AgEcon SEARCH
RESEARCH IN AGRICULTURAL & APPLIED ECONOMICS

The World's Largest Open Access Agricultural & Applied Economics Digital Library

This document is discoverable and free to researchers across the globe due to the work of AgEcon Search.

Help ensure our sustainability.

Give to AgEcon Search

AgEcon Search
http://ageconsearch.umn.edu
aesearch@umn.edu

*Papers downloaded from **AgEcon Search** may be used for non-commercial purposes and personal study only. No other use, including posting to another Internet site, is permitted without permission from the copyright owner (not AgEcon Search), or as allowed under the provisions of Fair Use, U.S. Copyright Act, Title 17 U.S.C.*

The Rise of Red and the Wane of White:

Wine Demand in Ontario Canada*

Conference Paper
AARES 2001
Adelaide, South Australia
January 23, 2001

Brenda Dyack
Phd Candidate
Department of Agricultural Economics and Business
University of Guelph
Guelph Ontario Canada N1G 1N4

Ellen Goddard
Professor
Cooperative Chair in Agricultural Marketing and Business
Department of Rural Economy
University of Alberta
Edmonton Alberta Canada

Abstract

Health Information is found to be a significant determinant of demand for white and red table wine using a two stage translog demand system model of wine demand in Ontario, Canada over the period 1985 to 1998. However, aging of the population seems to be the greatest factor affecting the shift from white to red wine over the study period.

* These are preliminary results and should not be quoted.

The Rise of Red and the Wane of White: Wine Demand in Ontario Canada

Introduction

The switch in consumption from white wine to red wine has been dramatic over the past 15 years worldwide. This trend has been reflected in Ontario Canada which has the unique distinction of being the single largest importer of wine in the world. This is because the single body, The Liquor Control Board of Ontario (LCBO), controls the importation and sale of all imported wine in the province. Through its power as the provincial alcohol regulating monopoly, the LCBO also controls many other aspects of alcoholic beverage consumption in Ontario by the almost 9 million people who are over the age of 15. While these powers evolved from a historical base of protecting society from the evils of alcohol, the LCBO now provides a significant source of revenue for the provincial government through its modern role of not only regulating consumption but also encouraging responsible consumption.

Although the sales are regulated by the LCBO, the trend in Ontario has been the same as the trend elsewhere: more red and less white is being consumed. This is clear from Charts 1-4 which show the dramatic doubling of red wine consumption since 1990 from one and half litres per year per capita to over 3 while consumption of white has fallen from 6 to 4 litres. The charts illustrate clearly how the trend to lower wine consumption was reversed for red wine around 1990 while the white wine decline increased. These trends left total wine consumption slightly lower but fairly constant over the 15-year period from 1985 to 1998.

The purpose of the research presented in this paper is to estimate the role played by health information change in the switch from white to red wine. Media messages based on medical research have increased over the study period and have often been cited as an explanation for the switch in preferences. This is a heady claim. It is a strong hypothesis because it presumes that consumers have made a significant and sustained change in behaviour in response to information they receive about healthy food choices. This means that consumers have trusted the information they have received, changed their beliefs about a good and most significantly, this change in attitude has been translated in an effective change in demand for red and white wine. The implications of this kind of response to information change on the part of consumers for governments and producers is not trivial. However, there are no studies that have quantified the impact of health information change on wine or alcohol consumption. The goal of the research presented here is to quantify the impact of the information change relative to the other determinants of demand.

The paper proceeds as follows: the next section provides an overview, through charts, of the market environment in Ontario using the data available for this research. The following section identifies and illustrates the two sources of information change studied here: advertising and health information. Two health information indicators are described. The next section identifies the hypotheses to be tested and this

is followed by a description of the model to be used. Following this are the results, conclusions and thoughts on further research.

Market Trends and Data

The wine data for sales revenue and volumes by brand that are used in this study come from the LCBO and the Ontario Wine Council. Aggregates for domestic white, domestic red, imported white and imported red were created from the brand data set. A subset of the total data set was used for this study. Included are table wines while sparkling, fortified, and relatively higher priced, (so-called imported "vintage" and Ontario "Vintner's Quality Assurance – VQA) wines, are excluded. The goal was to estimate demand for table wine consumed by the majority of wine consumers without the influence of specialty situations. In the Ontario market, this definition means that both boxed wines and bottled wines are included in the data set. Advertising expenditure data by brand are from Nielsen Media Services while population, income and Consumer Price Indices come from Statistics Canada.

All data are monthly and extend from April 1985 to December1998. There are other studies of wine demand in Ontario but in all other cases data end in 1987 or before and therefore cannot address the question of the impact of the dramatic health information change that has occurred since then. (Lariviere et al, 2000; Larue et al, 1991; Andrikopoulos et al, 1997; and, Fuss and Waverman, 1987) The data set used here allows analysis of health information change and also the impact of the major demographic change that occurred in the 1990s with the maturing of the post war "baby boom" generation.

The change in annual trend for red wine is clear from Charts 1 and 3 while Chart 2 illustrates the percentage increase for each month during the study period. For the United States, Heien and Sims (2000) noted that the increase in red wine sales was 61% in the month that "60 Minutes", the public affairs television program aired its segment on the positive health benefits of red wine consumption. The story was told with reference to what was dubbed the "French Paradox". The "Paradox" relates to the situation where the French, despite their apparently high fat diets, have significantly lower cardiovascular disease. The paradox is apparently explained by the protective effects of the relatively large volumes of red wine consumed in France. Chart 2 illustrates a significant increase in November, 1991 for Ontario, when the show aired but not one that was atypical of the pre Christmas season and not one that was obviously different from the year before or the year later. This suggests that if health information was the cause of the switch to red, the information flow started earlier than the "60 Minutes" show on the French Paradox and the switch in Canada was not as dramatic as in the U.S. Although Chart 2 suggests a possible structural shift in demand, it was not sudden.

The standard determinants of demand are shown in Charts 5 and 6. With increases in real income it would be expected that wine consumption in general would be increasing if it is a normal good. With increases in prices for red wine, it would be expected that red wine consumption would decline. However, rightward shifts in demand are consistent with rising red wine prices. The upward trend in white wine prices could not be explained in the same way. Clearly, price analysis is more complex than these historical trends suggest. Especially with a good such as wine for which the aggregates shown here hide potentially significant quality changes. The trends for Ontario white wines are consistent with the quality change that has taken place for these wines. The 1970's "plonck" is being replaced by a higher quality white wine produced in Ontario. This evolution has been used as an explanation by the LCBO for the improvement in sales of domestic white wines relative to imports of white. Charts 3 and 5 illustrate this clearly by showing that all of the decline in white wine consumption in Ontario has been of imported whites despite a rising relative price of domestic whites.

The other factors that may have come to bear on the demand patterns are changes in demographics, changes in trade conditions and changes in the marketing of wine in Ontario. With respect to demographics, the trend in red is coincident with post war "baby boomers" reaching their mid forties. This is significant in light of the widely held belief that as we age we mature into an appreciation for the more complex qualities of red wines and move away from the simpler whites. This combined with the survey information produced by the Addiction Research Foundation in Ontario, that women are changing their traditional consumption pattern and are now increasing their alcohol consumption and converging with male behaviour, suggests that the market for reds has expanded in an uncommon way. And this expansion began in a dramatic way in the early 1990s as these demographic factors came to bear on demand. Also, it is significant that the beneficial red wine health information about the French Paradox would be of particular interest to the baby boomers precisely in the early 1990s when so many of them entered middle age when the probability of developing heart disease increases.

With respect to trade, the late 1980s saw the beginning of the phasing out of discriminatory taxation policy for imported wines that were implemented in order to protect the domestic, Ontario, wine industry. Import quotas on foreign grapes were adjusted and the 66% mark-up on imported wines (versus 1% on Ontario wines) was phased out. Although the industry is small and exports little, it has traditionally provided a significant supply of wine to Ontario consumers through the LCBO and through private winery stores which are typically, and conveniently, located at retail shopping centres and grocery stores. Imports are not available at these retail outlets. Charts 7 and 8 indicate that the trend is for consumers to purchase a greater proportion of domestic wines from retail outlets rather than LCBO stores. The trends of demand for domestic versus imported wines are different, especially for white wine, suggesting that the goods are perceived as different by consumers in Ontario.

Information Change

Two kinds of information change are incorporated into this study: advertising and health information. The health information has been provided through scholarly journal articles and newspaper articles and therefore, both these sources are reviewed here.

