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Grapevine or Informed Selection: Significance of Quality Attributes in India's Emerging Wine Market

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Abstract

Indian wine market is in a nascent state as compared to its counterparts in Europe, America and Asia. However, with rapid growth in GDP and consequent changes in lifestyle, the absolute size of the market is growing rapidly. The market size was about Rs. 3 billion in 2008 and by 2015 it had already reached Rs. 6 billion. Wine is a highly differentiated product, characterized by the presence of multifarious quality attributes. In this context, it becomes imperative to know the premiums attached to different wines and their attributes, resulting from selections made by producers and consumers. We undertake a hedonic price analysis of retail wine prices and their quality attributes. Results indicate that *Ceteris Paribus*, there is no premium attached to red wines in general over white wines. Reserve wines and a select few red wines do earn a premium though. Substantive premium is earned by foreign brands. Wines with higher alcohol content, club-shaped bottles, and cork closures carry a premium over other types of wines. Results may give cues both to producers and consumers on what new wines they could produce or consume.

Key Words: Indian Wine Market, Hedonic Pricing, Wine Quality Attributes, Red Wine, Emerging Markets

JEL Classification: L15, L66, D49

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1. Introduction

Wine was known to Indians since Vedic times. *Circa* 700 BCE, the great Sanskrit grammarian Panini had defined alcoholic beverages with various names including one called *Kapisayana*, which was made from grape juice (Pillai, 1997). Later, *circa* 320 BCE, Kautilya, in his treatise *Arthashastra* made reference to two wines, Kapisayana and Harahuraka (Kangle, 1972). These two names were not mere generic references to liquors, for Kautilya provided list of other liquors such as *medaka* distilled from rice; *prasanaa* made from betelnut and barley; *maireya* made from jaggery, pepper, and fruits; and, medicinal Aryurvedic alcohols such as *asawas* and *arishtas* made from wood-apple, molasses, honey and other ingredients. The two specific wines Kautilya referred to, are the early examples of appellations based on geographic indicators (GI), for Kapisayana and Harahuraka were the wine-producing north-western regions of the Indian empire under Chandragupta Maurya (Mookerji, 1966). Consumption of wine did not seem to be a taboo in Vedic and Mauryan period, i.e., during the period extending beyond 1st millennium BCE. Even during the Golden Age of the Gupta dynasty *circa* 5th century CE, celebrated playwright Kalidas made abundant references to wine in his Sanskrit dramas.

However, post-Vedic texts such as the codes of conduct called *smrutis* and the Buddhist religious texts discouraged consumption of alcohol (Bose, 1922). Advent of west Asian religions into India also meant that conservative attitudes to consumption of alcoholic beverages continued, although the late-entrant European colonialists did not shun alcohol. In independent India, one of the Directive Principles of state policy, codified in Article 47 of the Constitution of India also discouraged consumption of alcohol. Adopted in 1950, it clearly stated, "The State shall endeavour to bring about prohibition of consumption, except for medicinal purpose, of intoxicating drinks and drugs which are injurious to health" (GOI, 1949). Today, if a few Indian states such as Gujarat, Bihar, and Nagaland have banned alcohol consumption, most of the others have high levels of taxation on alcohol sales. Moreover, central government has imposed customs duty of 150 per cent on wine imports. Furthermore, while domestic production and consumption of Indian made foreign liquors (IMFL) such as whisky was possible due to abundant availability of molasses, wine production was constrained by limited cultivation of grapes in India. Altogether, both figuratively and literally, Indian wine consumer was in a predicament echoed by the 13th century Persian poet Rumy – "Either give me more wine or leave me alone!" (Barks, 1995).

Official discouragement notwithstanding, indicators are that production and consumption of wine in India is going to pick-up significantly. Firstly, with a projected population of 1.4 billion, India is likely to overtake China as the most populous country in the world by 2022 (UN, 2015). Thus, the absolute size of the Indian market is going to be large. Secondly, as borne out in studies by Anderson and Wittwer (2016) and Jiao (2017), while wine consumption in traditional wine-producing countries would continue to fall, macroeconomic growth-phase of emerging markets in Asia would play a major role in driving the global demand for wine. This is corroborated by the fact that India has had the fastest GDP growth in the world in recent years and that she is expected to continue with this trend in the future. Lastly, winds of change are blowing in India–Mindful of generating rural and agricultural employment with a bend towards sustainable production, Indian states such as Maharashtra have given 100 per cent excise duty exemption on wine production till 2021.

