

## Willingness to pay for red wines in China

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China's rapidly expanding wealthy population has expressed a new desire for imported red wines. Using data collected in China's major red wine consumption region of Beijing, this study analyzes the impact of country of origin, price, wine age, and brand on consumer-derived utility and willingness to pay for red wines. Findings from a conditional logit model and a mixed logit model indicate that price remains the key factor in Chinese consumers' red wine choices. For gift purchases, consumers are willing to pay an additional \$20 to move from a US wine to a French wine. For own consumption, French wines are preferable if their price is within a reasonable range of \$13–20 above Chinese or US wines. Chinese consumers also strongly favor branded and matured red wines. China's rapid and sustainable economic growth and its stronger integration to the global economy have led to greater disposable income and the expanding consumer demand for luxury beverage of red wines.

**Keywords:** wine consumption; willingness to pay; country of origin; wine brand; wine age

### Introduction

China's rapidly expanding wealthy population has expressed a new desire for imported Western wines (*China newsnet*, 2012). This segment's wine consumption has increased 20% in the first half of 2013, reaching 1.408 billion liters (ASKCI.com, 2013, Figure 1), and the consumption of foreign-made red wines in the major wine consumption area of Shanghai has gone up 15% annually since 2005 (OIV report, 2013; OIV website; Wang & Mao, 2009). China already is the world's fifth largest wine market and total consumption may rise to the second largest in 2016, behind only the USA but surpassing the old world giants of France, Italy, and Germany (Fagou 9.com; Ifeng.com). Even though wines in China are primarily imported from France (42.74% of all import value), Australia, Italy, and recently the USA (*China newsnet*, 2012), the wine choices of Chinese consumers may interest winemakers, marketers, and stakeholders from other countries as well (Camillo, 2012). Understanding Chinese wine consumption preferences and willingness to pay is of utmost importance for these potential market entrants.

Existing information shows that Chinese red wine lovers see foreign-made wines as a symbol of prestigious social status, exotic food culture, fashion, healthfulness, gracefulness, and enhanced quality of life (*Chinadaily*, 2007; Guangdong Wine Association, 2010; Liu &

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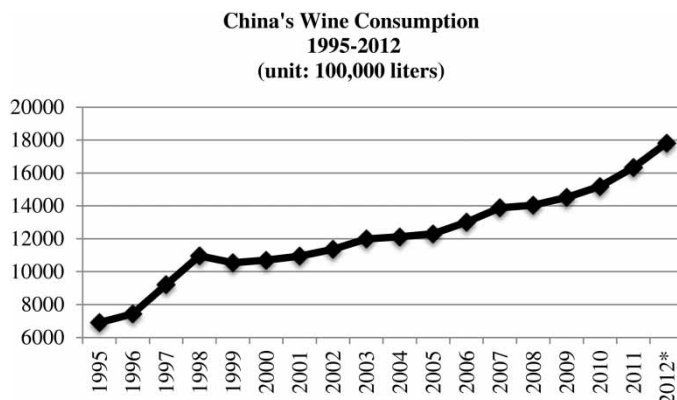


Figure 1. China's wine (including red wine) consumption from 1995 to 2012.

Source: Statistical Report on World Vitiviniculture (2013). \* is expected value.

Murphy, 2007). Previous studies found that wine consumption changed with income and taste preferences (Balestrini & Gamble, 2006; Yu, Sun, Goodman, Chen, & Ma, 2009). However, compared to decades ago when grape wines were used primarily to entertain top government officials and wealthy households, recent studies indicate the income effect has been reduced. Red wine is now a popular beverage for both the rich and the less affluent groups, thanks to the newly globalized wine supply, the rapidly expanding presence of Western restaurants, and the flourishing bar and nightclub business segment (News.cnyjc, 2013). Given that wine is a luxury beverage that is not essential to human nutrition, its consumption reflects an emerging appreciation for the enjoyment and comfort of luxury food, an admiration for a higher social status, and the respect of the local wine culture (Van der Veen, 2003).

A paucity of literature on Chinese wine consumption has focused on wine preference. However, willingness to pay has received little attention despite the fact that it provides insightful information to marketers and consumer demand researchers. This study is one of the first to analyze the impact of country of origin (COO), price, wine age, and brand on consumer-derived utility and willingness to pay for red wines. It applies a conjoint experiment to gather consumption choice data about domestic-made wines and imported wines from France and the USA.

