (Corsi, Casini, and Rungie 2010).

Halstead (2002) looked at the factors that influence purchase decisions for still (non-sparking) wines and the possible implication of these factors to improvements in the marketing mix of wine brands. He focused on the consumers' purchase behavior with regard to the effects of product cues, consumption occasion, and the consumer's sense of self in the UK wine market. After conducting four focus groups and doing qualitative research, his results suggested that consumers include several product cues for brand recognition. Wine tasting turned out to be the most important product measure after pre-conceptions for origin and grape-variety. Key selection criteria for buying wine included price, in accordance with country-of-origin preference, personal experience, label and word of mouth recommendations. Most importantly, his findings suggested that wine trial promotion is very important to companies within the wine distribution channel, and he questioned the use of mass advertising by wine producers as a brand awareness tool (Halstead 2002).

Supermarkets and other retailing centers offer numerous brands of wine, varying also in the price, grape variety, country of origin and other attributes. Romaniuk and Dawes (2005) investigated purchasing patterns based on different price tiers or price levels. Wines are extremely differentiated and advertised by their price range and so they assumed that the consumers would accurately remember the price paid for the wine purchase. To verify this assumption, they checked with an online wine-selling website to verify that most of the prices were accurate. Their findings indicated that customers were indeed buying across price tiers. Important to note is that they found no influence of same brand repeat buying towards the price tiers effect. Price tiers with higher penetration indicated increased average sharing with other price tiers categories. They argue that this creates a "double jeopardy" effect for small wineries in that the smaller the brand, the less the customers' share of the market and customers are buying less frequently as opposed to big brands. This study confirmed the price-based market structure in the wine category (Romaniuk and Dawes 2005, 57-64).

Studies on Wine Demand

I looked at several important and relevant wine demand research studies and what they had to say about the purchase patterns of wine consumers in the US as well other countries in the world for comparison purposes. To the extent possible, I am going to describe for each study the level of aggregation, the country where the study was conducted, and findings with respect to price responsiveness.

In order to discover the importance of wine within the overall alcoholic beverages demand, we can look at some examples from analysis on the Spanish wine market done by Angulo, Gil and Garcia (2000). They explored purchase behavior based on different alcoholic beverages for home consumption. Demographic characteristics discussed in this study were town

size, household size and age of the meal planner (the person that generally makes alcohol purchase decisions). The survey results suggested that the highest consumption for all alcoholic beverages was among two-member households. Their results suggested negative and significant own-price elasticity for all beverages, especially for wine. Beer and wine were significant substitutes while wine and spirits demonstrated a complementary relation. The probability of purchasing wine increased with an increase in household size. Young customers were less likely to buy wine over beer or spirits suggesting that wine is considered a more traditional (less fashionable or trendy) product on the Spanish market. Also, households with less educated members and located in smaller towns (less than 10,000 inhabitants) were more likely to buy wine. Gender differences were insignificant, indicating that both males and females had similar preferences for wine at home. Increases in income caused the expenditures for still wine to decrease and for the sparkling wine or cava (Spanish terroir's specific sparkling wine) to increase (Angulo, Gil, and Gracia 2001, 71-83).

Añez (2005) looked at wine demand at the varietal level in the U.S. market. He looked at both red and white varietals. More uncommon grape varietals such as Shiraz, Red Zinfandel and Fume/Sauvignon Blanc were price elastic and less susceptible to seasonal expenditure variations. However, high volume common wine varietals such as Chardonnay, Cabernet Sauvignon, Merlot and White Zinfandel were price inelastic and were highly susceptible to seasonal expenditure changes (Añez 2005).

A more recent study by Cuellar et al. (2008) explored wine varietals and different price points within each varietal. The results show a negative price elasticity for both white and red wine varietals. Their estimated income elasticity showed wine to be a normal good. There is slight difference between red and white wine price elasticities, the red wine seemed to be more

price elastic than white wine. On the other hand, white wine had significantly higher income elasticity than red wine. Furthermore, white wine consumers were more price responsive at lower price points whereas red wine consumers were more price responsive at higher price points. For both red and white varietals, income elasticity was stronger at upper price points (above $10). With few exceptions, results on own-price and income effects for specific varietals generally conformed to those for the aggregate red or white wines. Cross-price elasticity estimates demonstrated significant substitutability between red and white wine, but white wine consumers were slightly more loyal. In addition, among the different price points, consumers of the segment above $10 wines were more likely to switch colors than consumers in the lower price segments that were more loyal to their preferred wine color (Cuellar and Huffman 2008).

Davis, Ahmadi-Esfahani and Iranzo (2008) explored the demand for Australian wines in the US market using 2003-2005 ACNielsen data. They estimated a high degree of heterogeneity of consumers' preferences and different price elasticities for specific grape varieties. Their results suggest that Merlot and Cabernet Sauvignon face relatively elastic demand in the US, while rose wine demand is highly inelastic (Davis, Ahmadi-Esfahani, and Iranzo 2008, 401-417).

Fogarty (2008) conducted a meta-analysis using elasticities from various regions of the world. His findings suggest that the demand for alcoholic beverages had become less inelastic since the mid-1950s and income elasticity had been falling since the mid-1960s. Furthermore, his analysis supported the idea of the alcohol commodity group being a necessity meaning that the consumer reacted to price discounting with inventory behavior rather than with substitution behavior as had been previously predicted (Fogarty 2008).

Larivière et al. (2000) set up a demand system to allocate group expenditures across beer, wine and spirits in Ontario, Canada. They modeled group expenditures as a function of prices, per

capita income, advertising, demographics and trigonometric variables to account for seasonality. The estimation results showed that the demand for alcoholic beverages in aggregate is inelastic and expenditures on alcoholic beverages are unaffected by per capita income changes. Wines are price inelastic both in the short and long run, but the own-price elasticities for wine are close to unity. Another interesting fact from this study is that habit formation coefficients for wine are significant, therefore supporting the idea that the consumers develop their wine taste gradually (Larivière, Larue, and Chalfant 2000, 147-162).

Seale, Marchant and Basso (2003) conducted a study on imported and domestic red wine demand in the U.S. Import wine elasticities were included for five countries (Italy, France, Spain, Australia and Chile). In general, this study suggests that the US consumption of domestic wines exceeded the imported wines and therefore it gives an edge to the domestic wineries in this market. But the wineries should be careful when pricing their wines. When the income effect was considered, the US customers showed high price sensitivity. In accordance with the estimated own-price elasticity, increasing the price of US red wine by 1 percent could drop the quantity demanded by 1.6 percent (Seale, Marchant, and Basso 2003, 187-202).