With this context in mind, it becomes imperative to have a holistic understanding of the Indian wine market. Towards this end, in Section 2 we give a brief description of the size and structure of both global and Indian wine market. In comparison to other food products, quality attributes of wine are quite multifarious. In a nascent but rapidly growing Indian wine market, it is important to know what kind of wines are being sold in India, which quality attributes fetch a premium and whether or not consumers and producers are making informed selections regarding price of wine and its quality attributes. Therefore, in Section 3 we give a brief summary of the quality attributes of wine, refer to a few studies conducted in understanding the market preferences, and describe the hedonic price analysis methodology that we employ for studying Indian market. Thereafter, in Section 4 we introduce the data and the variables used for the analysis and report the estimated econometric relationship between wine price and wine attributes. Finally, in Section 5 we make concluding observations.

2. Global and Indian Wine Market

Data for 2015 indicates that the global wine production has crossed 28 billion litres. Of the total, four countries that dominate production are France, Italy, Spain and the US with a combined market share of close to 60 per cent. Similarly, four countries that dominate world wine consumption are the US, France, Italy, and Germany with a market share of 41 per cent. Significantly, China has already emerged as a major wine producer and consumer with a global market share of 4 per cent and 6.5 per cent, respectively. In comparison, Indian wine market is in a nascent state with global market share of about 0.04 per cent and 0.07 per cent, respectively (WI, 2017).

If we look at India's modern history starting with her independence in 1947, a limited amount of wine was being produced in the state of Goa till late 1960s. In the early 1970s, Shaw Wallace set up a winery at Hyderabad for its 'Golconda' range and UB Group started a winery at Baramati in collaboration with Bosca of Italy (Grypon, 2017). However, the real push for production of grapes and wines on an organized scale was received in 1980s when Champagne Indage plant was set up in 1984 in the state of Maharashtra (ILO, 2009). Later, Mahagrapes, a consortium of about 15 farmer cooperatives was formed in 1991 to promote exports of table-grapes from Maharashtra. While the grape varieties required for wine making were different than the table-grape varieties, this initiative gave a big push to the production of grapes in Maharashtra. To give further boost to this organic growth, 2001 industrial policy of the state of Maharashtra announced a planned creation of Wine Parks in grape growing districts such as Nashik and Sangli. Importantly, under this policy, excise duty on production of wine was waived till 2021. With these developments starting from 1980s, wine production in India in general and Maharashtra in particular increased significantly. Today, with more than 8000 acres under wine-grape cultivation in India, Maharashtra alone accounts for about 92 per cent of the total acreage (Gawande *et al*., 2017). Within Maharashtra, Nashik itself accounts for 80 per cent of the wine-grape cultivation, earning the epithet 'the wine capital of India'.

The rise in production of wine-grapes is a reflection of growing demand for wine. As per one estimate, the value of wine consumption in India in 2008 was about $60 million or about Rs.3 billion (JBC, 2008). Thereafter, average sales of wines have risen at an annual rate of about 12 per cent during the period 2009 and 2014. This growth rate was higher than the annual sales growth in whisky and beer by an average rate of about 3.5 per cent. (Holland, 2017). Today there are about 2.5 million wine consumers in India who consume a total of about 24 million litres of wine. Of the total wine consumption, more than 80 per cent of it is in metropolitan areas of Mumbai, Delhi, Bangalore, Goa, and Pune; with Mumbai alone accounting for almost 40 per cent of the total consumption (ILO, 2009).

In order to serve these consumers, there is severe competition among wine brands, both domestic and foreign. For example, there are a total of 93 wineries in India of which 75 are in Maharashtra alone (TOI, 2016). Moreover, the list of wine importers in India is also growing with every passing year. Today, there are more than 300 wine importers in India (Export Genius, 2017). In 2015, of the total consumption of wine in India, 70 per cent of it was accounted for by domestically produced wines and imports were valued at $28 million (Rs. 1.8 billion) accounting for rest of the 30 per cent. Domestic brands include quite a few names such as Sula, Fratelli, Four Seasons, Grover and York. Foreign brands also exist among the domestically produced wines, for India allows 100 per cent FDI in

wineries. In the past, companies such as Moet Hennessy, Vuove Cliquot, Diageo, E&J Gallo, and Pernod Ricard India have operated in the domestic market. Alongside, there are wines that are directly imported from abroad. Of course, while India is a net importer of wine, among the emerging economies, she also exports small quantities of wine. For example, in 2016, India's wine exports had reached $8.35 million, 70 per cent of which went to Holland, UAE, Japan, Qatar, and France, in that order (CID, 2017).

The above description indicates that Indian wine industry has already acquired the stylized features of a monopolistically competitive market with intra-industry trade; where numerous wine brands, both domestic and foreign, are competing to capture consumers' attention. It may be a niche market; however, the absolute size of the market just cannot be ignored. For example, wine production of domestic Indian brands was 11.5 million litres in 2015, which was larger than that of the countries such as Belgium, Luxembourg, and South Korea. Similarly, India's wine consumption of 16.2 million litres in 2015 was larger than that of the countries such as Turkey, Luxembourg, and the Philippines (WI, 2017). Moreover, as mentioned earlier, with the continuing prospect of being the most populous country with the fastest growing economy; and, consequent urbanization, exposure to foreign cultures, and changing lifestyle, Indian wine industry is poised to grow rapidly in the foreseeable future.