Advertising has been characterised in the economics literature as either informative or not. It has also been quantified in a number of ways including ad expenditures per capita or physical space devoted to ads. (Goddard, 1988) These debates are not taken up here. Assuming that there is a potentially informative role played by ads and as a preliminary attempt to include ads in the analysis of wine demand, we take a standard approach and include ad expenditures per capita on wine. Ad expenditures by brand for TV, radio, newspapers and magazines are aggregated for the study period into totals for red domestic, red import, white domestic and white import. The trends in Chart 10 indicate a significant decline in annual ad expenditures for both brand and "generic" wine ads. In this study, generic ads are defined to be those ads that are placed by countries and companies without identifying specific brands. Hence, ads promoting the "wines of France" and ads promoting "Lindeman wines" are included under generic advertising. Domestic wines are more heavily advertised than imports according to these data.

The remaining charts illustrate the trends in information about the relationship between wine and health. There has been a number of attempts to quantify the impact of health information on consumer demand for food with a range of variables used to proxy information and information change. Simple counts of informative articles and various weighting systems have been used to proxy health information. To our knowledge, none has used a scoring system such as the one described below. (Wilson and Marsh, 2000; Variyam et al, 1996; Robenstein and Thurman, 1996; Nivens and Schroeder, 2000; Nayga, 1997; Kinnucan et al 1997; Dodd and Morse, 1994; Cortez and Senauer, 1996; Chern et al, 1995; Chang and Kinnucan, 1991; Capps and Schmitz, 1991; Brown and Schrader, 1991)

Chart 11 indicates that based on a count of articles, there has been growth, and an increase in the growth, of health information linking wine consumption with health. Both Medline and Lexis/Nexis were searched for articles that linked wine with health. "Health" included specific diseases such as cardiovascular disease and cancer as well as total mortality. All diseases were searched in order to incorporate the influence of potentially negative information about wine as well as the positive information about wine consumption. For example, wine has been cited as a factor that potentially raises the risk of breast cancer in pre-menopausal women. This information needs to be balanced against the encouraging information that red wine might be good for cardiovascular disease. Chart 11 provides a simple count with no indication of positive or negative information. Some researchers have separated articles into positive and negative ones. They then use a difference in positive and negative in their analysis (Brown and Schrader, 1990, Kinnucan et al, 1997). The acknowledged problem with this approach is that the indicator that is developed can act

more like a simple time trend than specifically a health indicator. Also, there is the problem of the start being at zero when clearly, information existed before the start date.

Charts 12 and 13 illustrate the indicators that were developed for this study. Their construction is the same but one is developed using Canadian newspaper articles found through Lexis/Nexis and the other is based on Medline medical research paper abstracts. All articles were read, and all were scored according to how encouraging they were with respect to moderate wine consumption. Not all articles referred to red wine in particular and therefore 2 indicators were developed for each source with one based on reference to wine studies and one based on red wine studies most of which were a subset of the wine studies. The scoring was done on a 1-10 basis with a score of 10 meaning that wine is the most beneficial alcoholic beverage for reducing risk of disease while a score of 1 meaning that wine is the worst. A score of 5 means that wine is no better or no worse or not mentioned specifically. In other words, a score of 10 provides strongly encouraging information while a score of 1 provides strongly discouraging information and a score of 5 provides balanced, neutral information which would not be expected to give incentives to change behaviour. The reference point is “moderate” consumption. Although the methodology can be thought of as subjective, it is not a value judgement or personal perspective that guides the scoring. Much like the marking of student work, the person evaluating the kind of information that is portrayed in each article used a set of objective criteria in order to evaluate the net position of the article on the health benefits and costs of consuming wine. Details of the scoring system are available from the principal author.

In order to avoid the problems of starting values and mimicking simple time trends, these indicators were developed as ratios. The goal was always to develop an indicator that reflected the information received by consumers. Hence, negative information reduced the score below a neutral level while encouraging information increased it above. This was done by developing a ratio of actual score to the score that would have existed if all information had been neutral, ie with a score of 5 for each article. This is justified based on the goal of identifying information that changed behaviour because a score of 5 would not be expected to change behaviour. For example, if one article exists for a month and it is neutral, then the indicator for the month is a “1”. If the next month sees only one positive article with a score of “10” then the indicator for the month is equal to 5. Cumulative scores are used in order to incorporate a stock of knowledge.

Chart 12 indicates that the Medline Health Indicators for Red wine and wine in general are very similar with the Red Wine Health Information Indicator lying below the wine indicator. Comparing Charts 12 and 13 indicates that it would be unwise to rely only on medical research when health information is evaluated. Chart 13 illustrates the different information provided by the print media in Ontario that was particularly damaging to wine consumption. This happened in the 1980s due to a highly publicised scandal about the testing of wine by the LCBO. The Medline indicator does not reflect this local issue. For this reason, it was decided that the newspaper indicator provides a better reflection of the information that consumers receive in Ontario. This choice is supported by work by Houn et al (1995) who studied the degree to which

medical research pertaining to alcohol consumption and breast cancer in medical research journals was reported on in the popular press. They found a very low rate of reporting and selective reporting. They found that press reports were based on reports in only 7 of the 29 journals carrying relevant articles. 81% of relevant articles were not cited by the press. Since the goal here is to develop an indicator that reflects the amount and kind of information received by consumers, it was decided that press coverage, rather than medical research articles was the relevant base for the information that reaches consumers.

Chart 14 shows the final Red Wine Health Information Indicator that was used in this study. It is based on the newspaper articles that linked wine consumption to health from 1985 to 1998 using the scoring method described above. The indicator follows the expected trend by turning positive and increasing after January 1990. Also, there is a significant increase after January 1994.

The discussion above suggests that trade, demographics and health information changes all took dramatic turns in the late 1980s and early 1990s. Price and income changes have been more subtle suggesting that the dramatic changes in demand will be better explained by the demand curve shifters other than income.

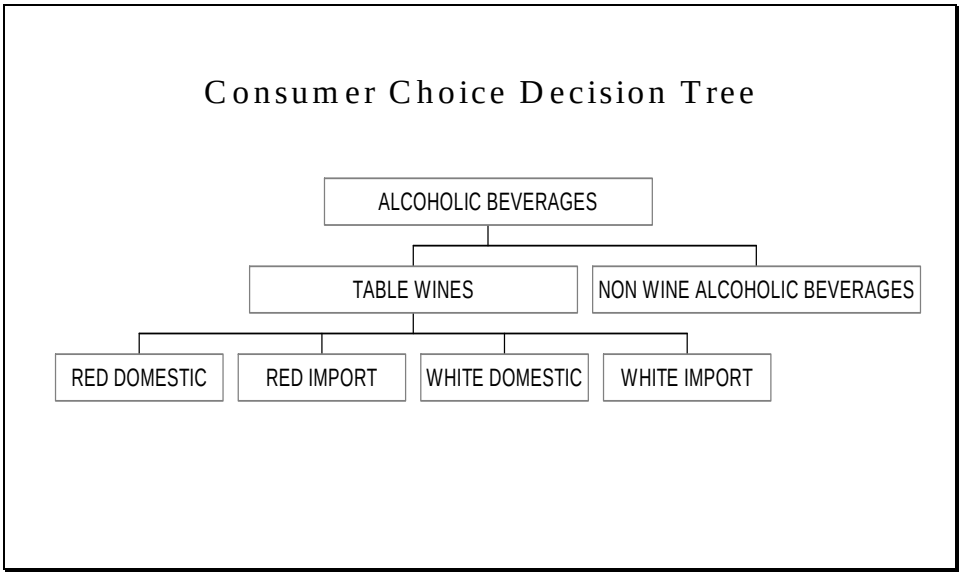
Hypotheses

- Factors other than relative prices and income have had a significant impact on wine consumption behaviour.
- Greater red wine consumption is consistent with an aging, more “sophisticated” alcohol consuming population.
- Health information changes have had a significant independent effect on changing behaviour in the Ontario wine market.
- Total wine consumption has not been measurably affected by habit formation but habits affect red and white consumption separately.

Habit formation is referred to here particularly because of the addictive characteristic of alcoholic beverages. However, it is not expected that we will find a major impact of habit formation given that total wine consumption has declined while the number of wine drinkers has increased significantly.

Model

A two-staged budgeting approach is taken for the demand for wine. This is based on the consumer choice decision tree given below.