Torisi, Stefani and Seghieri (2006) did a wine demand study in the Italian wine industry for red table wine packaged in tetra, plastic, and bag-in-box containers for four major brands using scanner data. Included in the data was the percentage of wine volume sold during promotional activities (when the original prices have been reduced by at least five percent for no more than six weeks). The Italian wine market is highly segmented, which is quite like the US wine market and therefore the method of this research can be utilized for US market analysis. They estimated a brand-level demand model with expenditure shares for each wine brand as the dependent variable and price and total expenditure for the group of wines as independent

variables. Elasticities were calculated in order to explore the price competition among selected brands and their substitutes. The volume of wine sold was significantly influenced by promotional activities. The amount sold of the prompted brand increased, while sales of other brands suffered. Own-price elasticities were elastic, ranging from -1.10 to -2.21, meaning that small changes in the price of table wine imposed remarkable changes in quantities purchased (Torrisi, Stefani, and Seghieri 2006, 391-403).

Hedonic Pricing Studies

Wine hedonic studies seek to explain the price of wine in terms of extrinsic and intrinsic qualities and outside factors such as weather. Intrinsic qualities include level of acidity, sweetness and other attributes that can be measured objectively. Extrinsic qualities are related to the product but are not physically a part of it and are also known as image variables (Fandos and Flavian 2006, 646-662). Other authors have argued that image variables may include the brand, the price, reputation, grape varieties, ranking, awards and the region of origin. In this section, I explain results from hedonic studies. These studies are connected to the customer loyalty in the sense that price formation is very complex subject and so an understanding of hedonic models could help to formulate a better understanding of this subject. Also, the relationship between price and quality rating is an important issue in my study. The studies reviewed below are from different regions of the world and reflect different sized wineries although I have chosen them with respect to applicable to small- and medium-sized wineries in US.

Lutzeyer (2008) estimated a hedonic price function for South African wines to determine the relation between wines' market price and their characteristics. Separate regressions were run for red and white wines. She concluded that for red wines, quality measured as ratings from wine magazines and blind tastings significantly impacted price deviations from average red wine

prices. Also, age or vintage had a significant impact on the price deviations. Only a limited number of red grape varietals, such as Pinot Noir, had a significant impact on the price. This grape varietal is typical for this region (WOSA 2009). On the other hand, for white wines, Lutzeyer (2008) found that the most important attributes impacting price were blind tastings and age or vintage of the wines. Ratings from wine magazines did not show significance in the models for white wines.

Carew and Florkowski (2008) investigated the price premiums in the British Columbia Wine Market for Australian red wine brands and their attributes. They used a hedonic wine price model setting the hedonic price function as an equilibrium price relationship that considers supply and demand of wine prices. The independent variables were measures of objective characteristics that were described on the bottle label. Data included weekly sales of red table wine for two years procured from liquor stores. Results showed that most brands were price discounted relative to the comparison brands. Some have price premiums, and the highest price premiums are due to superior reputation and exquisite quality. Having price premiums meant that price was positively correlated with the respective brand attributes. Grape varietals, although statistically significant, did not influence prices very much. Finally, this study shows that retailers could sell wine at different price points since the results of this hedonic price analysis show a wide range of price premiums and discounts resulting from the various attributes included in each brand (Carew and Florkowski 2008, 194-194-204).

Lecocq and Visser (2006) implemented hedonic pricing to compare the wines of two regions in France, Bordeaux and Burgundy, over time. The variables used are again wine label characteristics and rankings from an expert. Their objective in this study is to find the most significant variables that contribute to the price formation of each region's wine. Their results

showed little significance for the sensory (tasting) variables, jury grades, or ratings from experts in the Bordeaux equations. The ratings differed with greater significance in the Burgundy region due to different classification systems used in the wine growing regions. The variables with the most explanatory power were those associated with the label information and extrinsic variables such as rating, vintage and appellation (Lecocq and Visser 2006, 42-56).

Schamel (2003) explored California wines and applied a hedonic price model using data from nine annual wine competitions. Overall, the results confirmed that a wine's price is related to its own quality and to producer and regional reputations for quality. More specifically he drew three conclusions in this study:

1. Wine competition awards had a significant positive effect on prices suggesting that consumers are willing to pay for premium wines;
2. However, premiums that consumers are willing to pay were small. Consumers are becoming more knowledgeable about wine in general and they tend to not rely only on these ratings;
3. Among Californian wines, there is trend of regional differentiation and it is growing with the industry growth itself (Schamel 2003, 8).

Nerlove (1995) studied the relationship between market price and quality in the Swedish market. Own-price elasticity was estimated to be about -1.65 holding quality constant, which showed that Swedish consumers are price sensitive (price was an exogenous variable). Moreover, red wines were sold at discounts against white wines. From the analysis of intrinsic variables with price as the dependent variable, bouquet (floral aroma of the wine), astringency and mouth feel were significantly positively related to price. Acidity was negatively related to price. Another interesting finding was that Swedish consumers were paying a premium for

European wines. New World wines sold at a discount. Consumers also preferred white wine and dryer and less acidic wines (Nerlove 1995, 1697-1716).

In order to explore the impact of brand, origin, grape variety and retail outlet on wine prices, Steiner (2004) applied hedonic analysis. The data included Australian wines sold at retail outlets during 1994 in England and Scotland. He looked at the revenue impact of labeling changes at the retail level and at overall marketing implications. There are three important conclusions from his results. First, the quality of the sales channel was significantly valued by the consumers. Second, consumers valued regional origins jointly with grape varieties. Moreover, consumers considered these two variables as representatives for brands. The third important conclusion considers the impact of grape varieties. Cabernet Sauvignon, Chardonnay, Pinot Noir, Riesling and Sauvignon had a positive impact on price. On the other hand, Cabernet, Shiraz, Semillon, Semillon Chardonnay and Colombard-Chardonnay had negative impact on price (Steiner 2004, 287-307).

Constanigro, McCluskey and Mittelhammer (2007) compared red California and Washington wines. They worked under the assumption that the wine market is differentiated by several different price segments in addition to red and white wine segments. They estimated hedonic functions for different product-class categories and found that consumers value the same wine attributes differently across categories. Investigating separately each price segment of red wines (commercial, semi-premium, premium and ultra-premium) they found that Washington wines were sold for a discount in the premium and ultra-premium classes, but were no different from California wines in the commercial and semi-premium markets. Blended wines were sold for a high premium in the fine wines segment, while they were not different from Zinfandel wines in the inexpensive price segment. Merlots had the highest associated price premium in the

commercial segment, while Cabernets and Pinot Noirs were the most expensive ultra-premium varietal wines (Costanigro, McCluskey, and Mittelhammer 2007, 454-466).

Chapter 3: Data and Methods

Data

The data for this study were collected from two different sources. The first source was online ratings from the *Wine Enthusiast* magazine. These reviews were published between 2003 and 2007 and are available at the magazine's website (Wine Enthusiast Magazine 2010). The online database contains thousands of wine reviews, which have a degree of consistency across years because they are reviewed by a permanent panel of tasters (Strum 2010, 10). The reviews were searched by wine brand and the year of publication and were the source of information for grape varietals sold by each brand, vintages, prices and quality rankings. The second source was the Nielsen Answers database provided by the Nielsen Company and made available to me through the University of Arkansas's Walton College of Business. These data were the source for data on customer loyalty measures, demographic information, and additional characteristics of wine brands. It is important to make clear that the brand is the cross-sectional unit of analysis.