3. Wine attributes and Research Methodology

In a nascent but rapidly growing multi-billion rupee Indian wine market, is there awareness about quality attributes of wine, and, are producers and consumers making informed selections keeping the wine attributes in mind? This question is important, for unlike other food products, wine has multifarious hidden and sensory quality attributes. For example, among others, one is the appellation based on GI, which identifies a particular wine with a particular growing region. In fact, as per the GI registry of the World Trade Organization (WTO), no wine from any part of the world but from Champagne county in France can be called as Champagne. Apart from region of origin, there are many important attributes to wine such as colour (red/white/blush pink), fizz (still/sparkling), grape variety and blend, and methods of producing, storing, bottling, and sealing. Some claim that these boil down to five basic attributes– sweetness (or dryness), Acidity (tart), tannin (bitterness), fruit (dark/light flavours), and body (alcohol). Organoleptic test to ascertain some of these quality attributes has a six-stage 's' process - see, swirl, sniff, sip, swish, and swallow or spit.

Of course, consumers may not go through the details of all quality attributes or do formal testing every time they consume wine. However, if wines of various kinds are being produced and sold

among a certain clientele in major metropolitan regions of India, then the repeat purchase mechanism would ensure that wines are being traded for their select choices of attributes and for their specific prices. If data on wine prices and their attributes are available at a point in time, it could enable one to find a relationship between the price of a wine and its multiple attributes. This may give clue to the importance or the lack of it, attached to different quality attributes of wines. And, if one is able to discover the importance of different quality attributes of wine, producers could come up with newer blends and/or educate consumers about the specific quality attributes.

Numerous studies have been conducted on understanding the quality attributes of wines and the choices consumers make in wine markets around the world (e.g., Perrouty *et al*., 2006; Gil and Sánchez, 1997; Lockshin *et al*., 2009). A comprehensive review of this literature is covered by Lockshin and Corsi (2012). Among other features, this literature review documents studies conducted on comparisons of old world and new world wines and markets, segmentation of wine-consumers in developed countries, and value attached by consumers to sustainable or green wine practices. The review also suggests that there has been a predominance of one-off convenience sample studies which are difficult to interpret for generalizable results. Although wine quality and its relationship to pricing is studied for old world and new world countries (Bombrun and Sumner, 2001; Corduas *et al*., 2013; Estrella Orrego *et al*., 2012; Roberto Luppe *et al*., 2009) hardly any studies have been conducted for emerging markets, and, the relationship between grape variety, wine quality, and consumer behaviour has remained under-explored. A study by Camillo (2012) did cover an online survey in China which received a little more than 400 responses. In this study, intrinsic factors such as health-related motivation and knowledge acquired through tasting were found to be important. Moreover, among other things, extrinsic factors such as brand, country of origin, and visits to wineries were also identified as the influencing factors among the Chinese. Camillo, however, does mention that other emerging markets such as India need to be studied. The need for such a study also becomes imperative from the observation by Jiao (2017) that emerging markets are sensitive to macroeconomic business cycles, and, demand, not from developed markets, but from emerging markets would be a powerful factor affecting wine prices.

In this context, we address the gap in this literature by studying the Indian wine market by applying Rosen's (1974) theory of hedonic prices and spatial equilibrium. Essentially, this involves a cross-sectional analysis of wine prices and wine attributes at a point in time, where the repeat purchase mechanism ensures different consumers and producers settling on selection of different wines, wine quality attributes, and their retail prices. In a spatial equilibrium among competing wines, price of any particular wine would turn out to be the sum total of the shadow prices of the various attributes of the

wine. For example, Schamel *et al*. (1998) estimated a hedonic pricing model for US wine market. Their study showed that the estimated price elasticity of sensory quality was larger for white wine, indicating that U.S. consumers were willing to pay a higher quality premium for white wine compared to red wine. The results also suggested regional reputation and individual quality indicators being more important to U.S. consumers of red wine. They concluded that differentiating wines on the basis of regional origin as a quality attribute may have a higher payoff for regions primarily growing red wine.