France has continued to lead China's grape wine import market with total sales of 65.9 million liters in the first half of 2013. Major wine suppliers from France formed marketing teams to focus on wine tasting and sales promotions, which contributed to a 40–50% sales expansion in 2011 (*Chinese Grape Wine Information Net*, 2012). In contrast, though rising progressively, China only purchased a small share (5.5%) from the USA in 2012, making US wines a newer and less familiar product to Chinese consumers (Red Wine World Net, 2013). This study included both the well-known French wines and the emerging US wines to compare the impact of COO on wine choices. This study quantifies the impact of COO, price, wine age, and wine brand on consumer-derived utility for the purchase of privately consumed wines and gift purchases: it identifies the most important attribute that affects wine purchases for both settings, measures the price premium that consumers are willing to pay (WTP) to move from domestic to foreign-made wines, and analyzes the impact of income change on wine choices. This study differs from existing literature by applying a quantitative model to calculate the impacts and WTP. It provides wine industry stakeholders and academic researchers with new understandings of wine preferences in the rapidly growing Chinese market.

### Selection of attributes and the conjoint experiment

Results of a literature review are presented in Table 1. Based on the review, a list of selected attributes and attribute levels is shown in Table 2. We had a graduate student from Renmin University of China to gather wine price information before we developed the survey. She visited small, mid-sized, and large supermarkets and documented the price for 328 different red wine products.

Table 1. Literature review.

	Authors and year of publication	Product and findings
COO on wine selection	Wall et al. (1991)	Consumers tended to rely on a country's image to evaluate its product quality
	Elliot and Cameron (1994)	When quality of local-made is equivalent or better than foreign-made, local-made is preferred
	Keown and Mura (1995)	COO was the most important factor that affected wine selection in Northern Ireland
	Skuras and Vakrou (2002)	COO contributes to WTP in Greece
	Balestrini and Gamble (2006)	Chinese consumers use COO to evaluate wine quality
	Li et al. (2006)	35% of respondents in Shanghai and Hangzhou China rely on COO to make wine choice
	Yu et al. (2009)	For private occasions, Chinese wines tend to be the first choice. For gift or business dinner, French wines are the first choice for Chinese
	Camillo (2011)	COO was the second most important factor and price was the fifth factor that affected Chinese consumers' wine selection
Price on wine selection	Chao (1993)	If consumers view products from a country as usually low in quality, they seek other quality indicators
	Elliot and Cameron (1994)	Cheaper products are rejected due to consumer intention to avoid dissatisfaction in consumption
	Assael (1995)	Price is an important cue to quality in wine choice
	Lockshin and Horowitz (2002)	Quality-conscious consumers use price to judge wine quality
	Liu and Murphy (2007)	Examined Shanghai and Guangzhou consumers' wine behavior and found that the higher the wine price signals, the higher the social status
	Camillo (2011)	Price is positively correlated with one's education and salary
	Mann et al. 2012	Price is more important than COO in affecting organic wine purchases
Brand on wine selection	Gluckman (1990) and Orth and Krska (2002)	Consumers rely on brand to discern quality
	Keown and Mura (1995)	Brand was the second most important factor to change wine choice
	Atkinson (1999)	Brand, next to COO, is perceived to be more important than price and COO to determine wine quality.
	Lockshin, Jarvis, d'Hauteville and Perrouy (2006)	Australian consumers are WTP less for national big brand but more for small brand wines
	Gergaud and Livat (2007)	Knowledgeable consumers tend not to use brand but use price to evaluate wine quality
	Camillo (2011)	Chinese consumers use brand as the most important factor to evaluate wine quality
	Wine age on wine selection	Mtimet and Albisu (2006)

Table 2. Selected attributes.

Attributes	Levels
COO	China USA France
Price	80 Yuan/bottle 150 Yuan/bottle 280 Yuan/bottle
Years	Two Five Ten
Brand	Branded Not branded

Using her data, we picked 80 Yuan for lower-end red wines, 150 Yuan as a medium price, and 280 Yuan for a relatively expensive red wine.

A choice-based conjoint (CBC) analysis is used to determine consumer WTP for red wines. Batsell and Lodish (1981) first developed the CBC framework to predict the probability that an individual consumer would choose one out of several frequently purchased products. Recently, Lusk and Hudson (2004) summarized the advantages of CBC: (1) it can closely mimic shopping experiences of selected consumers and (2) it allows researchers to examine trade-offs between product attributes. The primary drawback of CBC is its hypothetical bias problem. Consumers tend to overstate WTP in a hypothetical situation compared to a real purchase, resulting in potential estimation bias (Cummings, Harrison, & Rutstrom, 1995). Lusk and Schroeder (2004) used a choice experiment involving beef rib-eye steaks with different quality attributes to compare consumer responses to hypothetical and non-hypothetical questions. Their study concluded that hypothetical CBC responses differed from non-hypothetical responses, but marginal WTP was not statistically different across the two settings.

The CBC analysis utilizes a discrete choice modeling technique to analyze individual choice behavior. Discrete choice modeling is based on the classical utility work of Lancaster (1966) who proposed that consumers derive utility from different features, rather than from the product per se. A rational consumer chooses the features that yield the highest utility (Louviere, 1988; Louviere, Hensher, & Swait, 2000). According to Ben-Akiva and Lerman (1985), consumption choice is a function of both observable product features and the demographics of choice-makers.