Table 3.1 below presents summary statistics for the variables described below. The reader should note that normalizations described in this chapter and used to facilitate the regression analysis described in Chapter 4 are not reflected in Table 3.1.

Table 3.1: Descriptive Statistics for Analysis Variables

	N	Mean	Std Dev	Min	Max
Dependent Variables					
Purchase Frequency (times per year)	376	1.70	0.35	1.06	3.00
Repeat Purchases (percent of buyers)	376	24.85	6.45	5.29	46.45
Purchase Cycle (days)	376	53.14	13.50	23.50	118.41
Units per Occasion (750 ml equiv.)	376	1.00	0.48	0.12	3.78
Explanatory Variables					
Brand Characteristics					
Price ($ per 750 ml equivalent)	376	18.42	15.79	5.00	117.00
Quality Ranking (scale of 80 to 100)	376	85.59	2.16	80.00	95.00
Penetration (%)	376	0.63	0.79	0.08	5.58
Price Deals (% of buyers using)	376	35.64	12.45	8.90	70.59
Coupons (% of buyers using)	376	0.71	1.55	0.00	12.99
Origin (1 if imported, 0 if domestic)	376	0.35	0.48	0.00	1.00
Varietals or Wine Type (Binary Variables)[A]					
Chardonnay	376	0.60	0.49	0	1
Pinot Grigio	376	0.25	0.43	0	1
Riesling	376	0.20	0.40	0	1
Sauvignon Blanc	376	0.32	0.47	0	1
Cabernet Sauvignon	376	0.54	0.50	0	1
Merlot	376	0.48	0.50	0	1
Pinot Noir	376	0.26	0.44	0	1
Shiraz	376	0.40	0.49	0	1
Zinfandel	376	0.22	0.42	0	1
Other White Varietals	376	0.23	0.42	0	1
Other Blush Varietals	376	0.06	0.24	0	1
Other Red Varietals	376	0.17	0.38	0	1
Red Blends	376	0.21	0.41	0	1
White Blends	376	0.07	0.25	0	1
Blush Blends	376	0.05	0.22	0	1
Retail Channel Importance (Percent of Sales)[B]					
Groceries with supercenters	376	55.42	13.07	15.19	89.10
Drugstores	376	2.51	2.79	0.00	21.74
Warehouse Clubs	376	14.22	12.01	0.00	66.06
All Other Channels	376	31.81	9.67	6.89	65.26

A. Binary variables indicating presence or absence of the varietal or type indicated.
B. Volume index. Each is normalized by volume through the grocery and supercenter channel.

Table 3.1: Descriptive Statistics for Analysis Variables (Cont.)

	N	Mean	Std Dev	Min	Max
Explanatory Variables (Cont.)					
Consumer Demographics (Dollar Volume Indexes)					
Income[C]					
Income (below $20,000)	376	25.00	29.54	0.00	262.92
Income ($20,000 to $30,000)	376	31.95	25.40	0.00	210.73
Income ($30,000 to $40,000)	376	51.76	37.00	0.43	344.35
Income ($40,000 to $50,000)	376	70.49	47.86	0.95	370.06
Income ($50,000 to $70,000)	376	93.96	44.55	13.29	366.17
Income (Higher income)	376	268.92	75.26	47.84	472.86
Age[D]					
Age (Female Head < 35 yrs)	376	62.79	34.20	0.00	243.44
Age (Female Head 35 to 44 yrs)	376	94.87	39.74	12.44	260.13
Age (Female Head 45 to 54 yrs)	376	109.43	39.51	16.29	303.85
Age (Female Head 55 to 64 yrs)	376	105.87	55.49	15.28	394.49
Age (Female head 65 yrs or older)	376	78.78	46.41	3.28	255.80
Household Size[E]					
Size (one member households)	376	86.89	34.72	24.47	233.34
Size (two member households)	376	138.27	33.86	39.29	244.74
Size (three to four member households)	376	82.88	28.23	14.70	192.01
Size (households of five or more)	376	65.13	57.57	0.00	530.15
Race and Ethnicity					
Race (African American)[F]	376	111.94	8.93	51.96	128.01
Race (Asian)[F]	376	32.01	31.26	0.00	295.69
Ethnicity (Hispanic)[G]	376	110.70	103.89	0.00	628.20

C. Volume index. Each is normalized by index for household with income in the $50,000 to $70,000 range.
D. Volume index. Each is normalized by index for households with a female head aged 45 to 55 years.
E. Volume index. Each is normalized by households with three to four members.
F. Volume index. Each is normalized by index for Caucasian buyers.
G. Volume index. Higher value indicates, account for larger share.

Dependent Variables

There are four dependent variables in this study. Each is measured at the brand level, and with one exception, was obtained from the Nielsen Answers database. In the case of this single

exception, the measure was a combination of information from Nielsen Answers and *Wine Enthusiast* ratings.

1. ***Purchase Frequency***. The first measure of brand loyalty is purchase frequency. This represents the average number of times that consumers bought the particular brand of wine each year. This average measure of frequency includes both one-time and repeat buyers.
2. ***Percent Repeat*.** The second measure of brand loyalty is repeat purchasers. This is measured as the percentage of total buyers of the brand who purchased the brand two or more times within a given year.
3. ***Purchase Cycle*.** The third measure of customer loyalty is purchase cycle. This is calculated as the average number of elapsed days between purchases among repeat purchasers. Note that this is a different measure than purchase frequency above in that it excludes one-time customers. Also, it is measured in days and so a smaller value implies greater loyalty.
4. ***Units per Purchase Occasion*.** The final measure is the average number of 750ml equivalent units bought by the average consumer on each purchase occasion. This was computed as total dollars per occasion as reported in Nielsen Answers data divided by the average price of the brand as recorded in the wine reviews for the year in question. The reviews contain consistent prices for 750ml equivalent units. See below for additional details on price measurement.

Independent Variables

Brand Characteristics

The first group of explanatory variables addresses brand attributes including price, quality, varietals sold under the brand name, country of origin, brand penetration and the magnitude of sale deals and coupons.

Price and quality. ***Price*** is measured as the simple average between the highest priced wine and the lowest priced wine within the brand. Prices are measure in dollars per 750ml units or equivalent. ***Quality*** is measured as ranking from the *Wine Enthusiast* professional tasters. Wines are rated on a scale of 80-100 with 100 being the best. Normally, ratings are provided for each varietal that is sold in the brand umbrella. To measure quality, I chose the ratings corresponding to the lowest and the highest priced varietals and took simple average for each brand. Overall, just over fifty percent of the brands in the Nielsen Answers data had wine reviews in the *Wine Enthusiast*. Brands having data from both sources were included in the study. Table 3.2 presents descriptive sample statistics for price and quality rankings for wine in the sample across all brands and over five years**.** The average price was $18, with a large standard deviation of $15. The minimum price was $5 and the maximum was $117. The ratings were less variable with average rating of 85 and a standard deviation of 2. The minimum rating was 80 and the maximum was 95 on a scale of 80 to 100. The correlation coefficient between price and rating is 0.70 and is significantly different than zero indicating that higher ranked wines do cost more.