Following Rosen (1974) and Schamel, Gabbert and Witzke (1998), we characterize the utility maximization problem of a consumer as follows:

(1) $$\text{Max } U = f(W, X) \qquad \text{s.t.} \qquad M - P_W - X = 0,$$

where arguments of the utility function U are wine (W) and a composite numeraire good (X) representing all other goods. W is a vector of N attributes of wine, where amount of its Kth attribute is denoted by W_K. M is the income and P_W is the price of wine. We make an implicit assumption that per period a consumer purchases one bottle of wine and that the price of the numeraire good is normalized to 1. The marginal rate of substitution (MRS) between the Kth attribute of wine and the numeraire good X is given by:

(2) $$\text{MRS} = \frac{\delta f(W,X)/\delta W_K}{\delta f(W,X)/\delta X}.$$

In equilibrium, when utility (U) is maximized, the MRS must be equal to the ratio of the shadow price of the attribute W_K and the price of X. X being the numeraire good, therefore, the following equilibrium condition emerges:

(3) $$\text{MRS} = \frac{\delta f(W,X)/\delta W_K}{\delta f(W,X)/\delta X} = \delta P_W/\delta W_K,$$

where $\delta P_W/\delta W_K$ represents the marginal implicit price of the wine attribute W_K.
Further, the utility function can be written as:

(4) $$U = f(W_1, \ldots, W_K, \ldots, W_N, M - P_W).$$

Solving (4) for an explicit functional form for P_W by keeping utility at its maximised value U^* and keeping choices of W_{-K} constant at their optimal values Z_{-K}*, one can generate a consumer's bid curve B as:

(5) $$B = g(W_K, W_{-K}^*, U^*).$$

Ceteris paribus, the bid curve B shows the maximum amount that a consumer would be willing to pay for wine as a function of the attribute W_K. Higher the amount of W_k in W, higher would be the bid

price B. Thus, B will be a positively sloped function with respect to W_K. Moreover, we assume diminishing marginal utility with respect to W_K, and, therefore, the bid curve B would be a concave function with respect to W_K. Based on different consumers' preferences/incomes, there would be different bid curves, say $B^I(W_K)$ & $B^J(W_K)$ for two different consumers I and J.

Similarly, on the supply side, we can sketch out an offer curve C for a representative wine producer with respect to the attribute W_K as follows:

(6) $$C = h\,(W_K\,,\, W_{-K}^*,\, \pi^*).$$

The offer curve C of a representative wine producer shows the minimum price at which it would be willing to sell a unit of wine as a function of the attribute W_K while keeping all other attributes (W_{-K}^*) and profit (π^*) at the optimal level. The offer curve C is positively sloped with respect to W_K, for additional amount of W_K can be offered only at a higher price. Moreover, offer curve C is a convex function with respect to W_K, for it exhibits increasing marginal cost of providing additional units of W_K. Based on different wine producers' production technology and cost, there would be different offer curves, say $C^R(W_K)$ and $C^S(W_K)$ for two different wine producers R and S.

In a monopolistically competitive market for wines, there are different wine producers selling different kinds of wines to different consumers at different prices. Producers must be coming out with wines that they differentiate on the basis of the very many wine attributes. Similarly, consumers must be choosing wines on the basis of the varying combinations of the wine attributes going into the making of a wine. In the marketplace, a spatial equilibrium of the tangencies of the bid and offer curves would decide which wines get sold at what price. If one has a cross-sectional data on wine prices and the quality attributes of wines, the equilibrium relation between wine price and quality attributes can be estimated econometrically in the following form:

(7) $$P_W = v\,(W_1, \ldots, W_K, \ldots, W_N),$$

The coefficient of the attribute W_k in the estimated linear regression equation (7) would be $\delta P_W/\delta W_K$, which we described in equation (3) as the marginal implicit price of the attribute W_K. Of course, while the best fit estimated equation (7) need not be linear, the coefficients would measure the relative premium attached to the attributes among themselves.

4. Data, Regression, and Analysis

The spatial equilibrium concept underlying hedonic price analysis warrants that data points be collected at a particular point in time. Keeping this in mind, data on wine prices and wine attributes were collected on a single day on 27th March 2017. The city of Mumbai is the commercial capital of

India and the largest consumer of wines accounting for close to 40 per cent of the wine sales in India. Therefore, the data was collected in Mumbai from one of the largest suburban grocery stores, Haiko Supermarket located in Powai. A total of 206 data points were used for which relevant information about the quality attributes was available and quantifiable. The wines consisted of domestic brands, foreign brands produced domestically, and imported brands. We identified quite a few quality attributes of wine that a consumer would know by reading the label and by physical examination of the wine bottles. The key attributes can be classified into regional affiliation of brands, wine-grape varieties, physical attributes of the wine and the bottle, alcohol content, and vintage. The description of the variables is provided in Table 1 below.