Assuming Weak Separability between Table Wine and Non Wine Alcoholic Beverages, the demand for wine, expressed in expenditure form is assumed to be of the double log form shown below. Work by Clements et al (1997) suggests that it is reasonable to assume weak separability between wine and other alcoholic beverages.

$$\ln(TEXP_w) = f(\ln(Ads), \ln(Health), \ln(P_{qw}), \ln(P_{Pnonalc)}), \ln(Y), \ln(Age), \ln(TEXP(-1), MD)$$

Where: TEXP is total expenditure on wine per capita

TEXP(-1) represents habit formation

Ads is total advertising expenditure per capita

Health is the Health Information Indicator

P_{QW} - quantity weighted price index for all wine derived from LCBO data

for red and white wines

P_{nonALC} is Consumer Price Index for non wine alcoholic beverages

Y is per capita wages and salaries

MD are monthly dummies

AGE is proportion of the population over 15 which is over 45 ie +45/+15

per capita values use population over 15 years of age

For the second stage, it is assumed that consumers are utility maximisers and their indirect utility function is of the translog form. (Pollak and Wales, 1992) This is shown below.

$$\ln V = \alpha_0 + \sum \alpha_i \ln(P_i / Y) + 1/2 \sum \sum \beta_i \ln(P_i / P) \ln(P_j / Y)$$

This expression shows only prices but the model can be extended to include the variables included in the stage one equation. (Goddard, 1988) With advertising assumed to be a separate variable in the utility function and with the other variables (as defined above) included, the expenditure share equations (w) are derived using Roy's Identity as the following.

$$w_i = \frac{\alpha_i + b_i \ln AGE + c_i \ln(VOL_i(-12)) + \sum_j \beta_{ij} \ln(P_j / Y) + \sum_j a_{ij} \ln Ads + h_i \ln Health}{\sum_k \alpha_k + \sum_k b_k AGE + \sum_k c_k \ln(VOL_k(-12)) + \sum \sum \beta_{kj} \ln(P_j / Y) + \sum \sum a_{kj} \ln Ads + \sum_k h_k \ln Health}$$

Imposing symmetry, adding up and maintaining a hypothesis of homotheticity requires the following respective constraints on the system.

$$\beta_{ij} = \beta_{ji}, \qquad \sum_k \alpha = -1, \qquad \sum_j \beta_{ij} = 0, \qquad where\, k = 1,...n\ for\, n\ goods.$$

And elasticities are of the following form:

$$E_{ii} = -1 + \frac{\beta_{ii} / w_i - \sum_j \beta_{ji}}{D} + w_i E_{1st\ stage}$$

Which is the own price elasticity. Other elasticities are similar in structure with the Denominator, D, equal to the denominator of the expenditure share equation. The variables are in per capita form under the assumption of the average consumer being a typical consumer. Total expenditure is endogenized between the first and second stage so that demand for individual wine types at the second stage is responsive to changes in total expenditure allocated to wine at the first stage. "E 1st Stage" is the elasticity from the first stage.

There are 4 wine types and therefore 3 equations are estimated – Red domestic, red import, white domestic – with the parameters for white import being established using the adding up conditions.

Results

The following tables show the results. T-statistics are in brackets below estimated elasticities. R^2 for stage one (total wine expenditure), red domestic, red imports and white domestic are .81, .98, .94, and .81 respectively. White imports was the equation left out of the simultaneous 4 equation estimation. For the second stage, own price elasticities for red and white imports indicate elastic demand which is consistent with the cross price elasticity which indicates that they are significant substitutes for each other. Hence, relative price change will cause substitution between imported red and white but domestic reds and whites are gross complements. Other researchers have found this as well and explain it by saying that wine is bought in bundles of different types. (Andrikopoulos et al, 1997, Larue et al, 1991) It could be that wine is purchased in bundles for consumption in mixed bundles for consumption by more than one individual or for more than one purpose. This would make sense for wine in particular because it is typically consumed with meals and for entertaining. In these situations, consumers would be buying to match meal courses, types of food and a range of tastes. Hence, it is conceivable that a rise in price of one kind of wine will reduce the marginal volume consumed of the other type for that bundle consumed. White domestic wine presents difficulties with a positive own price elasticity which is significant, and a significant negative cross price elasticity with red imports which is not well explained. Other researchers have also found the same difficulty with Ontario whites. Explanations could be that quality improvements for Ontario whites have been relatively greater than for all other wine types and that these changes have led to increased

consumption. Hence, greater consumption despite rising prices may be a result of real quality improvements that are not reflected by the aggregate called "domestic white wine" in this analysis. Also, it may be the case that aggressive marketing of domestic whites has increased demand through a shift in tastes despite rising prices. Both effects are likely in Ontario given the market situation reviewed above.

Price Elasticities (Marshallian - at sample means)

	RED DOMESTIC	RED IMPORT	WHITE DOMESTIC	WHITE IMPORT
RED DOMESTIC	0.43 (1.48)	-0.07 (0.24)	-1.63* (6.31)	0.27 (0.82)
RED IMPORT	-0.02 (0.14)	-1.48* (7.88)	-0.42* (2.97)	0.94* (4.06)
WHITE DOMESTIC	-0.46* (4.17)	-0.40* (2.86)	0.33* (2.92)	-0.43* (4.12)
WHITE IMPORT	0.06 (0.39)	0.54* (2.75)	-0.25 (1.83)	-1.30* (7.74)

Note * indicates significant at .95 level.

Stage 1 results given below indicate that age is a significant factor affecting wine consumption with a positive impact. Wine and all other goods are complements and the own price elasticity for wine is virtually zero.

Stage 1

Wine Elasticities (*denotes significance at .95 level)

1.29* AAGE

-0.92* Non alcohol price index

-0.01 Total Ads

0.03* Price of Wine

0.02 Lagged consumption

* indicates significance at .95 level.

Further results are given below for the two stages when estimated together. Results indicate that red wine consumption and aging have been correlated strongly: the red wine age elasticity is largest and positive and white wine age elasticity becomes insignificant. The Health Indicator elasticity is positive and elastic for red wine and negative and mainly inelastic for white wine indicating that red wine health benefit information has encouraged consumers to consume less white and more red but reduction of white has been less elastic than the increase in red. This could be due to many realistic circumstances such as the inability to drink red wine due to migraines and the resistance to change old habits due only to health information. Own price elasticities are reproduced below in order to highlight the relatively greater size of the Age and Health Information Indicator elasticities. Although a Habit formation "elasticity" is shown an elasticity of this sort makes little sense. It is shown to indicate the relative sizes of the impact of price, health information, age and habits.

The goods are income elastic but because homotheticity is maintained, income elasticities estimates are all equal and equal to 1 plus the stage one elasticity. However, the magnitude is comparable to other alcohol studies and it is significant. (Lariviere et al, 2000; Andrikopoulos et al, 1997; Larue et al, 1991, Duffy, 1987 and 1995; Fuss and Waverman, 1987)

Elasticities

	Age	**Health Index**	**Own Price**	**Habit Formation**	**Income***
Red Domestic	**5.46 (7.45)**	**1.94 (3.95)**	**0.43 (1.48)**	**0.46 (3.12)**	**1.14 (8.80)**
Red Import	**2.82 (4.11)**	**1.10 (6.01)**	**-1.48 (7.88)**	**-0.33 (3.03)**	**1.14 (8.80)**
White Domestic	**1.15 (1.89)**	**- 1.07 (5.46)**	**0.33 (2.92)**	**0.31 (1.94)**	**1.14 (8.80)**
White Import	**0.13 (0.23)**	**- 0.37 (4.40)**	**-1.30 (7.74)**	**-0.02 (0.13)**	**1.14 (8.80)**

*** Homotheticity assumed throughout.**

Advertising elasticities were found to be virtually insignificant. Total wine ad elasticity in stage one is insignificant and the only significant stage two ad elasticities were for red and white imports and domestic white (-0.01, with t-stats between 1.76 and 1.95). Before these results are accepted more work needs to be done with different definitions of advertising. Also, it may be the case that these results are correct if there is little impact of ads between types of wine – red vs white. This is a standard finding in the wine demand literature with insignificant ad elasticities and negative ad elasticities (Lariviere et al 2000; Nelson, 1999; Duffy, 1987 and 1995). However, this result would not preclude their being significant ad effects between brands.

Conclusions: Hypotheses Revisited

The evidence suggested by the analysis given here, indicates the following responses to the hypotheses posed by this research:

Yes Factors other than relative prices and income have had a significant impact on recent wine consumption behaviour.

Yes Greater red wine consumption is consistent with an aging, more "sophisticated" wine consuming public. Aging of the population seems to provide an explanation for most of the trend wine consumption in Ontario.

Yes Wine Health Information has been estimated to have had a significant independent impact on wine consumption behaviour (preferences) by type of wine.

Yes Total (stage 1) wine consumption has not been measurably affected by habit formation but habits appear to have affected red and white consumption separately.

Also, this work has revealed an interesting anomaly to the world wine trends: While it is true that white has been on the wane and red on the rise worldwide and in Ontario, Ontario presents some interesting exceptions with domestic white wines enjoying a significant growth.

This research set out to determine a way to reflect the changes in wine health information in a quantifiable way through a wine health information index. The newspaper index developed and tested here has been estimated to have provided a significant and nontrivial explanation of the changing patterns of wine consumption in Ontario. For red imports the impact of information was estimated to be similar to the impact of prices and one third the impact of the aging of the population.