Table 3.2: Sample Statistics for Price and Rank Variables for Wine across all brands and over five years

Variable	**Mean**	**Standard Deviation**	**Sum**	**Minimum**	**Maximum**
Price	18.42	15.79	6925	5	117
Rank	85.59	2.16	32182	80	95

Varietals. The types of varietals sold under a given brand name are measured through a series of binary variables taking a value of one if the brand sold the varietal or the varietal type in question and a value of zero otherwise. Many brands sold one or more of the following popular varietals (see figure 3.1): Chardonnay, Pinot Grigio, Riesling, Sauvignon Blanc, Cabernet Sauvignon, Merlot, Pinot Noir, Shiraz and Zinfandel. The model includes a separate binary variable for each of these varietals. There were numerous other varietals sold that were less common across brands and that are probably not as well known to the everyday wine customer. I note brands selling these other varietals by three variables labeled: ***Other White Varietals***, ***Other Blush Varietals*** and ***Other Red Varietals***. Each variable takes the value of one if the brand sold any of the several varieties shown in Table 3.2 below. Finally, some brands sold non-varietal specific wines. Three variables: ***Red Blend***, ***White Blend*** and ***Blush Blend*** are used to indicate whether brands sold non-varietal wines.

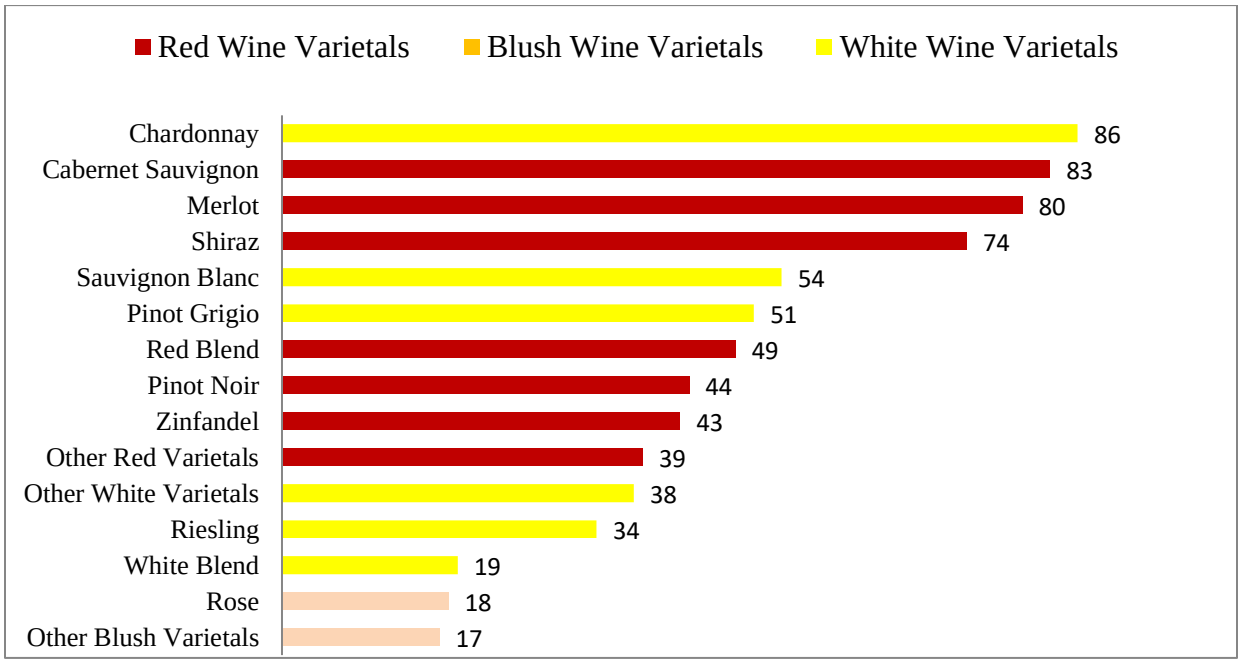

Figure 3.1: Number of Brands Selling Specified Wine Varietal Within the Database Used for Empirical Models

Table 3.3: Other Wine Varietals

Other White Varietals	Other Blush Varietals	Other Red Varietals
Chenin Blanc	Moscato	Barbera
Fume Blanc	White Cabernet Sauvignon	Cabernet Franc
Garganega	White Merlot	Carignan
Gewürztraminer	White Shiraz	Carmenère
Muscat	White Sangiovese	Corvina
Roussanne		Gamay/Valdiguie
Semillon		Lemberger
Symphony		Malbec
Torrontés		Meritage
Viognier		Montepulciano
Viura		Mourvedre
		Nero d'Avola
		Petit Sirah
		Primitivo
		Sangiovese
		Tempranillo
		Teroldego

Other Brand Characteristics. Other brand characteristics include origin of the brand, brand penetration, and the magnitude of the deals and coupons in wine merchandizing. ***Origin*** is measured as a binary variable, taking a value of one if the wine is imported or taking a zero value if it is a domestic wine brand. ***Brand Penetration*** is measured as the percentage of total US households that purchased the wine brand at least once over the full period. It is a potentially important control variable, because it proxies availability in the marketplace. ***Percent Deal*** is measured by the percentage of buyers that purchased the wine on sale deal. ***Percent Coupon*** is measured by the percentage of the buyers that purchased the wine with a coupon.

Channel Characteristics

Brands vary by the distribution channel through which they are sold. In this study, I control for the importance of these distribution channels. Nielsen Answers provides information on the following channels:

- Grocery Stores and Supercenters,

- Drugstores,
- Warehouse Clubs and
- Other Channels.

Channel usage is measured by percentage of total buyers of the brand purchasing through the channel in question. In my study, I normalize each channel measure by the percentage of buyers purchasing through the grocery and supercenter channel. Thus, I have three channel variables for ***Drugstores***, ***Warehouse Clubs*** and ***Other Channels*** each measured as a ratio to the grocery and supercenter channel.

Demographic Characteristics

Demographics are measured as dollar volume indexes from the corresponding demographic group. The dollar volume index identifies demographic groups that accounted for above or below average dollar volume purchases for a given product group, category or brand. My study includes demographic data for age, household size, the number of children in the family, race, ethnicity, and income per household.

***Age*.** Age is represented by indexes for age ranges below 35, between 35 and 44, between 45 and 54, between 55 and 64 and over 64 years of age. Each index is normalized by the 45-54 year old category. Consequently, there are four age variables in the model.

***Household size*.** Indexes are available for households of various sizes. The categories are: one member households, two member households, households of three to four members, and five or more member households. Each index was normalized using the index for two-member households as a base. In total, there are three household size variables included in the model.

***Children*.** Presence of children in the households and their respective ages are represented by four indexes. The categories are: no children less than 18 years of age, any children less than 6

years of age, any children between 6 and 12 years of age, and any children between 13 and 17 years of age. Each index is normalized by the index value from the no children less than 18 years of age category.