An experimental design was developed to gather product attribute preferences and demographics information. Lusk and Norwood (2005) pointed out that large experimental designs did not necessarily perform better than designs with a smaller choice set. To address the choice set issue and reduce the cognitive burden of survey respondents, this study used a small design of four alternatives on each card: three alternatives represented the countries where the products were produced, and one opt-out alternative represented 'I will not choose any product alternative'. We used the random method of selecting from the full factorial design that contains all possible combinations of attributes and attribute levels (Louviere et al., 2000). We randomly drew profiles from the full factorial design without replacement. The random method maintains orthogonality, that is, uncorrelatedness of the selected attributes; it performs well for discrete utility functions; and it is flexible in estimating interactions of attributes (Lusk & Norwood, 2005). Each respondent was asked to complete three repeated questions. A sample choice question appears in Figure 2. Respondents were also asked to complete 53 other questions. These questions included consumption frequency and quantity, retail venues used, factors affecting consumption choices, and the demographics of age, gender, education, and monthly household income.

Assume you are buying a bottle of red wine for your family; please pick your MOST preferred product from the four listed.				
	Country of origin	Price	Year	Brand
1	China	80 Yuan	Two	Branded
2	U.S.	150 Yuan	Five	Not branded
3	France	280 Yuan	Five	Not branded
4	I prefer none of the listed product			

Figure 2. A sample choice card.

## Data

Agricultural economics graduate students from Renmin University of China were trained in survey administration. They conducted the survey in 6 of the 14 districts in Beijing. The stores visited and the districts where interviews were conducted appear in Table 3. The interviews took place in January 2012, corresponding with the Chinese spring festival, when consumers shopped for new years' gifts. Shoppers at Carrefour and Wal-Mart stores as well as other small- or midsized food stores were surveyed. The reasons for including Carrefour and Wal-Mart are twofold: (1) they are the two largest supermarkets in Beijing that carry assorted wines from different countries and (2) the wine departments at these two stores usually receive a great deal of shoppers during holiday seasons, thus providing us convenient access to potential participants. A total of 540 observations were collected and used.

Respondents' demographics are listed in Table 4. The majority of the consumers fell into the 25–45 years old group (63%) and 19% were above 46 years old. Relatively, wine consumers in China tend to be young and better educated, although we admit that such a statement lacks sufficient data to support. Supermarkets, such as Carrefour and Wal-Mart, are often target retail stores of domestic and international red wine marketers. Our sample has more younger consumers than older consumers (55% of consumers between 20 and 35, 26% between 36 and 45, 11% between 46 and 55, and 8% above 55 years old). We believe that our sample is representative of our targeted wine consumers. The sample had more females (56%) than males (44%); many were married (73%); and over 70% held a college or more advanced degree. As a result of a random sampling, the sample included more female than male respondents. Compared to China's National Bureau of Statistics that reports 31.5% of Beijing residents hold a bachelor's degree, our sample includes more bachelor's degree holders (39%).

In addition, 54% of the respondents had a household monthly income of 9000 Yuan or less (about \$1428; 1\$ = 6.3 Yuan when the survey was conducted) and 28% had an income of 13,001 Yuan or more (about \$2063). Many respondents worked for state-owned organizations

Table 3. Interview stores and locations.

District	<i>n</i>	%	Name of stores	<i>n</i>	%
Congwen	120	25	Carrefour	172	36
Chaoyang	114	23	Wal-Mart	143	30
Xicheng	86	18	Midsized or small stores	159	34
Haidian	78	16	Total	474 <sup>a</sup>	100
Xuanwu	66	14			
dongcheng	20	4			
Total	484	100			

<sup>a</sup>Ten observations were recorded without documenting the store name, but with the store district; 56 observations were not showing the store name and the location district.

Table 4. Respondents' demographics.

	Frequency	Proportion (%)
Age		
20–25	97	18
25–35	200	37
36–45	137	26
46–55	58	11
above 55	42	8
Total	534	100
Gender		
Male	235	44
Female	301	56
Total	536	100
Marital status		
Married	386	73
Not married	138	26
Other	4	1
Total	528	100
Education		
Middle school or below	40	7
High school or technical school	113	21
Job training college	95	18
Bachelors	210	39
Masters or PhD	81	15
Total	539	100
Before tax household monthly Income (Chinese Yuan)		
Less than 3000	45	8
3000–5000	92	17
5001–7000	91	17
7001–9000	65	12
9001–11,000	56	11
11,001–13,000	43	8
13,001–17,000	50	9
17,001–23,000	45	9
above 23,001	45	9
Total	532	100
Job		
State owned	149	30
Large private owned	140	29
Foreign owned	64	13
Chinese foreign joint owned	37	8
Small private owned	57	12
Students	14	3
Other	28	6
Total	489	100

(30%) and large private-owned organizations (29%); some of them worked for foreign-owned companies (13%) or China–foreign jointly owned companies (8%).