Worth noting is that health information disseminated through newspapers was estimated to be a significant determinant of demand for wine by colour of the wine, while media ads were not. This result is consistent with many other studies that indicate that consumers are more likely to respond to information that they view as neutral and therefore nonproprietary. The implications for industry ad behavioiur are suggestive only and require further analysis on a brand-by-brand basis. Also, these results hold implications for government policy which may suggest a proactive social marketing role for government if it is in the public good to encourage wine consumption in order to promote good health. Of course this issue is controversial and the work presented here is but one piece of input to a policy that might encourage alcohol consumption in society.

In conclusion, the implication of the work presented here is that information matters in a quantifiable and significant way – people appear to have received the health information generated by medical research, they changed their tastes and then they have responded through changing patterns of consumption.

Further Work

These are some of the issues that deserve attention in the study of wine demand:

There are better ways to proxy price for aggregate goods and these should be investigated. For example, a Fisher price index could be used. There is no measure of quality incorporated here and this is surely a significant factor to be included especially for estimating price elasticities. This matter needs to be addresses especially for white domestic wine. Other information variables could be incorporated. For example, such programs as discouraging ads by MADD – Mothers Against Drunk Drivers - may be influencing demand for wine. Also, the translog may not be the best choice of flexible functional form – others need to be tried. And the incorporation of curve shifters may be better facilitated with precommitted quantities or scaling. (Alston, Chalfant and Piggott, 2001)