***Race and ethnicity*.** There are three race categories: Caucasian, African American and Asian. Out of these three categories I normalized for the Caucasian category and so have two race variables. The only category for ethnicity is Hispanic, which is volume index purchased by Hispanic households.

***Income*.** There are several categories of income included in the Nielsen Answers data in $10,000 increments. The categories for income are as follows: less than $20,000; $20,000-$39,999; $40,000-$49,999; $50,000-$59,000; $60,000-$69,000. The data are problematic because during the early years (2003-2005), there is only one category for high-income individuals: $70,000 and higher. However, in 2006 and 2007 there are two categories: $70,000-$99,000 and $100,000 and higher. Because these are volume indexes, there is no straightforward way to aggregate the different high-income categories into a consistent measure over time. To address this issue, I first compared the brand-level average values for the $70,000 and higher index from the earlier years with the average values for the $70,000-$99,000 and $100,000 and higher categories from the later years. The mean absolute deviation was much lower for the 100 and higher index than for the $70,000-$99,000 index. Consequently, my solution was to use the $70,000-higher index for 2003-2005 and the $100,000-higher index for the 2006-2007 as a measure of the overall importance of high-income customers to the wine brand.

Hypotheses

There are several conclusions we can draw from the literature review and economic theory that help form *a priori* expectations about the relationship between the independent variables and dependent variables.

Price

I expect price to affect each of the dependent variables in this study. Specifically, I expect negative relationship between the price and the purchase frequency, percent of repeat purchasers, and purchased units per occasion. I would expect a positive relationship between purchase cycle (number of days) and price. The reason for these hypotheses is the simple law of demand which states that as the price increases, the quantity of wine purchased would decrease (Cuellar and Huffman 2008).

Quality and Rating

Assuming rating score conveys quality, I expect positive relationship between rating score and purchase frequency and percent repeat purchase. For the purchase cycle, I would expect a negative relationship with ratings. Other things equal, a higher quality wine would lead to more satisfied customers who would be more likely to repeat purchase of the brand and on a shorter purchase cycle. On units per occasion, one might expect similar positive relationship with rating. However, if customers rely more on their experience for everyday purchases and use ratings only as a guide for a gift purchase or for special occasion purchases, then rating may be negatively correlated with the customer loyalty measures.

Varieties

White wines are consumed more frequently than red wines. Consequently, I would expect brands with white varietals in their product lines to perform better on the standard customer loyalty

measures being examined here. Common grape varietals such as Merlot, Cabernet Sauvignon and Chardonnay are also frequently purchased, and so brands with these varietals offered may also do better on customer loyalty. On the other hand, more knowledgeable wine buyers could be expected to look for brands that include less common and unique varieties such as Torrontes, Tempranillo, Viura, etc. To the extent that more knowledgeable wine buyers are more loyal, one may expect brands with unique varieties to perform better in customer loyalty.

Brand Penetration

Brand penetration is a measure of the availability of the brand. If the brand is not available for purchase this will have negative effect on most customer loyalty measures. Consequently, I would expect a positive relationship between brand penetration and both, purchase frequency and repeat purchasing. For the same reason I would expect a negative relationship between purchase cycle and penetration. However, I would expect no relationship between penetration and units per occasion because this measure should not be dependent on the probability of the customer encountering the brand.

Deals and Coupons

The impact of price deals and coupons could impact the customer loyalty measures in different ways. It is natural to postulate a positive relationship between deals and purchase frequency and units per occasion. Other things equal, a price deal may make additional purchases more likely, and customers would be expected to increase volume purchased on each occasion as they seek to take advantage of the deal. Though, the effect of deals on the percentage of repeat customers or purchase cycle is more ambiguous because a price deal is likely to induce an increased number of one-time purchasers. Similar arguments might apply to the effect of coupons on customer loyalty. Yet, it would not be surprising if the coupons' effect was found to differ in important

ways from the effect of deals. Coupons are different in that taking advantage of coupons often requires that customers play a more active role in pre-planning the brand purchase, and brand-loyal customers may be more likely to exhibit such behavior. Coupons may also be indicative of concerted efforts on the part of wineries to increase brand loyalty, e.g., by couponing certain customer segments, whereas price deals may be more indicative of other merchandising and inventory management practices being used by the winery or downstream retailers.

Channels

Channels through which the brand is represented are potentially important controls when analyzing the brand loyalty measures but forming clear *a priori* hypotheses can be difficult. By their nature, warehouse clubs usually encourage bulk purchase and so it is natural to expect a positive relationship between the measure of units per occasion and the volume moving through warehouse clubs. Though, customers likely visit warehouse clubs less frequently than other channels and so volume through warehouse clubs could be associated with lower purchase frequencies and longer purchase cycles. Warehouse clubs normally provide a much-reduced selection of brands compared to other retail channels and this may translate into customers who regularly purchase wines through warehouse clubs showing much stronger loyalty, simply because there are fewer alternatives. One would expect a negative relationship between units per occasion and volume moving through the drugstore channel because drugstore visits are generally not the major grocery shopping trip and it is likely that wine purchases are more likely to be unplanned. Due to the different buying patterns associated with each channel, forming and comparing expectations about other channels is very difficult. The impact of these settings on brand loyalty will depend, to some extent, on whether customers use these channels for routine purchases or for special occasions shopping.

Income

Findings from the literature reported earlier in Chapter 2 indicate that wine is a normal good. In this respect, one would expect customers with higher income levels to purchase wine with greater frequency and in greater volumes. This may translate into greater brand loyalty. However, to the extent that higher income customers seek more variety or are more risk-taking in their purchase behavior, one may see lower values for purchase frequency and percent repeat purchasers and longer values for purchase cycle among high-income customers.

Brand Origin

According to one study of the US wine market, customers are expected to be more loyal to domestic wines (Seale, Marchant, and Basso 2003, 187-202). Regardless, wine origin is a reasonable control variable for the analysis of brand loyalty.

Demographic Controls

I am not developing *a priori* hypotheses on the specific effects of the demographic variables included in the analysis. However, the literature review above indicates that demographic characteristics are generally important to explaining wine purchase behavior and that their effects tend to vary depending on cultural and geographic context. Consequently, the demographic variables described above are expected to be important control variables in the analysis of the brand loyalty measures considered here.

Methodology

Advantages of Panel Data

The data used in my study can be described as panel data, which means they represent measurements taken from cross sectional units over time. According to Gujarati (p 638) “The combination of time series with cross-sections can enhance the quality and quantity of data in

ways that would be impossible using only one of these two dimensions." As noted earlier in Chapter 2, Hall and Lockshin advocated usage of panel data for modeling purchase behavior of wines arguing that such data could provide clearer indications of the hierarchy of cues or attributes used in wine choice and could thereby better predict repurchase probability (Hall and Lockshin 2003, 13-15). Specifically, panel data are advantageous because there is generally heterogeneity within the cross-sectional units and this can provide important information about the problem being analyzed. Second, panel data often contain more variability because they combine variation among the cross-sections with variation over time and this can alleviate multicollinearity problems. Third, as noted by Kennedy (2008), panel data enable better analyses of dynamic adjustments especially in cases where knowledge of individual dynamic reactions is crucial to understanding the problem being studied. Finally, when the time series from available units of interest is too short for separate time series analysis, panel data may provide the only way to longitudinally analyze the data (Yaffee 2003, 6-18).