Of the total 206 observations, about 55 per cent of the wines were red wines. Another 12 per cent were of the Reserve category. While the definition of a Reserve wine varies, it signifies that the wine has been aged for at least a few years and kept in oak barrels. For example, Spanish Reserva is a wine that must be aged for 3 years and the wine must be kept in oak barrels for at least 6 months during the 3-year period (WF, 2014). Similarly, on an aesthetic dimension, about 27 per cent of the wine bottles had a club shape rather than a cylindrical one. Most of the attributes of such kind are captured by dummy variables taking value 1 or 0. Moreover, alcohol content of wines varied from 8 per cent to 14.5 per cent. Furthermore, price of wines ranged from Rs. 500 per bottle to as high as Rs. 8647 for Champagne. Among various regions, price of Indian brands varied from Rs. 500 to Rs. 1500; price of old-world wine brands from countries like France, Italy, Spain, and others varied from Rs. 1500 to Rs. 6000; and price of new-world wine brands from Chile, US, Argentina, Australia and others varied from Rs. 1250 to Rs. 5000. The way dummies are defined, the base dummy observation turns out to be young (as opposed to reserve), non-sparkling, domestically produced, Indian white wine brand, stored in cylindrical bottle with non-cork closure, and made from mixed grape varieties.

To choose the functional form for the hedonic price equation (7), a particular Box-Cox transformation of the variables is used for which the data fits well. Since all independent variables except ALCHL (alcohol content) are dummy variables taking values 1 or 0, transformations such as the Log-Log, Lin-Log, and first-differences could not be used. Exponential functional form fits the data best which can be described by the equation:

(8) $$P_W = e^{[\beta_0 + \sum_{K=1}^{33} \beta_K W_K]}.$$

Converting the equation in its logarithmic form, one can estimate the following equation econometrically:

(9) $$\ln P_W = \beta_0 + \sum_{k=1}^{33} \beta_K W_K.$$

Table 1: Variable Definitions and the Wine Count

Variable	Definition	Wine Count
PRICE	= Retail Price of Wine, (Rs/750 ml) [Minimum Rs. 500, Maximum Rs. 8647]	206
NWWB	= 1 if New World wine brand, else 0	58
OWWB	= 1 if Old World wine brand, else 0	92
CHMP	= 1 if it is a Champagne, else 0	02
SPRK	= 1 if it is a Sparkling wine, else 0	25
RED	= 1 if it is a Red wine, else 0	114
PINK	= 1 if wine has Blush Pink colour, else 0	22
CLUB	= 1 if the bottle has a club shape, else 0	54
CORK	= 1 if the bottle has cork closure, else 0	130
CHBL	= 1 if the wine is Chenin Blanc, else 0	10
RSWH	= 1 if the wine is Riesling White, else 0	02
VGNR	= 1 if the wine is Viognier, else 0	06
CHRDN	= 1 if the wine is Chardonnay, else 0	16
SVBL	= 1 if the wine is Sauvignon Blanc, else 0	16
CBSV	= 1 if the wine is Cabernet Sauvignon, else 0	14
SNGV	= 1 if the wine is Sangiovese, else 0	08
SHIRZ	= 1 if the wine is Shiraz/Syrah, else 0	16
GRNCH	= 1 if the wine is Grenache, else 0	02
ZNFDL	= 1 if the wine is Zinfandel, else 0	04
MRLT	= 1 if the wine is Merlot, else 0	23
PNNR	= 1 if the wine is Pinot Noir, else 0	04
MRCB	= 1 if wine is Merlot + Cabernet, else 0	10
MROT	= 1 If wine is Merlot + Other, else 0	01
SHCB	= 1 if the wine is Shiraz + Cabernet, else 0	06
SHOT	= 1 if the wine is Shiraz + Other, else 0	02
CHRPN	= 1 if wine is Chardonnay + Pinot Noir, else 0	04
MTSV	= 1 If Montepulciano Sangiovese, else 0	02
MLBC	= 1 if the wine is Malbec, else 0	02
CRMNR	= 1 if the wine is Carmenere, else 0	02
PNTG	= 1 if the wine is Pinotage else 0	04
MTPCN	= 1 if the wine is Montepulciano, else 0	04
CHNT	= 1 if the wine is Chianti, else 0	02
RSRV	= 1 if the wine is a Reserve, else 0	25
ALCHL	= Alcohol Content in wine, (% ABV) [Minimum 8% & Maximum 14.5%]	206

The above function is valid only for positive values of P_W, which makes sense as wine prices will always be positive. Here the coefficient β_K demonstrates a constant percentage change in P_W due to a unit change in the quality attribute W_K; i.e., $\beta_K = [(1/P_W)*(\delta P_W/\delta W_K)$. Moreover, the Constant term β_0

captures all other factors that potentially could affect the wine price and is not covered by the wine attributes we have captured in the equation. The results of the estimation are reported in Table 2 below.