Table 5 shows the wine purchasing behavior of the survey respondents. A majority of them purchased red wines regularly (84%), with 44% purchasing wines once every month or two and 25% purchasing wines once every two weeks or more often. Respondents reporting they did not purchase wine often cited 'too expensive' (33%), 'always get wines as a gift' (24%), and 'cannot find good products' (20%) as reasons for infrequent purchases. Very few respondents were worried about the quality of wine (4%). A majority of the respondents purchased one or two

Table 5. Red wines purchase behavior.

	Frequency	Percent (%)
Purchase regularly or not		
Purchase	366	84
Do not purchase	59	14
Do not know	9	2
Total	434	100
Reasons not to purchase		
Too expensive	15	33
Always get wine as a gift	11	24
Cannot find good products	9	20
Worry about quality	2	4
Other	9	
Total	46	100
Purchase frequency		
Once every week	33	9
Bi-monthly	57	16
Once every three weeks	29	8
Once every month	108	30
Once every two months	51	14
Once every three months	38	10
Less often than once every three months	48	13
Total	364	100
Purchase quantity per store visit (bottles)		
One	162	45
Two	149	41
Three	17	5
More than three bottles	34	9
Total	362	100
Purchase price/bottle		
Less than 50 Yuan	77	22
50–90	59	16
91–120	92	26
121–180	39	11
181–250	51	14
More than 250	40	11
Total	358	100
Have preferred brand or not		
Do not have	243	69
Have one	73	21
Have two or more	37	10
Total	353	100
Buying purpose		
For the family	290	80
For friends or relatives	27	8
For guests	26	7
Not sure	11	3
For customers	5	1
For colleagues	4	1
Total	363	100
Purchase venue		
Large supermarkets	250	69
Liquor stores	40	11
Mid- or small-supermarkets	37	10
Duty shop	11	3

(Continued)

Table 5. Continued.

	Frequency	Percent (%)
Online	11	3
Other	9	3
Alcohol wholesalers	4	1
Total	362	100
Purchase increase or decrease compared to 2011		
Increased	101	29 (21)
Did not change	231	67
Decreased	15	4 (30)
Total	347	100

bottles per store visit (86%), with most of the purchases priced at 120 Yuan or less (64%) (about \$19/bottle). One-fourth of them paid more than \$28 in equivalent Chinese Yuan per bottle and 11% of them paid more than \$40 per bottle.

Many respondents did not have a preferred brand (69%), but 10% of them had two or more preferred brands. Thus, preliminary statistics seem to indicate that brand does not affect purchase decisions significantly. We asked respondents to choose the top reason for their wine purchase. Most selected own consumption (80%) and few selected gift (8%) or treated guests (7%). A majority of the respondents made the purchase at large supermarkets (69%), with fewer purchasing at liquor stores (11%) or mid- or smallsupermarkets (10%). Compared to 2011, about one-third of the respondents increased wine consumption by 21%; most of them consumed a similar amount of wine as in 2011 (67%); and 4% have decreased their wine consumption by 30%. The sample suggests that red wines are popularly and frequently consumed in Beijing and consumers are diversified with respect to different age, education, and income groups.

Based the survey data, utility for the main effect conditional logit model was estimated using

$$\begin{aligned}
 \text{Utility} = & \beta_1 (\text{China}) + \beta_2 (\text{US}) + \beta_3 (\text{France}) \\
 & + \beta_4 (\text{price}) + \beta_5 (5 \text{ year}) + \beta_6 (10 \text{ years}) \\
 & + \beta_7 (\text{branded}).
 \end{aligned} \tag{1}$$

The interaction effect was estimated using

$$\begin{aligned}
 \text{Utility} = & \beta_1 (\text{China}) + \beta_2 (\text{USA}) + \beta_3 (\text{France}) + \beta_4 (\text{price}) \\
 & + \beta_5 (5 \text{ years}) + \beta_6 (10 \text{ years}) + \beta_7 (\text{brand}) \\
 & + \beta_8 (\text{USA} * \text{income}) + \beta_9 (\text{China} * \text{income}) \\
 & + \beta_{10} (\text{France} * \text{income}).
 \end{aligned} \tag{2}$$

The three COO variables of *China*, *USA*, and *France* are dummy variables.

The impact of COO on derived utility was estimated using the first three coefficients. These three coefficients were estimated relative to the ‘I will not choose any product alternative’ option. The ‘5-year’ and ‘10-year’ attribute levels were estimated relative to the ‘2-year’ level, which was omitted in the estimation. The ‘branded’ attribute levels were estimated relevant to the ‘no brand’ level, which was omitted as well. The dependent variable *Utility* in the aforementioned conditional logit model is reported choices. These choices are set to ‘1’ if an alternative is chosen,



and '0' if it was not chosen. Two situations were estimated for each model: one to understand the factors affecting own-consumption wines and the other to understand the factors affecting gift purchases.