Random Versus Fixed Effects Models for Panel Data

Panel data models take into account the cross-sectional and time variability of the information analyzed for estimating the parameters. Two panel data models are typically used: the fixed-effects panel data model (equation 1) and the random-effects panel data model (equation 2):

$$y_{it} = \eta_i + \beta x_{it} + \vartheta_{it} \qquad (1)$$

$$y_{it} = \alpha + \beta x_{it} + (\eta_i + \epsilon_{it}) \qquad (2)$$

where:

i = 1 … N, identifies the cross-sections

t = 1 … T, identifies the time periods

η_i = cross-sectional heterogeneity

ϑ_{it}, ϵ_{it}= random disturbances.

The difference between one model and the other lies in the relation between the cross-sectional heterogeneity (η_i) and the random disturbance. In a fixed-effects panel model, heterogeneity is considered fixed, while in a random effects panel, heterogeneity is defined as the composition of a common fixed part plus a specific random one for each individual.

In this thesis I am using the random-effects model. A commonly used test to distinguish between fixed or random effects is the Hausman Test and its application is found to be relevant for making the decision when there is no certainty about the relationship between x_{it} and the disturbance (Rubio and Yague, 2009). However, there are other considerations that motivated my decision to use the random-effects model. There are some drawbacks of the fixed-effects model within the context of my study that are associated with the need to estimate the fixed-effect term for each brand. The first is a loss of degrees of freedom. In my data, the number of cross-sections is very large relative to the number of time periods. The second is that it is impossible to make inferences about the impact of the explanatory variables that do not vary within the brand. This is especially a problem for measures described above on the brand origin and varietals sold under the brand name. For these measures, there is often no variability within a given brand over time but understanding the role that varietal offering plays in customer loyalty is important to the overall objectives of the study. As stated by Greene (2003), the random-effects model is a regression with a random constant term, with distinctive advantage of allowing for time-invariant variables to be included among the regressors. The random-effects estimator is also more efficient, especially when the cross-sections represent a sample from a large population, as is the case in my study. According to Wooldridge (2002) whenever there is a large

number of random draws from the cross sections, it makes sense to treat the unobserved effects as random draws from the population.

Applied estimator and description of software used

The mixed procedure within SAS version 9.1 was used to estimate the random effects models (SAS Institute 1999, 1111-1113, 1114). One potential statistical problem is that brands vary in volume purchased and the measures being used in my models are typically aggregates to the brand level. Thus, heteroskedasticity is of concern. Fortunately, the Nielsen Answers data provided the number of raw buyers for each brand, and I used this as weighting variable in the mixed procedure to address the heteroskedasticity concern. Raw buyers is explained in the AC Nielsen Homescan user guide as the unprojected (raw) number of product group or category buying households who also purchased the product group or category in the channel/retailer (ACNielsen 2006, 104).

Chapter 4: Results

In this chapter I describe the main results of the analysis. Recall from the previous chapter that four brand loyalty measures are examined using random-effects panel data models. Results of these models are reported in Table 4.1, which provides estimates organized into several broad categories of explanatory variables. The organization of this chapter follows the same outline as the table.

Controls for household size and controls for presence of children in the household were highly correlated. Consequently, two specifications of the models were used, one with controls for household size and another with controls for the number of children. Results were robust to this difference in specification and so Table 4.1 and the discussion below are based on findings from the model with controls for household size.

Brand Characteristics

Price. As hypothesized, the price of the brand shows a negative relationship with purchase frequency and the percentage of customers repeat purchasing the brand. Also, as expected, higher prices are statistically associated with longer purchase cycles (longer times between purchases among repeat customers). However, the significance of the estimated price effects in each of these models is marginal (at the 10 percent level). The effect of price on units per occasion is negative and highly significant (at the one percent level). While price does seem to have the expected effect on brand loyalty outcomes, it is noteworthy the estimated coefficients in each case are quite small. For example, the elasticity of purchase frequency with respect to price is -0.02. The results indicate that price does affect brand loyalty but not by a great deal.

Quality Ranking. Quality rankings were not statistically significant with the first three brand loyalty measures in Table 4.1. Quality rating was significant and negative in the model for units

per purchase occasion and so more highly rated wines were purchased in smaller volumes. Based on Table 4.1, the elasticity of units per occasion with respect to quality rating was -3.00.

Market Penetration. Table 4.1 shows that penetration is very important to the first three brand loyalty measures. In each case it is statistically significant at the 1 percent level, is of the expected sign and is quite large in magnitude. This shows that frequency, repeat purchases, and the length of purchase cycle among repeat customers is driven to a large extent by availability of the brand in the marketplace. Market penetration had no statistical effect on the units per purchase occasion. As argued earlier in chapter 3, this is not surprising because units per occasion are unlikely to be influenced by exposure to the brand.

Promotional Activities. Promotional activities such as sale deals and coupons generally had no statistical effect on the brand loyalty measures. The one exception is that the purchase cycle among repeat customers does decrease as importance of deals increases. This relationship is significant at the 10 percent level. The finding suggests that, if anything, deals primarily affect existing customers, those that already have exposure to the brand and make it more likely that these customers will buy the brand again on another shopping occasion. However, it is important to note that the estimated effect is small in magnitude.

Origin. The results presented in Table 4.1 provide no evidence that any of the brand loyalty measures depend on whether wines are imported or are of domestic origin.

Varietals and Wine Types

An interesting finding is that frequency, the first measure of brand loyalty, is not at all statistically related to any of the explanatory variables measuring the varietals or type of wine. These variables do appear to have an impact on the percentage of customers that repeat purchase the brand and, on the rapidity (purchase cycle) with which these repeat purchases occur.

Specifically, brands with Riesling and Zinfandel in the product-mix tend to have a greater percentage of repeat customers, while brands with Cabernet Sauvignon in the product-mix tend to have a lower percentage of repeat customers. The positive and significant association with repeat purchase may indicate that customers are more brand loyal when they find everyday white or blush wines that they especially like. Zinfandel is an important red varietal, but the greatest volume of Zinfandel grape is processed as white Zinfandel, a popular blush varietal (Anez, 2005). Riesling is also a popular white varietal. The significant and positive sign on the variable measuring the presence of other, less common white varietals is consistent with this explanation. The negative and statistically significant coefficients associated with Cabernet Sauvignon and other, less common, red varietals could indicate that these wines are being consumed on more unique occasions and that there is less opportunity for customers to become familiar with the corresponding brands.

The number of days in the purchase cycle does decline for some of the popular varietals. Specifically, brands selling Merlot or Sauvignon Blanc have coefficients that are negative and statistically significant. Brands offering less common white varietals tend to have longer purchase cycles. There is a bit of a tradeoff in that the presence of these rare varietals appears to increase the percentage of repeat customers, but they tend to wait longer between purchases. Interestingly, brands that sell blush blends are repeatedly purchased on a considerably reduced cycle than brands that do not. The coefficient estimate indicates that the purchase cycle decreases by six days when the brand includes a blended blush wine. These blends are often marketed as inexpensive, everyday wines and that may explain this finding.