Table 2: Hedonic Price Regression Estimation

Variable	Coefficient Value	T-Statistics
Constant	5.502[a]	16.126
NWWB	0.782[a]	11.232
OWWB	0.988[a]	13.665
CHMP	1.002[a]	5.432
SPRK	0.079	0.654
RED	0.026	0.267
PINK	0.017	0.165
CLUB	0.167[b]	2.386
CORK	0.095[d]	1.933
CHBL	-0.131	-1.029
RSWH	0.194	0.856
VGNR	0.046	0.316
CHRDN	-0.098	-0.884
SVBL	-0.051	-0.461
CBSV	-0.158	-1.613
SNGV	0.153	1.343
SHIRZ	-0.051	-0.534
GRNCH	-0.489[b]	-2.348
ZNFDL	0.128	0.791
MRLT	-0.183[c]	-2.062
PNNR	0.332[c]	2.042
MRCB	0.216[d]	1.968
MROT	-0.117	-0.409
SHCB	-0.167	-1.213
SHOT	-0.060	0.286
CHRPN	0.203	-1.210
MTSV	-0.325	-1.580
MLBC	0.163	0.753
CRMNR	-0.333	-1.563
PNTG	-0.316[c]	-2.129
MTPCN	-0.290[d]	-1.890
CHNT	-0.002	-0.011
RSRV	0.188[a]	2.793
ALCHL	0.084[a]	3.430

[a] Significant at 0.01 two-tail test, [b] significant at 0.02 two-tail test, [c] significant at 0.05 two-tail test, [d] significant at 0.05 one-tail test.

Multiple R^2 and the Adjusted R^2 of the regression are 0.783 and 0.741, respectively. The overall significance of all regression coefficients is confirmed with a high F-statistics value of 18.796. Also, the estimated χ^2 values of B-P-G and Glejser test were very low and not significant to reject the null hypothesis of homoscedasticity. Moreover, the independent dummy variables were tested for multicollinearity using Klein's rule and VIF. Auxiliary R^2 values for all the significant variables in the regression were lower than the overall R^2. Similarly, VIF values for the significant variables in the regression were much lower than the thumb rule VIF value of 10. Table 3 reports these regression diagnostics.

Table 3: Diagnostic Tests for the Regression

Test	Method	Statistics
1. Goodness of Fit	Multiple R^2	00.783
	Multiple R^2_{Adj}	00.741
2. Overall Significance	F Statistics	18.796[a]
3. Homoscedasticity Test	B-P-G χ^2	00.851[b]
	Glejser χ^2	00.000[b]
4. Multicollinearity	Klein's Rule	00.716[c]
	VIF	03.515[d]

[a] Significant at 0.01 two tailed test, [b] not significant at 0.01 and 0.05 two tailed test, [c] highest auxiliary R^2 among significant variables in the regression is less than overall R^2, [d] highest among significant variables in the regression and less than critical value of 10.

The estimated hedonic price equation throws up quite interesting inferences. The coefficients of variables associated with old-world wine brands, new-world wine brands, champagne, reserve wines, and alcohol content show strong statistical significance at 1 per cent two-fail test. *Ceteris Paribus*, in spatial equilibrium, an old-world wine brand carries an average premium of about 99 per cent over the base Indian wine of similar kind. This premium is about 21 percentage points more than the premium attached to the new-world wine brands. While Champagne carries a premium of 100 per cent, a Reserve wine seems to fetch 19 per cent premium over the young Indian base wine. Interestingly, C*eteris Paribus*, each additional unit of (% ABV) of alcohol fetches a premium of about 8.4 per cent. Perhaps this goes to show that Indian consumers value higher alcohol content even in wine, though the alcohol content in wines is much lower than that in other liquors such as whiskies. The coefficient for club-shaped bottles is strongly significant at 2 per cent two-tailed test. There is a premium of

about 17 per cent for club-shaped bottles over cylindrical-shaped ones. Since Champagne is filled in club-shaped bottles, the effective premium for Champagne, therefore, would be 117 per cent.

Let us consider the results with respect to wine-grape varieties. The coefficient for the red wine dummy is statistically very insignificant. This means that *Ceteris Paribus*, there is no premium associated with red wines in general over the white wines. However, some specific red wines seem to acquire a premium. For example, the red wines Pinot Noir and Merlot-Cabernet do seem to enjoy a premium of 33 per cent and 22 per cent at 5 per cent two-tailed and 1-tailed test, respectively. However, there are other red wines with negative premiums. For Grenache there is a negative premium of 49 per cent at 2 per cent significance level, two-tailed test. Similarly, Pinotage and Merlot also have a negative premium of 32 per cent and 18 per cent at 5 per cent significance level, two-tailed test. Neither any of the specific white wines nor any other mixed 2-varieties wines in the data showed any premium over the base Indian brand. A wine with cork closure showed a premium of about 9.5 per cent over a wine with other forms of closure such as a cap at 5 per cent significance level, one tailed-test.