Chart 1

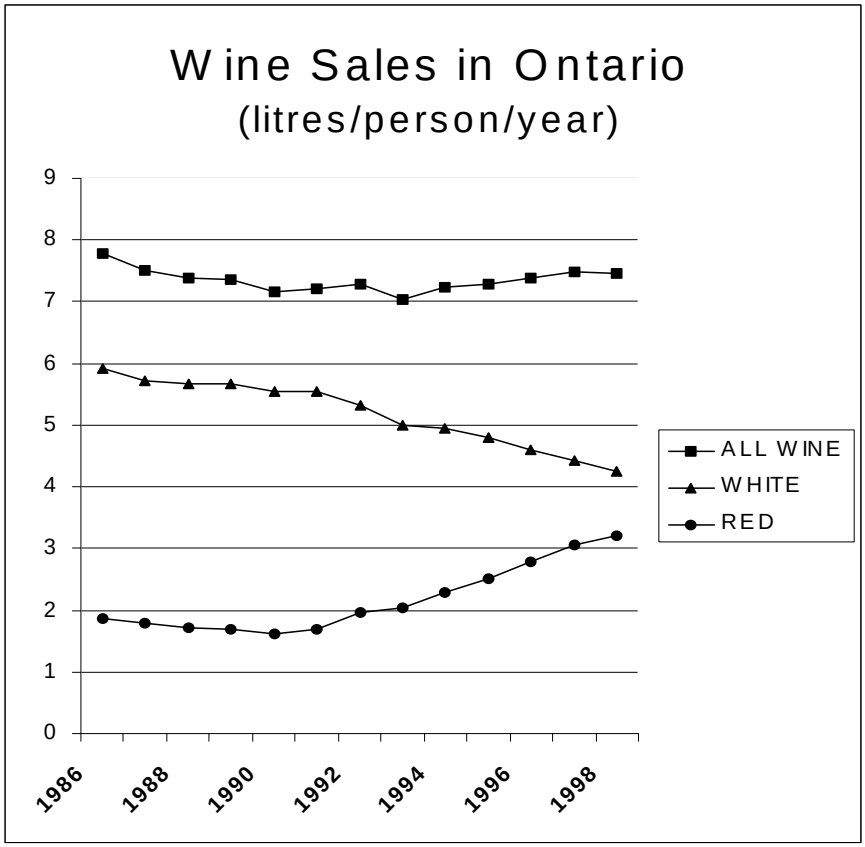


Chart 2

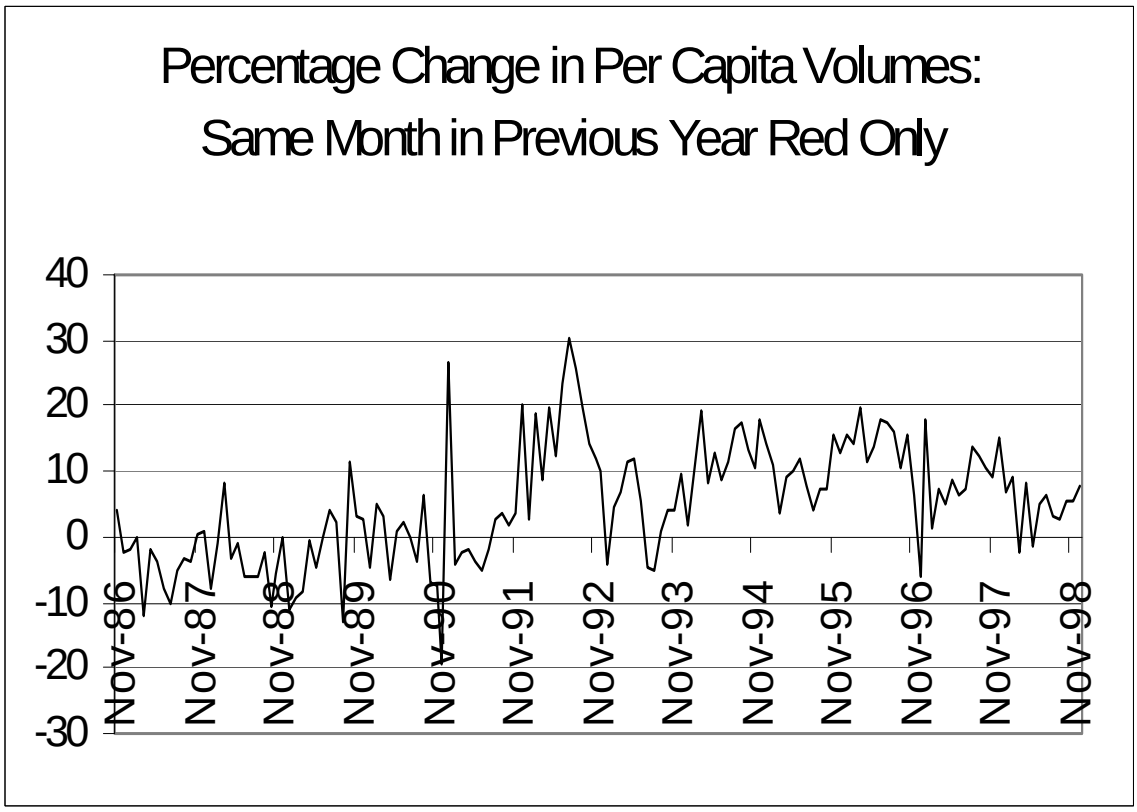


Chart 3

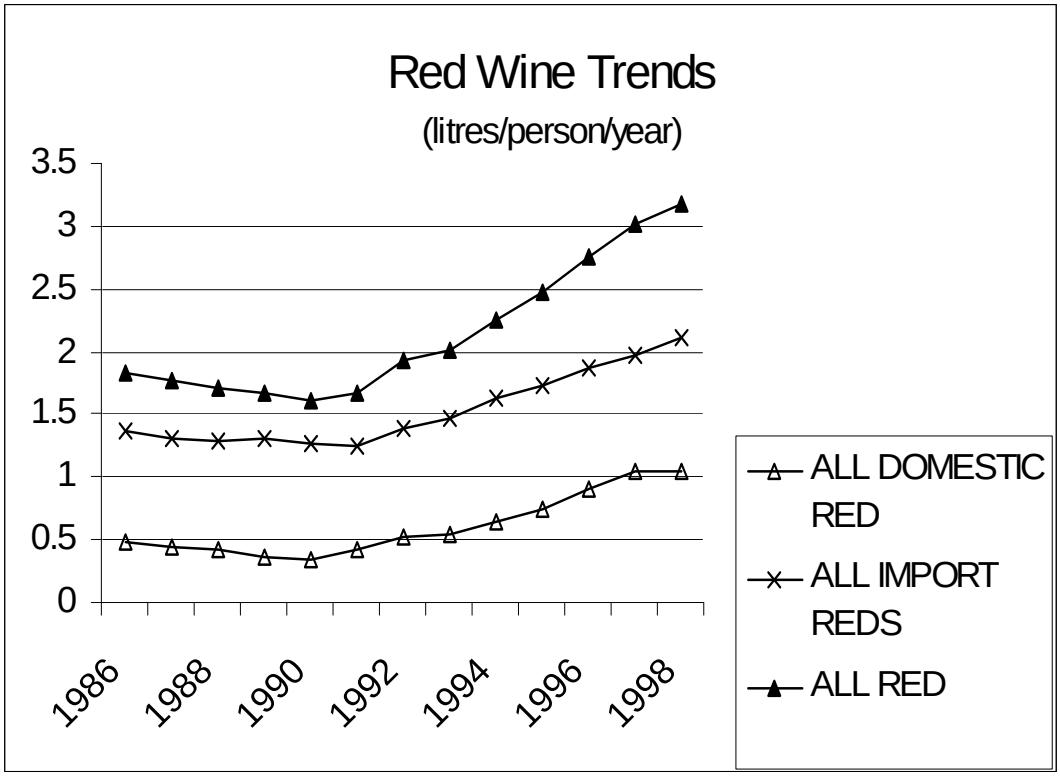


Chart 4

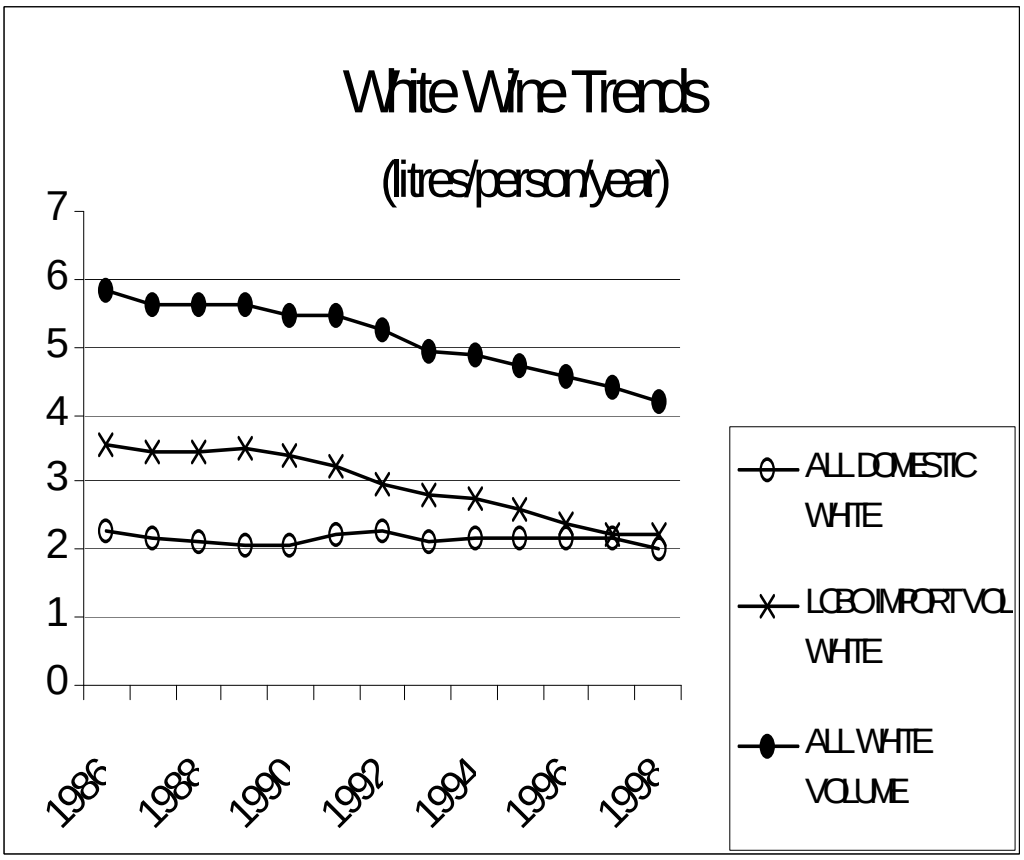


Chart 5

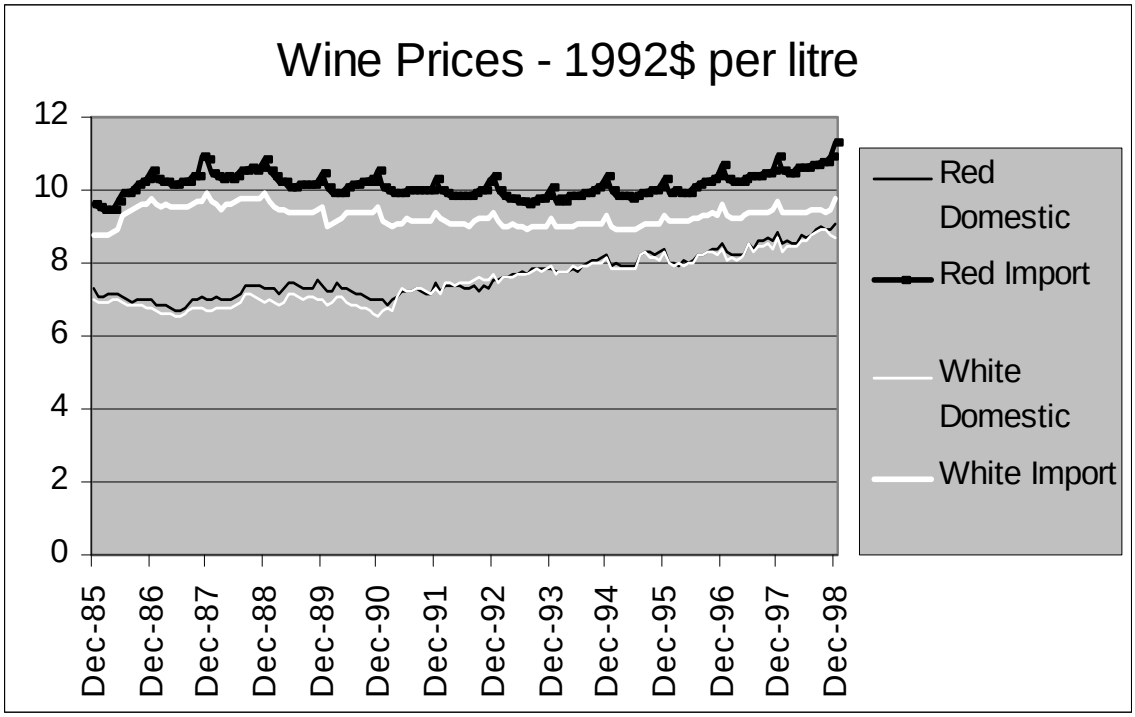


Chart 6

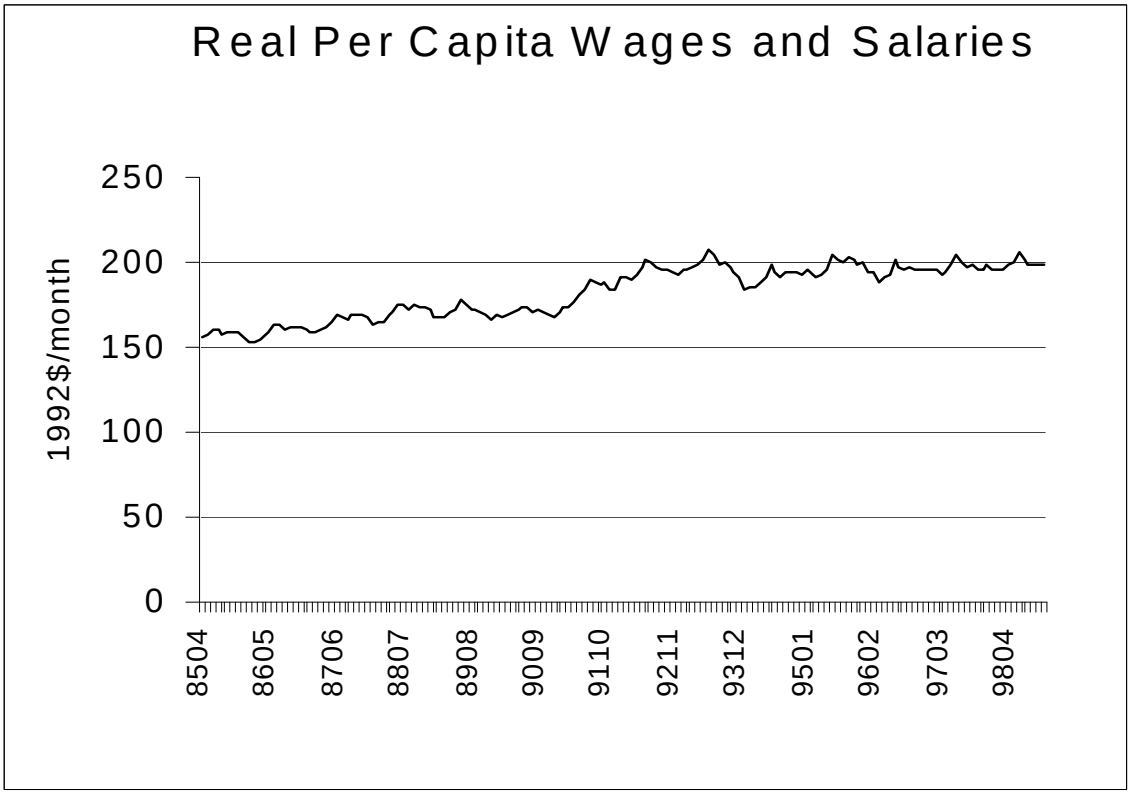


Chart 7

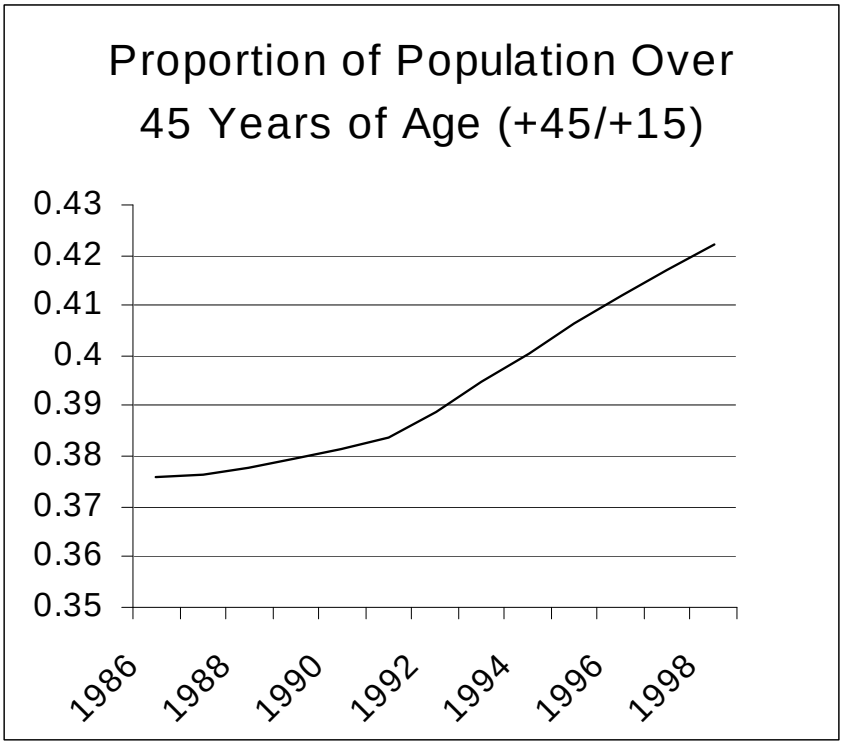


Chart 8

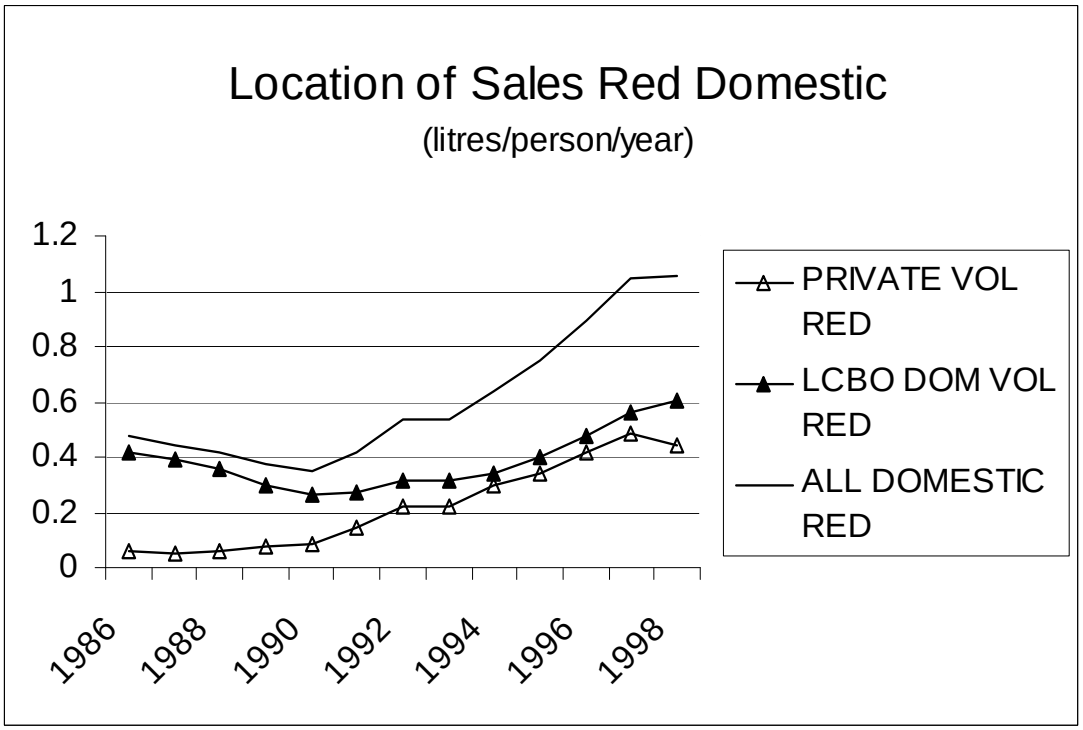


Chart 9

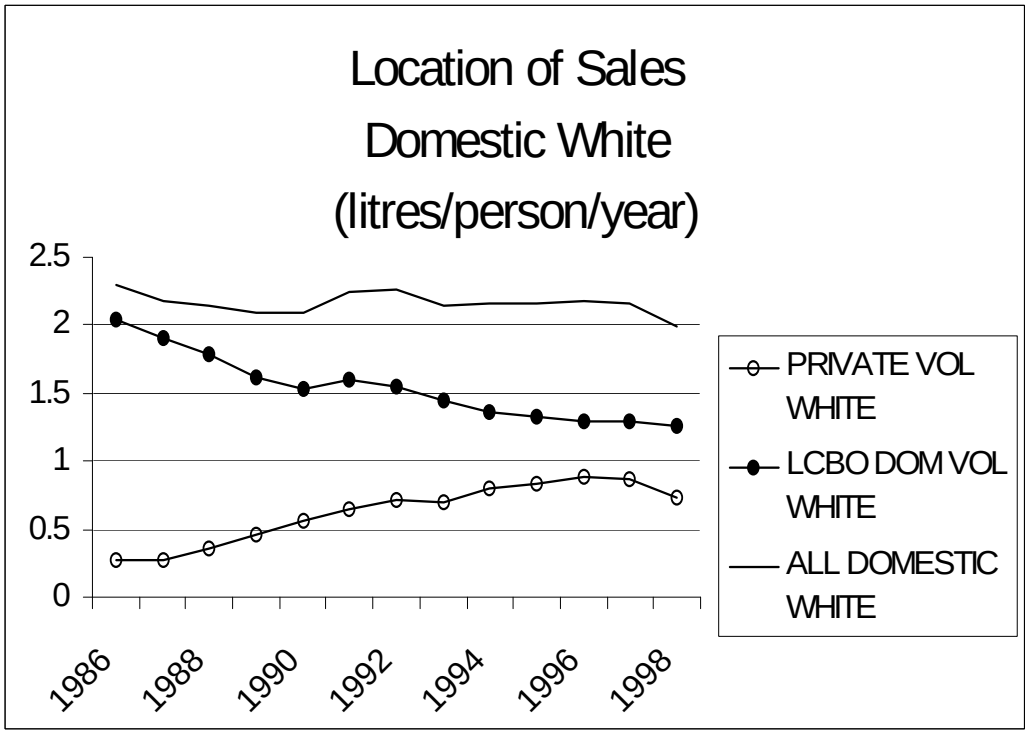


Chart 10

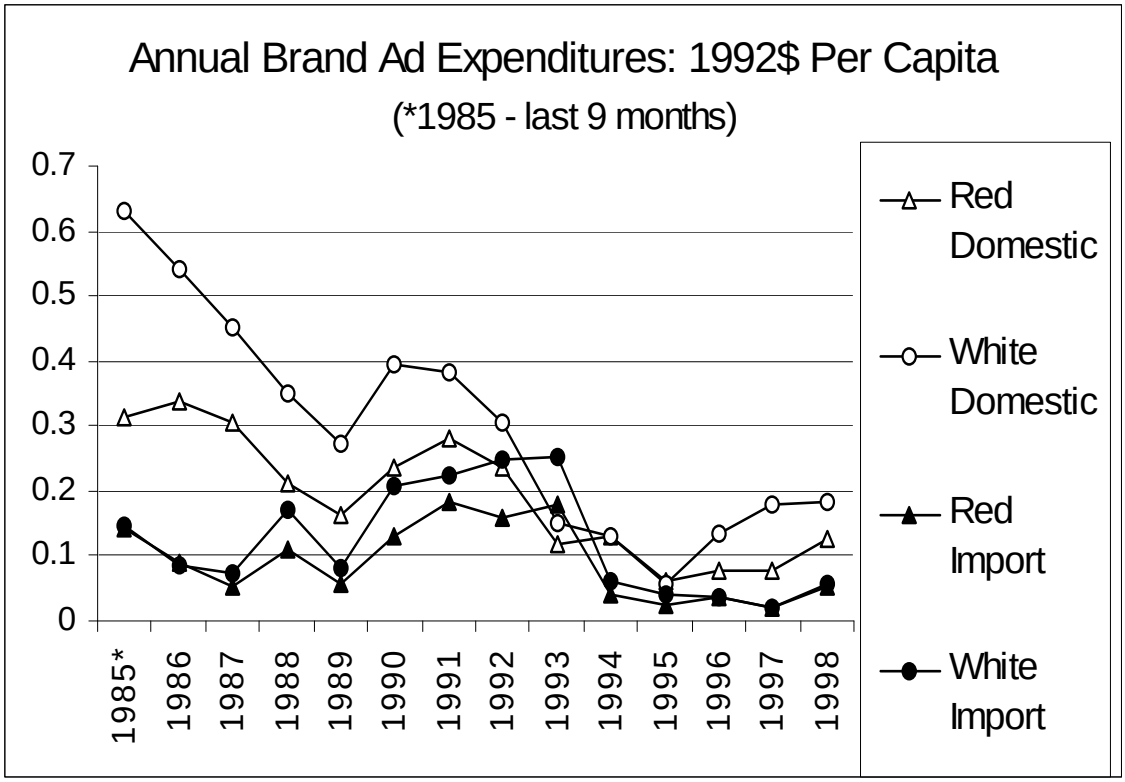


Chart 11

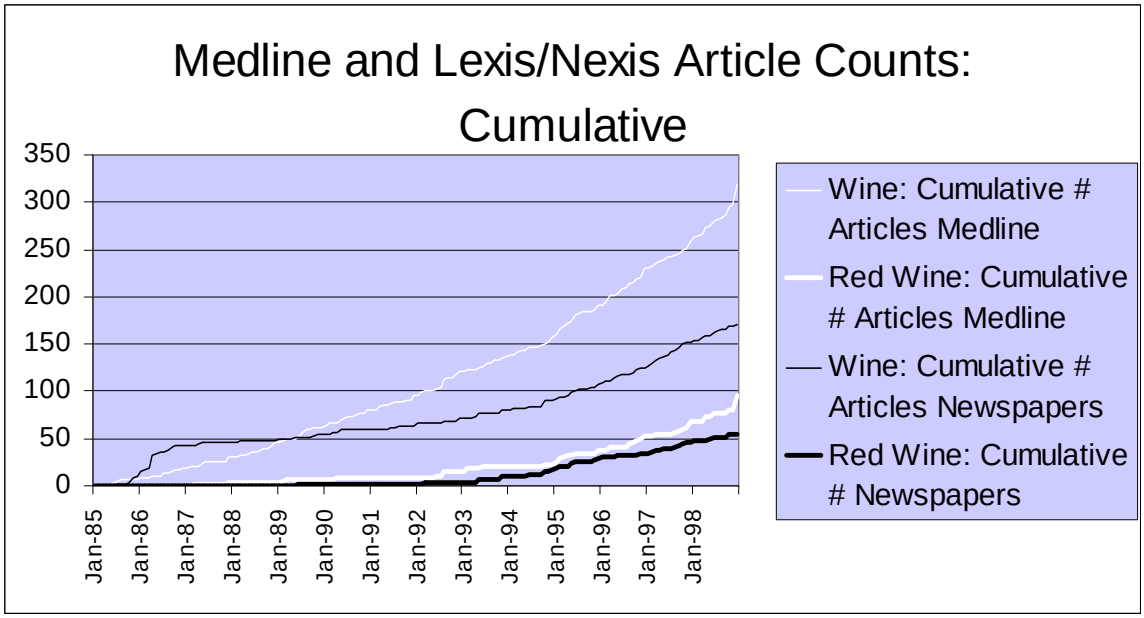


Chart 12

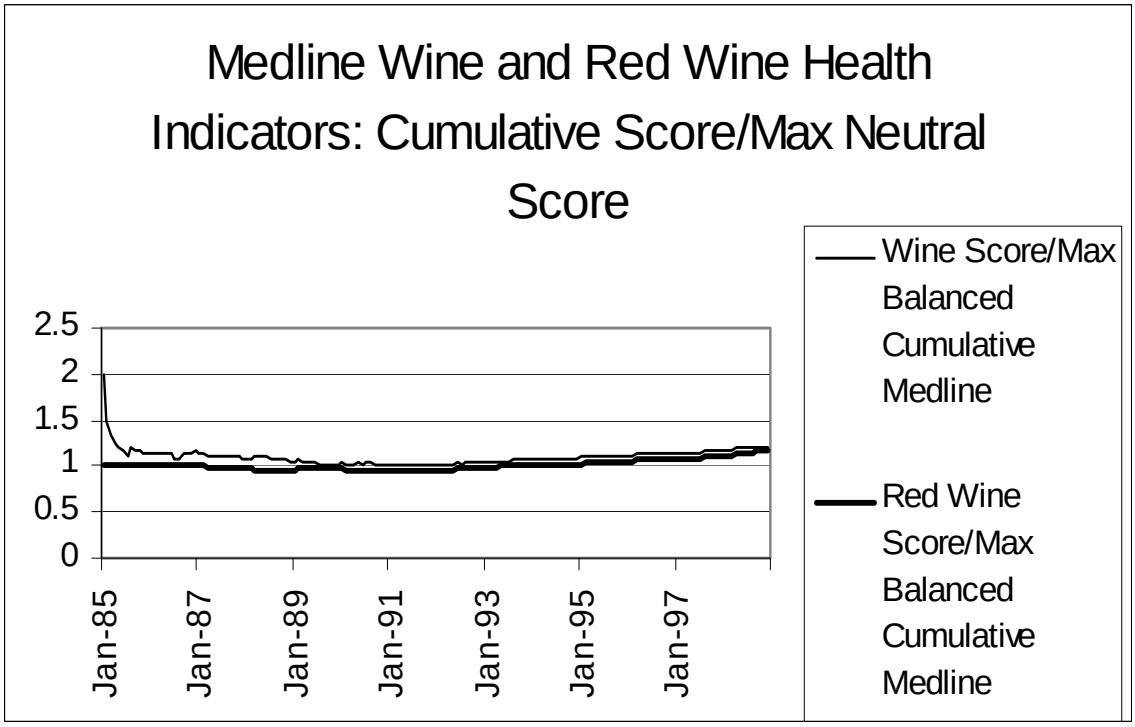


Chart 13

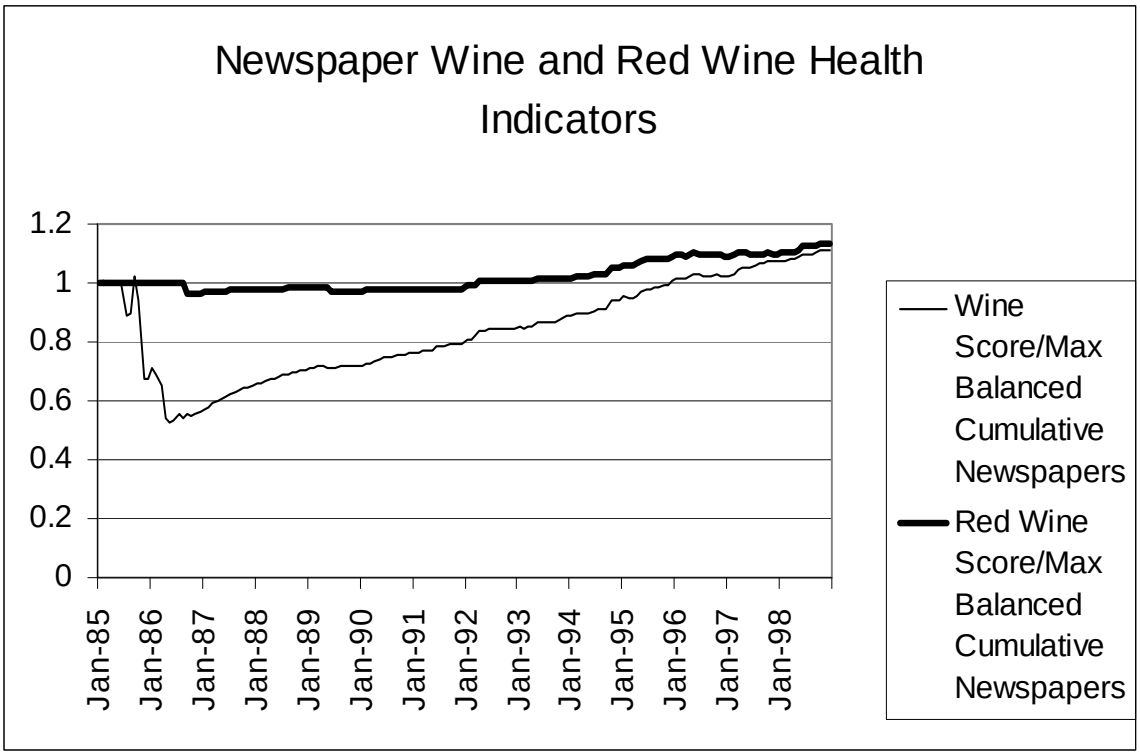
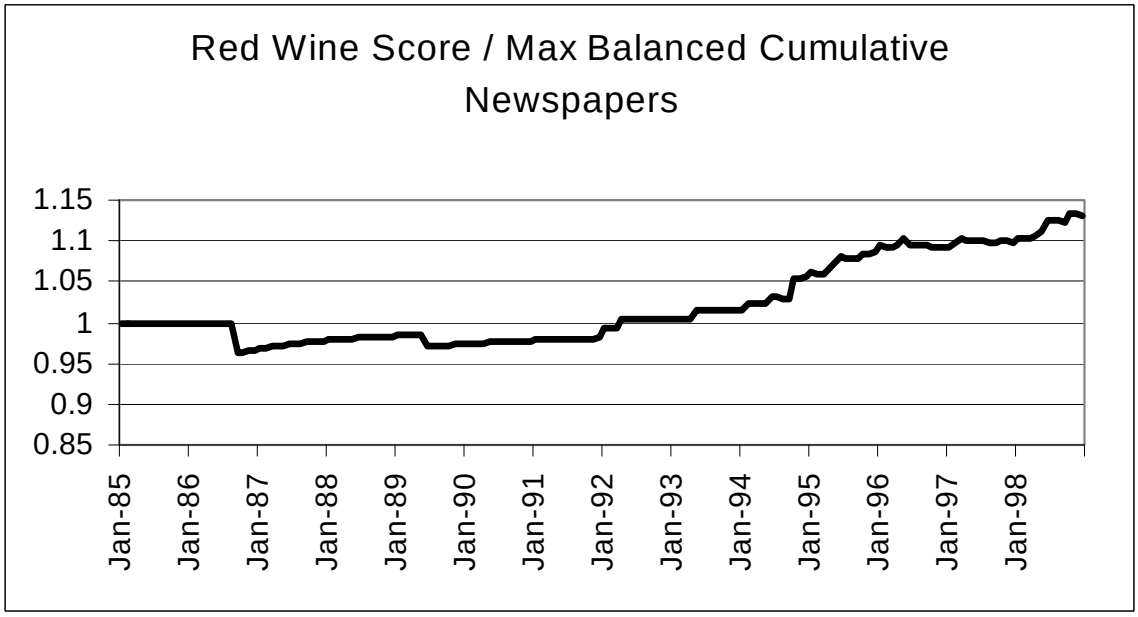


Chart 14



References

Alston, Julian, M, James A. Chalfant and Nicholas E. Piggott (2001) "Incorporating demand shifters in the Almost Ideal Demand System", Economics Letters 70:73-78.

Andrikopoulos, Andreas A., James A Brox and Emanuel Carvalho (1997) "The demand for domestic and imported alcoholic beverages in Ontario, Canada: a dynamic simultaneous equation approach". *Applied Economics* 29: 945-953.

Brown, Deborah J. and Lee F. Schrader (1990) "Information on Cholesterol and Falling Shell Egg Consumption." *American Journal of Agricultural Economics* 73: 548-555.

Capps, Oral Jr., and John D. Schmitz (1991) "A Recognition of Health and Nutrition Factors in Food Demand Analysis." *West. J. Agr. Econ.* 16:21-35, July.