Finally, presence of specific varietals or wine types does not have a meaningful impact on units sold per purchase occasion. There is a negative but small statistical relationship between

units sold and brands offering Shiraz, a popular red varietal; brands with less common red varietals; and brands with red blends.

Retail Channels

Findings with respect to retail channels suggest that brands that are more heavily distributed through drugstores are purchased more frequently and are more likely to be repeat purchased. Brands that are more heavily distributed through warehouse clubs were also more likely to be repeat purchased. This later finding may be due to the limited selection available in the warehouse club format. Interestingly, there is no statistical evidence that brands emphasizing distribution through warehouse clubs sold more units per occasion.

Income

Findings with respect to income indicate that brands with more volume going to the lowest income group (under $20,000 per year) were statistically more likely to be repeat purchases on a more rapid cycle and experienced greater volume sales on each purchase occasion. Otherwise, brands with greater volumes sold to households with incomes in the $30,000 to $40,000 range had greater overall purchase frequencies. Where brands with greater volumes sold to the highest income category had lower overall purchase frequencies. This latter finding would be consistent with higher income customers being more likely to exhibit variety-seeking behavior in wine purchases and may also reflect the large number of brands in the mid- to upper-price ranges.

Demographic Controls

Household Age. Brands emphasizing the youngest households were purchased more frequently but were less likely to be repeat purchased. That said, those customers that did repeat purchase these brands did so on a reduced cycle but tended to buy lower volumes per purchase occasion.

Brands emphasizing older households were purchased less frequently and those with strongest sales to households over 65 years experienced longer purchase cycles and reduced units per purchase occasion.

Household Size. There is no statistical relationship between brand loyalty and volume sales going to households of different sizes.

Race and Ethnicity. Brands with greater volume sales to Asians and Hispanics were purchased less frequently. Brands emphasizing Asian customers were also less likely to be repeat purchased, were purchased on a longer cycle, and generally experienced lower unit sales per purchase occasion. Brands emphasizing African American customers were less likely to be repeat purchased but those customers that did repeat did so on a reduced purchase cycle.

Table 4.1: Estimated Coefficients for Random Effects Models for Brand Loyalty Measures (Total Obs. = 376)

Dependent Variables												
	Purchase Frequency (times per year)			Repeat Purchases (percent of buyers)			Purchase Cycle (days)			Units per Occasion (750 ml equiv.)		
Explanatory Variables	Coef.	t-ratio		Coef.	t-ratio		Coef.	t-ratio		Coef.	t-ratio	
Intercept	2.114	3.022	**	24.540	1.659		39.432	1.252		4.587	5.691	***
Brand Characteristics												
Price ($ per 750 ml equivalent)	-0.002	-1.863	*	-0.053	-1.939	*	0.113	1.948	*	-0.016	-10.798	***
Quality Ranking (scale of 80 to 100)	-0.001	-0.094		-0.018	-0.105		0.141	0.383		-0.035	-3.723	***
Penetration (%)	0.189	5.520	***	3.384	4.719	***	-3.329	-2.015	**	0.009	0.210	
Price Deals (% of buyers using)	-0.001	-0.813		-0.033	-1.092		-0.107	-1.666	*	0.000	-0.241	
Coupons (% of buyers using)	0.011	1.246		0.298	1.576		-0.366	-0.920		0.008	0.803	
Origin (1 if imported, 0 if domestic)	-0.020	-0.412		-0.057	-0.057		-2.463	-1.009		-0.041	-0.651	
Varietals or Wine Type [A]												
Chardonnay	0.054	1.643		1.116	1.598		-2.262	-1.525		-0.020	-0.539	
Pinot Grigio	0.020	0.547		-0.260	-0.348		0.459	0.279		0.011	0.271	
Riesling	0.061	1.375		1.701	1.814	*	-1.190	-0.591		0.005	0.100	
Sauvignon Blanc	0.045	1.217		-0.390	-0.501		-3.142	-1.842	*	0.006	0.128	
Cabernet Sauvignon	-0.035	-0.980		-1.527	-2.027	**	-0.367	-0.231		-0.051	-1.259	
Merlot	-0.007	-0.215		-0.548	-0.802		-3.267	-2.281	**	0.024	0.663	
Pinot Noir	0.027	0.672		0.329	0.391		-0.544	-0.298		-0.042	-0.890	
Shiraz	-0.044	-1.381		-0.654	-0.971		1.353	0.944		-0.078	-2.116	**
Zinfandel	0.056	1.388		2.102	2.488	**	-1.093	-0.596		0.004	0.088	
Other White Varietals	0.046	1.133		2.574	3.024	***	3.515	1.927	*	-0.040	-0.856	
Other Blush Varietals	-0.042	-0.699		-2.980	-2.366	**	4.404	1.631		-0.034	-0.485	
Other Red Varietals	-0.037	-0.936		-2.145	-2.571	**	0.540	0.304		-0.112	-2.458	**
Red Blends	0.044	1.199		1.523	1.968	*	1.916	1.184		-0.117	-2.838	***
White Blends	-0.068	-1.125		-1.310	-1.025		-0.790	-0.296		0.031	0.447	
Blush Blends	0.016	0.255		-0.797	-0.618		-6.042	-2.091	**	-0.037	-0.508	
Retail Channel Importance [B]												
Drugstores	0.022	3.089	***	0.281	1.922	*	-0.488	-1.488		-0.012	-1.393	
Warehouse Clubs	0.001	0.531		0.059	1.679	*	0.098	1.207		0.001	0.348	
All Other Channels	-0.002	-0.884		0.029	0.762		-0.017	-0.205		0.001	0.255	

* Asterisks indicate significance, * at the 10 % level, ** at the 5 % level, and *** at the 1 % level. See footnotes at the end of table.

Table 4.1: Estimated Coefficients for Random Effects Models for Brand Loyalty Measures (Total Obs. = 376) (Cont.)