5. Concluding Observations

Wine was not a taboo in ancient India; however, it received discouragement during the medieval times leading up to post-independence era. Today, however, barring a few states in India, consumption of wine is not discouraged. In fact, to promote employment and farmers' income, states like Maharashtra have given excise duty exemption to wineries. From the demand side as well, with the prospect of continued rapid GDP growth, burgeoning metropolitan population, globalization, and the consequent changes in lifestyle; demand for wines has been increasing and the trend would continue in the future. In this context, it becomes imperative to know the premiums attached to different wines and their attributes resulting from selections made by producers and consumers in the wine market. For this purpose, we employed the hedonic price analysis methodology to Indian data. The idea is that repeat purchase mechanism and spatial equilibrium in a monopolistically competitive wine market would reveal the premiums attached to various attributes of wines giving cues both to producers and consumers on what new wines they could produce or consume.

Our study shows that there is distinct and significant premium to old-world and new-world wines, in that order, as compared to Indian wine brands. High customs duty cannot be the culprit for the premium, for India allows 100 per cent FDI in wineries, and, importantly, customs duty offers protection to domestic brands to raise their prices. In the absence of high customs duty, while prices may get lower in general, the relative premium to foreign brands will remain. If Indian brands are to become popular, brand building exercise will have to be strengthened. For example, while wine

tourism initiatives such as Sula Fest by Sula Wines may be replicated by others, its on-farm use of solar power could be highlighted as the sustainable farming practices adopted by Indian brands. Irrespective of the brands, Reserve wines maintain a nominal premium of about 19 per cent. While a substantive overall premium for Champagne was expected, part of the premium is also related to the club-shape of the Champagne bottle. We find a premium for club-shaped wine bottles as compared to cylindrical ones. Wine brands, therefore, may consider bringing out some of their wines in club shaped bottles. While alcohol content in wine is generally much lower than that in other liquors such as whisky, we see a premium attached to alcohol content of wines. Therefore, wine brands may consider increasing alcohol content in their wines to suit Indian palate, although within the relevant alcohol range for wines.

Our analysis also shows that there is no premium for red wine in general over white wine. If the perceived health benefits of red wine were known, one would expect a premium for red wines in the market. If at all brands would like to convey this message, they have not been successful. For some specific red wines, however, there seem to be varying premiums. If Pinot Noir and Merlot-Cabernet carry a positive premium; Grenache, Pinotage, and Merlot carry a negative premium. Finally, cork closures to wine bottles do carry a premium close to about 10 per cent.

Ours is the first econometric study applying hedonic price analysis to the Indian wine market. It gives broad market-driven signals about the wine attributes. While wineries can take cues from the study in bringing newer wines to the market, consumers too can ascertain how much they should pay for a given combination of attributes in a wine. Of course, if the taste of the pudding is in the eating, the ultimate test of the wine is in the drinking. The fact that the constant term in the regression equation was also statistically significant shows that there are other factors than those captured in the study that also influence premiums attached to wines. There seems to be a scope for increasing consumer awareness about wines, and, conducting organoleptic and contingent valuation studies on consumer choices.

References:

Anderson, K. and Wittwer, G. (2016). "Evolving Consumption Patterns and Free Trade Agreements: Impacts on Global Wine Markets by 2020," Working Paper No. 0116 ISSN 1837-9397, *Wine Economics Research Centre*, The University of Adelaide.

Barks, C. (1995). "Constant Conversation," translated poem in *The Essential Rumi*, p. 94, New York, NY: HarperCollins.

Bombrun, H., and Sumner, D. (2001). *What determines the price of wine?* AIC Issues Brief, Vol.18, pp. 1-6.

Bose, D. (1922). *Wine in Ancient India*, pp. 20, 22, 24, Calcutta: K.M. Connor & Co.

Camillo, A. (2012). "A strategic investigation of the determinants of wine consumption in China", *International Journal of Wine Business Research*, Vol. 24, No.1, pp. 68-92.

CID (2017). *The Atlas of Economic Complexity*, Centre for International Development (CID) at Harvard University, accessed from http://atlas.cid.harvard.edu/explore/?country=104&partner=undefined&product=833&productClass=HS&startYear=undefined&target=Product&year=2016, on 15/2/2018.

Corduas, M., Cinquanta, L. and Ievoli, C. (2012). "The importance of wine attributes for purchase decisions: a study of Italian consumers perception", *Food Quality and Preference*, Vol. 28, No. 2, pp. 407-418.

Estrella Orrego, M.J., Defrancesco, E. and Gennari, A. (2012). "The wine hedonic price models in the 'Old and New World': state of the art", *Revista de la Facultad de Ciencias Agrarias*, UNCuyo, Vol. 44, No.1, pp. 205-220.