Chalfant, James A. and Julian M. Alston (1988) "Accounting for Changes in Tastes." *J. Polit. Econ.* 96:391-410, April.

Chang, H. S. and H. W. Kinnucan (1991) "Advertising, Information, and Product Quality: The Case of Butter." *American Journal of Agricultural Economics* 73: 1195-1203.

Chern, Wen S. and Jun Zuo (1995) "Alternative Measures of Changing Consumer Information on Fat and Cholesterol." Paper presented in the Annual Meeting of the American Agricultural Economics Association, Indianapolis, Indiana, August 6-9.

Chern, W. S., E. T. Loehman, and S. T. Yen (1995) "Information, Health Risk Beliefs, and the Demand for Fats and Oils." *The Review of Economics and Statistics* 76: 555-564, August.

Clements, Kenneth W and Henri Theil (1987) *Applied Demand Analysis: Results from System-Wide Approaches*. Cambridge:Balliner.

Clements, Kenneth W, Wana Yang and Simon W. Zheng (1997) "Is Utility Additive? The case of alcohol" *Applied Economics* 29: 1163-1167.

Cortez, Rafael and Ben Senauer (1996) "Taste Changes in the Demand for Food by Demographic Groups in the United States: A Nonparametric Empirical Analysis." *Amer. J. Agr. Econ.* 78:280-89, May.

Dodd, Tim H. and Steve Morse (1994) "The Impact of Media Stories Concerning Health Issues on Food Product Sales", *Journal of Consumer Marketing*, 11 (2): 17-24.