## Results

STATA 11 econometric software was used to run the conditional logit model and the estimates are shown in Table 6. The likelihood ratio tests, LR  $\chi^2$ , and the Prob >  $\chi^2$  scores suggest that the conditional logit model is a good fit for both the own-consumption model and the gift purchase model. The LR  $\chi^2$  score is the likelihood ratio  $\chi^2$  test score, which was computed by contrasting the null model (with the constant only) with a model that includes the selected variables. It measures how well the estimated model fits the likelihood. Prob >  $\chi^2$  score measures the probability of getting a likelihood ratio score as low as the score from the null model. The small Prob >  $\chi^2$  score shows that at least one of the selected explanatory variables can explain the variance in the dependent variable. The  $P > |z|$  score measures the statistical significance of coefficients for selected variables. For example, the  $P > |z|$  score of < .001 for the Chinese variable means that the coefficient of the estimate is significant at .1% level. Pseudo- $R^2$  measures the proportion of variance in the dependent variable associated with the independent variables. In the own-consumption model, the three estimated coefficients for the COO variables are all positive and statistically significant, indicating that wines from these three countries contribute positively to the overall consumer-derived utility and wine purchase is significantly preferred to the no-purchase option. The estimated coefficients indicate that French wines contribute more to derived utility than US wines and Chinese wines, which contributed similarly to derived utility. Thus, respondents desire French wines over US or Chinese wines for private consumption. The negative and significant price coefficient describes the downward sloping demand curve, illustrating the higher the price, the lower the quantity demanded. In addition, aged wines are more appreciated. Respondents want the 5-year and the 10-year wine more than the 2-year alternative (base value) and they demand branded wine more than the non-branded option. The results suggest that for private consumption (1) wines from all three countries are preferred to the no-purchase option; (2) Chinese consumers value the aged and branded wines; (3) and they desire cheaper wines.

Table 6. Results of the conditional Logit main effect model.

Variables	Self-consumption			Use as a gift		
	DF	Coefficient	$P >  z $	Variables	Coefficient	$P >  z $
China***	1	1.20	<.001	China***	-0.60	<.001
USA***	1	1.21	<.001	USA***	-0.54	<.001
France***	1	1.65	<.001	France	0.10	.525
Price***	1	-0.01	<.001	Price***	0.01	<.001
5 Years***	1	0.29	.003	5 Years*	0.16	.096
10 Years***	1	0.33	.001	10 Years**	0.20	.038
Brand***	1	0.48	<.001	Brand***	0.60	<.001
Log-likelihood	-2273	-2248				
LR $\chi^2(7)$	314.7	365.06				
Pseudo- $R^2$		0.065			0.075	
Prob > $\chi^2$	<.001	<.001				

\*\*\*Means statistically significant at 1% level.

\*\*Means statistically significant at 5% level.

\*Means statistically significant at 10% level.

The gift purchase model discloses a different story. The estimated China and US coefficients are both significant and negative; this indicates that wine produced in these two countries reduces the derived consumption utility by a significant level. However, buying French wines adds to the derived utility. But, the coefficient for the France variable is not statistically significant. Thus, purchasing French wines as a gift is not significantly better than the no-purchase option, but it is significantly better than purchasing US- or China-made wines.

The price coefficient is significant and positive in the gift purchase estimation, which illustrates an upward sloping demand curve, that is, the higher price will result in a higher quantity demanded. This price curve indicates irrational consumption behavior. When purchasing wines for gift purposes, consumers seem to consider price as a strong quality indicator. The impact of wine age is weaker, and brand is stronger, than in the own-consumption situation. This seems to show that for gift purchases, respondents consider wine age to a lesser extent than they consider wine brand. In summary, for gift purchases, respondents tend not to purchase Chinese or US wines, rather they prefer higher priced French items that are branded and are aged longer.

Following Mayen, Marshall, and Lusk (2007), the relative importance (RI) of the selected attributes is computed. The following formula is used to compute the RI for the price attribute:

$$RI = \frac{\beta_4(80) - \beta_4(280)}{(\beta_3 - \beta_1) + [\beta_4(80) - \beta_4(280)] + (0 - \beta_6) + (0 - \beta_7)}. \tag{3}$$

Price is the most critical attribute both for an own-consumption purchase and a gift purchase (Table 7). Brand and COO are equally weighed for gift purchases, but brand is slightly more important than COO in own-consumption purchases. Wine age is the least influential attribute in both occasions. Given that each attribute shares over 5% of the overall importance measure, all four attributes should be included in the estimation.