Export Genius (2017). *Wine Import in India - Data Analysis of Indian Wine Market of Q2 2017*, accessed from http://www.exportgenius.in/blog/wine-import-in-india-data-analysis-of-indian-wine-market-of-q2-2017-84.php, on 11/11/2017

Gawande, S., Shukla, P. and Mishra, A. (2017). "Study on Wine Policies, Regulations and Standards in Maharashtra, India," *Science, Technology & Public Policy*, Vol. 1, No. 2, pp. 12-22, accessed from http://article.sciencepublishinggroup.com/pdf/10.11648.j.stpp.20170101.12.pdf on 30/3/2018

Gil, J.M. and Sánchez, M. (1997). "Consumer Preferences for Wine Attributes: A Conjoint Approach", *British Food Journal*, Vol. 99, No. 1, pp. 3 - 11.

GOI (1949). Article 47, Part IV (Directive Principles of State Policy), Constitution of India, p. 23, accessed on 31/10/2017 from http://lawmin.nic.in/olwing/coi/coi-english/coi-4March2016.pdf

Gryphon (2017). *History of Wine in India*, accessed from http://www.gryphonbrands.com/history_wine.htm, on 11/11/2017.

Holland, S. (2017). *India Wine Insider: The Consumer Outlook*, accessed from http://www.sonalholland.com/india-wine-insider.pdf, on 11/11/2017

ILO (2007). *Indian Wine Industry*, Industry Reports, Delhi: India Law Offices (ILO), accessed from http://www.indialawoffices.com/ilo_pdf/industry-reports/wineindustry .pdf, on 11/11/2017

JBC (2008). *Comprehensive Study of Indian Wine Market*, Washington, D.C.: JBC International, accessed from http://www.indianwineacademy.com/comprehensive _study_iwm.pdf

Jiao, L. (2017). "Macroeconomic determinants of wine prices", *International Journal of Wine Business Research*, Vol. 29, No.3, pp. 234-250.

Kangle, R. (1972). *The Kautiliya Arthasastra*, 2st edition, Part II, p. 155, Delhi: Motilal Banarsidas.

Lockshin, L. and Corsi, A. (2012). "Consumer behaviour for wine 2.0: A Review Since 2003 and Future Directions", *Wine Economics and Policy*, Vol. 1, pp. 2-23.

Lockshin, L., Mueller, S., Louviere, J., Francis, L. & Osidacz, P. (2009). "Development of a New Method to Measure How Consumers Choose wine", *The Australian and New Zealand Wine Industry Journal*, Vol. 24, No. 2, pp. 37-42.

Mookerji, R. (1966). *Chandragupta Maurya and His Times*, 4th edition, p. 119, Delhi: Motilal Banarsidass.

Perrouty, J.P., d'Hauteville, F. and Lockshin, L. (2006). "The influence of wine attributes on region of origin equity: An analysis of the moderating effect of consumer's perceived expertise", *Agribusiness*, Vol. 22 No. 3, pp. 323-41.

Pillai, S. (1997). *Indian Society through Ghurye: A Dictionary*, p. 369, Mumbai: Popular Prakashan.

Roberto Luppe, M., Lopes Fávero, L.P. and Prado Belfiore, P. (2009). "Hedonic pricing models and the evaluation of attributes: the case of wines from Brazil, Argentina and Chile", *Esic-Market*, Vol. 134, pp. 27-47.

Rosen, S. (1974). "Hedonic Prices and Implicit Markets: Product Differentiation in Pure Competition," *Journal of Political Economy*, Vol.82, pp. 34-55.

Schamel, G., S. Gabbert, and H. Witzke (1998). "Wine Quality and Price: A Hedonic Approach," in *Global Markets for Processed Foods: Theoretical and Practical Issues*, Daniel Pick *et al*. (Eds.), pp. 211-221, Boulder, Colorado: Westview Press.

TOI (2016). *Association wants GST cover for wine*, article in Times of India (TOI), 5th August, accessed from https://timesofindia.indiatimes.com/city/nashik/Association-wants-GST-cover-for-wine/articleshow/53552792.cms, on 11/11/2017

WI (2017). *World Statistics*, accessed from Wine Institute (WI) site http://www.wineinstitute .org/resources/statistics, on 12/11/2017

WF (2014). *What is a Reserve Wine? Well, That Depends*, accessed from Wine Folly (WF) site http://winefolly.com/tutorial/reserve-wine-well-depends/, on 29/3/2018

UN (2015). *World Population Prospects: The 2015 Revision*, p. 4, accessed from https://esa .un.org/unpd/wpp/publications/files/key_findings_wpp_2015.pdf, on 16/2/2018