Duffy, Martyn (1995) "Advertising in Demand Systems for Alcoholic Drinks and Tobacco: A Comparative Study," *Journal of Policy Modeling* 17(6): 557-577.

Duffy, M.H. (1987) "Advertising and Interproduct Distribution of Demand: A Rotterdam Model Approach." *European Economic Review* 3: 1085-70.

Fuss, M. and L. Waverman (1987) "The demand for alcoholic beverages in Canada: an application of the almost ideal demand system". University of Toronto, Department of Economics and Institute for Policy Analysis, Working Paper 8714.

Goddard, E. W. (1988) "Modeling advertising effects in a systems framework". Department of Agricultural Economics and Business, University of Guelph, Working Paper 88-1.

Grossman, M. (1972) "On the Concept of Health Capital and the Demand for Health." *Journal of Political Economy* 80: 223-255.

Heien, Dale and Eric N. Sims (2000) "The impact of the Canada-United States Free Trade Agreement on U.S. wine exports". *Amer. J. Agr. Econ.* 82: 173-182, February.

Houn, Florence, Mary A. Bober, Elmer E. Huerta, Stephen D. Hursting, Stephen Lemon, Douglas L. Weed (1995) "The Association between alcohol and breast cancer: popular press coverage of research." *The American Journal of Public Health*, 72 (8): 1082-1085, August.

Kinnucan, Henry W., Hui Xiao, Chung-Jen Hsia, and John D. Jackson (1997) "Effects of Health Information and Generic Advertising on U.S. Meat Demand." *Amer. J. Agr. Econ.* 79:13-23, February.