	Dependent Variables											
	Purchase Frequency (times per year)			Repeat Purchases (percent of buyers)			Purchase Cycle (days)			Units per Occasion (750 ml equiv.)		
Explanatory Variables	Coef.	t-ratio		Coef.	t-ratio		Coef.	t-ratio		Coef.	t-ratio	
Consumer Income [C]												
Income (below $20,000)	-0.030	-1.130		-0.684	-1.215		-3.021	-2.501	**	0.064	2.063	**
Income ($20,000 to $30,000)	0.028	0.687		-0.017	-0.021		0.283	0.158		0.027	0.591	
Income ($30,000 to $40,000)	0.075	3.226	***	0.305	0.622		-0.466	-0.454		0.026	1.008	
Income ($40,000 to $50,000)	-0.010	-0.728		-0.012	-0.039		0.320	0.508		-0.002	-0.117	
Income ($70.000 or higher)	-0.001	-2.852	***	-0.007	-1.333		0.018	1.623		0.000	0.078	
Age [D]												
Age (Female Head < 35 yrs)	0.042	1.788	*	-0.842	-1.686	*	-2.776	-2.614	***	-0.059	-2.192	**
Age (Female Head 35 to 44 yrs)	-0.021	-0.833		-0.022	-0.040		0.651	0.573		0.023	0.790	
Age (Female Head 55 to 64 yrs)	-0.001	-2.849	***	-0.001	-0.182		0.017	1.350		0.000	-0.298	
Age (Female head 65 yrs or older)	-0.001	-2.046	**	0.011	1.400		0.035	2.168	**	-0.001	-2.185	**
Household Size [E]												
Size (one member households)	-0.046	-1.560		-0.146	-0.235		0.447	0.339		-0.004	-0.132	
Size (two member households)	-0.001	-1.318		0.015	1.400		0.028	1.210		0.000	-0.587	
Size (households of five or more)	0.000	1.597		0.007	1.093		0.005	0.376		0.000	-1.055	
Race and Ethnicity												
Race (African American)[F]	0.000	-0.821		-0.026	-2.739	***	-0.083	-4.150	***	0.000	0.016	
Race (Asian)[F]	-0.001	-3.928	***	-0.006	-1.989	**	0.019	3.267	***	0.000	-2.056	**
Ethnicity (Hispanic)[G]	-0.051	-2.455	**	0.291	0.670		0.392	0.409		-0.022	-0.882	

* Asterisks indicate significance, * at the 10 % level, ** at the 5 % level, and *** at the 1 % level. See footnotes below.

A. Binary variables indicating presence or absence of the varietal or type indicated.

B. Volume index. Each is normalized by volume through the grocery and supercenter channel.

C. Volume index. Each is normalized by index for household with income in the $50,000 to $70,000 range.

D. Volume index. Each is normalized by index for households with a female head aged 45 to 55 yrs.

E. Volume index. Each is normalized by households with three to four members.

F. Volume index. Each is normalized by index for Caucasian buyers.

G. Volume index. Higher value indicates, account for larger share.

Chapter 5: Recommendations

Introduction

The findings presented in Chapter 4 suggest several relatively straightforward recommendations. The purpose of this chapter is to outline these recommendations. Also, I address some limitations to the study and provide some suggestions for future work.

Recommendations

Expansion Strategy. With exception of units per occasion, the most significant driver of customer loyalty measures was exposure in the retail marketplace. This has important implications for small wineries as they move into mainstream retail formats. The results suggest that efforts to build brand equity will be more successful if the brand can be placed within multiple retailers and channels. This suggests two things. First, efforts to expand the retail market should, to the extent possible, emphasize an expansion strategy with an aim towards broad exposure across retailers and formats in a specified geographic area. For example, it may make sense to focus on a metropolitan area close to the winery's premises and work to develop broad exposure within that area as opposed to focusing on a few retailers with an aim towards broader, but less saturated, geographic coverage. Of course, there are other considerations that may affect this decision and the costs of serving multiple retail accounts need to be considered. Second, in terms of building brand loyalty, a strong commitment to expansion would be more successful than an incremental "slow growth" type of an approach. Consequently, the volume needed to support expansion will require a significant augmentation to the production capacity of the winery. Aside from the brand loyalty issues examined here, production costs considerations appear to also favor an abrupt expansion. Dillon et al. (1994) provide evidence that as capacity expands from 20,000 gallons (about the largest size that can rely exclusively on tasting room

sales), wineries are at a production cost disadvantage until they reach capacities of 80,000 to 100,000 gallons.

Product Mix. The key finding from the study is that brands with the most popular and common varietals in their product mix appear to have no meaningful advantage when it comes to brand loyalty. This is probably good news for small wineries in Middle America. Noguera et al. (2005) show that costs of establishing and operating vineyards for grapes such as Chardonnay, Merlot, Cabernet Sauvignon and other cold-hardy *Vitis (V.) vinifera* varieties are much higher (in some cases more than twice as high) than the costs of grape varieties that are more suited to production under continental climate conditions. In addition, production of common *V. vinifera* varieties requires more intense management (Noguera et al. 2005) and probably greater risk, both of which would be unwelcome at a time the winery is undertaking a significant expansion and embarking on efforts to cultivate new retail accounts. Instead, wineries should emphasize growth through product lines that can make use of grapes that are suited for local production. This is not to say the product lines should be narrow or limited. There is a relatively large spectrum of grape varieties that are suitable for different types of wines and styles of wine and that can be feasibly grown in continental climates (see Noguera et al. 2005).

Pricing Strategies. The results of this thesis indicate that price, while being statistically related to each of the four measures of customer loyalty, is probably not the overriding concern when it comes to developing and maintaining customer loyalty. Most small wineries will have already established price points for the wines beings sold through their tasting room. As these wineries expand and seek to build brand equity in other retail formats, their success in doing so is probably not going to require dramatic changes to the retail price point. Efforts to optimize

pricing might instead be aimed at product-push-type incentives to facilitate placement of the brand with retailers and thereby increase brand penetration within the market area.

Promotional Strategies. Findings indicate that promotional activities, specifically couponing and sale deals, are not that important to brand loyalty. Although, ignoring the potential for point-of-sale promotions is probably not good advice for small wineries seeking to expand into retail sales. Earlier findings, reviewed in Chapter 2 of this thesis, provide substantial evidence that wine tastings are important and so is the extent to which the customer identifies with the brand. Given that small wineries will likely be expanding into retail markets that are in relatively close proximity to the existing tasting room, it may be a good strategy to use point-of-sale promotions to inform consumers about the winery, its story, values and to provide incentives to participate in winery visits or local wine tours. An infrequent and pleasant winery visit coupled with a ready presence of brand in everyday retail markets is likely a successful way to increase brand-loyal customers.

Limitations and Suggestions for Future Study

The main qualification to the recommendations presented above relates to the data used in my analysis. The brands considered were, generally, larger and marketed on a broader geographic scale than would be typical for a small winery in Arkansas, Missouri, or similar areas. This was largely a result of the source data that were available for analysis. Despite this concern, the data do contain quite bit of variation across wines, price points, and channels. Furthermore, the data do reflect actual customer sales and demographics in the retail wine market and would be representative of what small wineries would face as they enter these markets.

There are ways to improve upon this study in future research efforts. First, the data available from ACNielsen were from 2004-2007. Incorporating newer data could make the results more

robust and would better show the effect of the recent economic downturn. Second, data on origins of wines was limited. Additional data on AVA (American Viticultural Areas) or place of origin (for the rest of the world) could potentially provide important insights, due to 'terroir characteristics' of small wineries. Third, prior studies suggest that wine knowledge and consumers' attitudes are important to purchase behavior and having data measuring these factors would be quite useful. Finally, around 40 percent of all the wine is sold through bars, restaurants and wine clubs and this was not included in my data (Datamonitor. 2009, p.15). Factors driving loyalty in these channels as well as interactions between sales for away-from-home consumption and at-home consumption would be interesting to incorporate into future studies.

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