WTP estimates for the main effect conditional logit model appear in Table 8. When buying wines for private consumption, respondents on average expect to receive a small premium of 1.6 Yuan (\$ 0.3) to move from US- to Chinese-made wines. Thus, Chinese wines receive a slightly lower WTP than US wines. However, the upper bound of this estimation includes zero; this indicates that the WTP premium for Chinese wines is not greatly lower than that of the US wines. Wines are usually expensive in China and this small WTP premium only means similar valuation for the Chinese and the US wines.

Respondents on average are WTP an additional 85.71Yuan (\$ 13.6) to move from US to French wines. Thus, they are WTP a premium to exchange US wines for the more expensive French items for own consumption. WTP for the two wine-age variables are both positive, indicating that the more mature 5- or 10-year-old wines are more favorable than the 2-year alternative. Respondents would pay a premium of 65.35 Yuan (\$ 10.4) to move from a 2-year-old wine to a 10-year-old wine. They expect to get 93.45 Yuan (\$ 14.8) to move from a branded wine to a no-

Table 7. Relative importance of selected attributes.

(n = 540)	Own-consumption	Gift-purchase
Price	0.45	0.42
Brand	0.21	0.25
COO	0.2	0.25
Wine age	0.15	0.08

Table 8. Willingness to pay estimates from the main effect model.

(n = 540)	Own-consumption		95% Confidence interval	
	WTP	SD	Lower	Upper
WTP USA to China	-1.6	19.29	-39.4	36.2
WTP USA to France	85.71	16.57	53.23	118.18
2- to 5-year old	57.16	18.18	21.53	92.79
2- to 10-year old	65.35	17.88	30.31	100.39
Branded to no brand	-93.45	12.41	-118.01	-68.88
	Gift-purchase			
WTP USA to China	-11.75	20.15	-51.24	27.74
WTP USA to France	127.42	22.95	82.43	172.41
2- to 5-year old	32.4	19.72	-6.26	71.06
2- to 10-year old	40.27	19.8	1.46	79.09
Branded to no brand	-120.11	19.98	-159.66	-80.56

brand option. The computed average wine price is 136.66 Yuan (\$ 21.7). Thus, consumers are WTP a large premium for branded French wines that have a longer age.

In the WTP for the gift purchase model, respondents tend to claim a compensation of 11.75 Yuan (\$ 1.9) to move from US wines to the Chinese alternatives. Thus, US wines are more appreciated than Chinese wines. However, the upper and lower bound includes zero, showing that the WTP premium is not significantly different from zero. The upper and lower bound are estimated using the estimated WTP plus/minus 1.96 times standard deviation. Respondents are WTP a positive 127.42 Yuan (\$ 20.22) to move from US wines to French wines, implying that French wines are highly valued for gift purposes. The two age-related variables both resulted in positive WTP, but only the 10-year alternative received a significantly higher WTP than the 2-year alternative, given the positive lower and upper bounds. Respondents are clearly WTP an additional 40.27 Yuan (\$ 6.4) to move from the 2-year wine to the 10-year wine. The brand WTP is negative and large, which suggests a strong desire for branded items. Thus, when shopping for a gift, respondents tend to prefer expensive French wines that are branded and have a longer age.

Results of the income interaction mixed logit model are shown in Table 9. The log-likelihood value, the LR  $\chi^2$  score, and the Prob >  $\chi^2$  score show that the selected variables effectively explain the change of derived utility. In the own-consumption model, the three COO estimates are all positive and significant, indicating that the respondents prefer wines from these three countries to the no-purchase option. Compared to the main effect model, in the interaction model the coefficient for the Chinese wine variable goes up from 1.20 to 1.41, meaning a bigger contribution of Chinese wines to the derived utility, when income is controlled. The COO impact of the US and French wines on derived utility remains the same as in the conditional logit model. Thus, for own consumption, French wines are the most favored and Chinese wines become more preferable than the US wines due to a COO impact. The price coefficient remains significant and negative, illustrating rational consumption behavior. The coefficients for the wine age and wine brand variables are similar to those in the main effect model. The interaction of Chinese wines and income is significant and negative, which explains the negative effect of income on the selection of Chinese wines. Thus, when income is controlled, the COO impact of the Chinese wines on derived utility becomes stronger.

When comparing the main effect model with the income effect model for gift purchases, the coefficient for the US variable increases from -0.54 to -0.33. This means that the negative

Table 9. Results of the income interaction mixed Logit model.