Lariviere, Eric, Bruno Larue and Jim Chalfant (2000) "Modeling the demand for alcoholic beverages and advertising specifications". *Agricultural Economics* 22:147-162.

Larue, Bruno, Alan Ker and Lorrie MacKinnon (1991) "The demand for wine in Ontario and the phasing-out of discriminatory mark-ups". *Agribusiness* 7(5): 475-488.

Nayga, R. M. (1997) "Impact of Sociodemographic Factors on Perceived Importance of Nutrition in Food Shopping." *Journal of Consumer Affairs* 31: 1-9.

Nelson, Jon P. (1999) "Broadcast Advertising and U.S. demand for alcoholic beverages". *Southern Economic Journal* 65(4): 774-790.

Nivens, Heather and Ted Schroeder (2000) "Beef demand after BSE: how food safety information affects consumer demand". Paper presented at the 2000 American Agr Ecns Assoc Meetings, Tampa, Florida.

Robenstein, R. G. and W. N. Thurman (1996) "Health Risk and the Demand for Red Meat: Evidence from Futures Markets." *Review of Agricultural Economics* 18: 629-641

Pollak, R.A. and T.J. Wales (1992) *Demand System Specification and Estimation*. Oxford University Press, New York, NY.

Variyam, J. N., J. Balylock, and D. Smallwood (1996) "A Probit Latent Variable Model of Nutrition Information and Dietary Fiber Intake." *American Journal of Agricultural Economics* 78: 628-639.

Christine A. Wilson and Thomas L. Marsh, "The Impacts of Demographics and Health Information on Meat Demand" 2000 SAEA Annual Meeting Selected Paper, Jan 6, 2000.