(n = 540) Variables	Own-consumption Coefficient	P >  z	Variables	Gift-purchase Coefficient	P >  z
China***	1.41	<.001	China***	-0.65	.001
USA***	1.22	<.001	USA*	-0.33	.093
France***	1.65	<.001	France	0.18	.338
Price***	-0.01	<.001	Price***	0.00	<.001
5 Years***	0.30	.002	5 Years*	0.18	.06
10 Years***	0.33	.001	10 Years**	0.19	.047
Brand***	0.47	<.001	Brand***	0.59	<.001
USA × income	0.00	.85	USA × income*	-0.04	.074
China × income*	-0.04	.087	China × income	0.01	.694
France × income	0.00	.859	France × income	-0.02	.415
Log-likelihood	-2238	Log-likelihood	-2215		
LR chi <sup>2</sup> (7)	317.11	LR chi <sup>2</sup> (7)	362.71		
Pseudo-R <sup>2</sup>	0.07		0.08		
Prob > chi <sup>2</sup>	<.001	Prob > chi <sup>2</sup>	<.0001		

\*\*\*Means statistically significant at 1% level.

\*\*Means statistically significant at 5% level.

\*Means statistically significant at 10% level.

impact of US wines on the derived utility is reduced when income is controlled. The price coefficient is statistically significant and positive, although its magnitude is close to zero. This result is similar to the one shown in Table 6 when income was not included. Therefore, consumers look for more expensive wines for gift occasions even though cheaper alternatives are available. With a higher income, respondents are reluctant to choose Chinese or US wines for gift purposes. The wine age and brand variables remain significant in the gift purchase model, showing that branded wines with a longer life are preferred. The interaction of US wines and income is negative and significant at 5% level, indicating that with improved income, respondents are less likely to choose US wines as a gift.

WTP estimation for the income interaction model is shown in Table 10. In the own-consumption model, respondents are not WTP more for the US wines than the Chinese options (zero WTP is located in between the lower and upper bounds). WTP to move from US

Table 10. Willingness to pay estimates from the income interaction mixed Logit model.

(n = 540)	Own-consumption		95% Confidence interval	
	WTP	SD	Lower	Upper
USA to China	36.07	34.16	-30.89	103.03
USA to France	83.53	32.14	20.53	146.53
2- to 5-year old	57.42	18.09	21.96	92.88
2- to 10-year old	64.51	17.86	29.51	99.51
Branded to no brand	-91.32	12.52	-116.1	-66.54
	Gift-purchase			
	WTP	SD	Lower	Upper
USA to China	-63.3	36.7	-135.24	8.64
USA to France	101.53	32.74	37.36	165.7
2- to 5-year old	36.81	19.94	-2.28	75.91
2- to 10-year old	38.82	19.98	-0.33	77.97
Branded to no brand	-118.61	20.05	-158.32	-78.9

wines to French wines is large and positive in both models. Thus, for either purpose, respondents seek French wines, and are willing to give up a remarkable premium in exchange for them. For instance, they are willing to give up 101.53 Yuan (\$ 16.1) to switch from a US wine to a French wine when purchasing a gift. Compared to findings from the main effect model, WTP for French wines for gift purposes dropped from 127.42 (\$ 20.2) to 101.53 Yuan (\$ 16.1), a decrease of 26 Yuan (\$ 4.1) with an income effect. Thus, wealthier respondents' WTP for French wines are found to be lower than that of less wealthy respondents. However, wealthier consumers still favor French wines due to the strong COO effect. With the income effect, WTP for aged and branded wines remains large and significant. For example, respondents are willing to give up 57.42 Yuan (\$ 9.1) to move from a two-year-old wine to a five-year-old wine for own consumption.

### **Conclusions and implications**

Using data collected in China's major red wine consumption area of Beijing, this study analyzed the impacts of price, COO, wine age, and brand on wine consumption, consumer-derived utility, and willingness to pay. Our empirical results suggest that price remains the most important factor affecting Chinese red wine choices. Chinese consumers consider price carefully when purchasing wines for own consumption and gift purposes. However, the direction of price impact is opposite. For own consumption, consumers derive extra utility from less expensive wines; for gift occasions, consumers prefer more expensive wines. This finding is consistent with conclusions from previous studies that Chinese wine drinkers tend to favor expensive wines for public occasions and inexpensive wines for own consumption. While seeking less costly wines for own consumption, Chinese consumers do not exclude French wines and are WTP a premium for them, within a reasonable range of \$13–20 above Chinese or US wines. Thus, it is untrue that luxury French wines are typically used just for public occasions to build a superior social status.

COO matters to the Chinese consumer. US wines are found to be a good substitute for Chinese wines but neither US nor Chinese wines are a good substitute for French wines. Chinese consumers admire French wines for own consumption as well as for gift purchases. However, they weigh more on price for own consumption but care more about wines' image for gift purchases. It is interesting to notice that, on average, our sample participants are willing to give up about 1% of their monthly income for a bottle of luxury French wine, either for a gift or family pleasure.

Our empirical results show that WTP to obtain a branded wine is as high as \$14 for own consumption and \$19 for gift purchases. These incredibly high WTP for branded items indicates that Chinese consumers have a strong preference for branded wine. One possible explanation for this strong preference could be the frequent publicity of tainted red wines that has weakened consumer confidence in non-branded wines. Another explanation could be related to the Chinese culture that makes people follow brand names, as evidenced by the prevalence of fake products in China.

This study first identified the impact of wine age on Chinese wine decisions. We found that consumers strongly prefer wines that have a longer age, both for family uses and for gift purchases. But WTP with regard to wine age is bigger for own-consumption purchases than for gift purchases. Specifically, for own consumption, Chinese wine consumers are WTP an additional 57.16 Yuan (\$ 9.1) to move from a 2-year-old wine to the 5-year-old wine, or 65.35 Yuan ((\$ 10.5) to move to the 10-year-old wine. For gift purchases, Chinese wine consumers are WTP an additional 32.4 Yuan (\$ 5.2) to move from a 2-year-old wine to the 5-year-old wine, or 40.27 Yuan (\$ 6.4) to move to the 10-year-old wine. A stronger price, brand, and COO impact on gift purchases may result in the reduced age impact.

The empirical findings from this study provide imperative information to domestic and international red wine suppliers to help them propose more effective marketing strategies. The dominant price impact deserves careful consideration and the pricing strategy should become the key

for successful marketing promotions. To domestic Chinese and US wine suppliers, it is more feasible to focus on the price-sensitive consumer segments to meet their needs for own-consumption wines. There is no evidence to show that US wines are more attractive to the wealthier consumers than Chinese wines. We suggest the US wine suppliers emphasize the needs of the less affluent segment to satisfy their demand for own-consumption wines. To the leading foreign suppliers from France, it is strategic to supply high-end products to satisfy gift purchase needs as well as to provide reasonably priced lower-end products to meet the own-consumption needs. China is already the largest red wine consumer in Asia and the fastest growing market in the world. New knowledge from this study should help red wine suppliers within and beyond China better serve these rapidly expanding wine-loving consumer groups in their effort to succeed in the increasingly competitive wine marketplace.

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## Appendix

### Models

#### Main effect conditional logit

According to Lancaster's random utility theory (1966), the utility of the  $i$ th consumer  $U_i$  ( $i=1, \dots, I$ ) derived from the  $j$ th alternative (out of a choice set of  $C$ ) is a function of the selected attributes of the alternative  $j$ :

$$U_{ij} = \beta x_{ij} + \varepsilon_{ij}, \quad (\text{A1})$$

where  $\beta$  is a vector of unknown parameters of interest,  $x$  is a vector of attributes for product  $j$  selected by consumer  $i$ , and  $\varepsilon$  is a stochastic error term resulting from measurement errors.

McFadden (1974) developed a discrete random utility model to calculate the probability  $P_{ij}$  that individual  $i$  will choose alternative  $j$  from choice set  $C$ , which equals the probability that the utility associated with choice  $j$  is greater than the utility associated with all other  $k$  choices in the same set. Thus,

$$\begin{aligned} P_{ij} &= P(\beta x_{ij} + \varepsilon_{ij} > \beta x_{ik} + \varepsilon_{ik}). \\ P_{ij} &= P(\varepsilon_{ij} - \varepsilon_{ik} > \beta x_{ij} - \beta x_{ik}), j \neq k. \end{aligned} \quad (\text{A2})$$

The model assumes that the error terms  $\varepsilon$  are independent and identically distributed with the Weibull (Gnedenko, extreme value) distribution (McFadden, 1974),  $P_{ij}$  is

$$P_{ij} = \frac{\exp(\beta x_{ij})}{\sum_{k=1}^J \exp(\beta x_{ik})} \quad (\text{A3})$$

In this conditional logit model,  $x$  represents product attributes and the model assumes that the characteristics of all respondents are the same across the sample.

WTP denotes the amount of money an individual consumer is willing to give up in exchange for the utility associated with a specific product attribute. For example, WTP can estimate the impact of price changes on wine choice, holding other wine attributes constant. According to Lusk and Norwood (2005), Mayen et al., (2007), and Chang et al., (2012), WTP equals

$$\text{WTP}_j = \frac{\beta_{j=1} - \beta_{j=0}}{-\beta_{\text{price}}}. \quad (\text{A4})$$

Take the COO variables as an example,  $\beta_{j=1}$  means the estimated parameter for USA, and  $\beta_{j=0}$  means the estimated parameter for China. Thus, the numerator is the difference in parameter estimation for the two selected countries and the denominator is the price coefficient.

The variance of WTP is estimated using (Greene, 2000)

$$\text{var}[\text{WTP}] \approx \left( \frac{\partial \text{WTP}}{\partial \beta} \right)' (\text{var}[\hat{\beta}]) \left( \frac{\partial \text{WTP}}{\partial \beta} \right). \quad (\text{A5})$$